THE HASHEMITE KINGDOM OF JORDAN

ANNUAL OF THE DEPARTMENT OF ANTIQUITIES OF JORDAN

Volume 46

JUM'A KAREEM MEMORIAL VOLUME

'AMMAN
2002

Annual of the Department of Antiquities of Jordan
Published by the Department of Antiquities, P.O. Box 88, 'Amman 11118 – Jordan

Editorial Board:
Dr. Fawwaz Al-Khraysheh
Dr. Khairieh 'Amr
Dr. Fawzi Zayadine
Dr. Rafe Harahsheh

Publications Unit:
Dr. Khairieh 'Amr
Hanadi Taher
Samia Khouri
Sofinaz Kabajah

Special thanks to Prof. Genevieve Dollfus for revising the French texts

Annual Subscription:
15 Jordanian Dinars (for Jordan)
50 US Dollars/ 50 Euros (elsewhere, inclusive of surface mail)

Computer Layout: Al-Wisam Printing Services
Printing: Al-Qairawan Printing Press

Jordan National Library Deposition No. 421/2003/D

Opinions expressed in the articles do not necessarily represent the policies of the Department of Antiquities of Jordan

All articles submitted for publication should follow the "Notes for Contributors", which are printed at the beginning of this volume.

NOTES FOR CONTRIBUTORS

The *Annual of the Department of Antiquities of Jordan* is devoted primarily to studies of the cultural heritage of Jordan and the neighbouring regions, including the reports and results of archaeological fieldwork. The deadline for submission of contributions is 31 May for publication in the volume of the same year.

Contributions should be sent to: Editor, ADAJ, Department of Antiquities of Jordan, P.O. Box 88, Amman - Jordan; and if sent by courier Tel: 4644 336. Queries may be addressed to the editor by Fax: +962-6-4615 848, or e-mail: publication.doa@nic.net.jo.

- **Language**: Contributions may be in Arabic or English.

- **Preparation of the Manuscript**: The manuscript should be no more than 15,000 words (around 30 pages) excluding bibliography, illustrations and figures captions. Please include name(s) and address(es) of the author(s) as you would like them to appear in the publication at the end of the manuscript. The order of the manuscript should be:
1. title of the contribution and name(s) of author(s);
2. body of text;
3. address(es) of authors;
4. bibliography/ references;
5. footnotes (if any);
6. captions of figures.

- **Submission of the Text**: should be on computer diskettes, Macintosh or PC compatible, as well as double-spaced hard copy. For Macintosh diskettes include a copy of the document saved as "text only" on your diskette. For PC compatible diskettes include a copy saved as "Rich Text Format". The manuscript should be submitted in final form with no substantive changes expected later.

- **Illustrative Material**: should accompany the manuscript at the time of submission. All illustrations (drawings as well as photographs) should be referred to in the text as "Fig." in consecutive order. Figures should not exceed 17 x 22cm in size. Illustrations in electronic form may be submitted, preferably in .jpg format (figures scanned into Word documents are not acceptable). The resolutions should be 250 pixels/in for photographs and 600 pixels/in for line drawings.

- **Foreign Words and Italicised Words**: should be indicated by underlining in the manuscript. To avoid misleading orthography, Arabic words and site names used in an article in another language should appear in Arabic and transcribed with diacritical signs and translated in terms of the system of transliteration from Arabic shown in recent volumes of *ADAJ*. Diacritical signs may be inserted by hand on the hard copy and need not be included on the diskette.

- **Footnotes**: lengthy footnotes are to be avoided and where at all necessary kept at a minimum. Bibliographical references are to be included in brackets in the text, e.g. (Brown 1989: 32-35).

- **Bibliography/ References**: should appear at the end of the contribution in alphabetical order. The following format should be utilized:

For articles:

Quintero, L.A. and Wilke, P.J.
1998 Archaeological Reconnaissance in the al-Jafr Basin, 1997. ADAJ 42: 113-122.

For collective volumes:

Gebel, H.G.K. and Bienert, H.-D.

1997 Ba'ja: A LPPNB Regional Center Hidden in the Mountains North of Petra, Southern Jordan. Results from the 1997 Investigations. Pp. 221-262 in H.G.K. Gebel, Z. Kafafi and G.O. Rollefson (eds.), The Prehistory of Jordan II. Perspectives from 1997. Berlin: ex oriente.

For monographs:

Peacock, D.P.S.

1988 Pottery in the Roman World: An Ethnoarchaeological Approach. London and New York: Longman.

- **Offprints**: 25 offprints are allocated for each contribution. Further copies may be ordered at cost price.

- **Copyright**: remains with the individual authors.

System of Transliteration from Arabic

Consonents

ء	' (except where initial)	ض	ḍ
ب	b	ط	ṭ
ت	t	ظ	ẓ
ث	th	ع	ʿ
ج	j	غ	gh
ح	ḥ	ف	f
خ	kh	ق	q
د	d	ك	k
ذ	dh	ل	l
ر	r	م	m
ز	z	ن	n
س	s	هـ	h
ش	sh	و	w
ص	ṣ	ي	y
ـة ة	a or at	ـه ه	a or ah

Long Vowels

ا، ى	ā
و	ū
ي	ī

Short Vowels

ـَ	a
ـُ	u
ـِ	i

Common Nouns

تل	Tall	دير	Dayr
جبل	Jabal	عين	ʿAyn
خربة	Khirbat	وادي	Wādī

List of Abbreviations

AA	Archäologischer Anzeiger
AAAS	Les Annales Archéologiques Arabes Syriennes
AASOR	Annual of the American Schools of Oriental Research
ACOR	Newsletter American Center of Oriental Research Newsletter
ADAJ	Annual of the Department of Antiquities of Jordan
AfO	Archiv für Orientforschung
AJA	American Journal of Archaeology
AUSS	Andrews University Seminary Studies
BA	Biblical Archaeologist
BAR	British Archaeological Reports
BASOR	Bulletin of the American Schools of Oriental Research
BIFAO	Bulletin de l'Institut Français d'Archéologie Orientale
CIS	Corpus Inscriptionum Semiticarum
CRAI	Comptes Rendus de l'Académie des Inscriptions et Belles Lettres
EI	Encyclopaedia of Islam
ESI	Excavations and Surveys in Israel
IEJ	Israel Exploration Journal
JA	Journal Asiatique
JAOS	Journal of the American Oriental Society
JFA	Journal of Field Archaeology
JGS	Journal of Glass Studies
JMA	Journal of Mediterranean Archaeology
JNES	Journal of Near Eastern Studies
JPOS	Journal of the Palestine Oriental Society
JRA	Journal of Roman Archaeology
JRGZM	Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz
JRS	Journal of Roman Studies
LA	Liber Annuus
LIMC	Lexicon Iconographicum Mythologiae Classicae
MA	Mediterranean Archaeology
OpAth	Opuscula Atheniensis
OpRom	Opuscula Romana
PEFQS	Palestine Exploration Fund Quarterly Statement
PEQ	Palestine Exploration Quarterly
QDAP	Quarterly of the Department of Antiquities in Palestine
REG	Revue des Études grecques
RÉS	Répertoire d'épigraphie sémitique
RB	Revue Biblique
SHAJ	Studies in the History and Archaeology of Jordan
WA	World Archaeology
ZDPV	Zeitschrift des Deutschen Palästina-Vereins

Table of Contents

In Memoriam: Ali Al-Jabiri
Fawzi Zayadine 11

Qā' Abū Ṭulayḥa West, 2001. An Interim Report of the Fifth Season
Sumio Fujii 15

A Brief Note on the 2001-2002 Winter Season Survey of the al-Jafr Basin in Southern Jordan
Sumio Fujii 41

Archaeology and Environment of the Dead Sea Plain: Preliminary Results of the Second Season of Investigations by the Joint La Trobe University/ Arizona State University Project
Phillip C. Edwards, Steven E. Falconer, Patricia L. Fall, Ilya Berelov, John Czarzasty, Christopher Day, John Meadows, Cathryn Meegan, Ghattas Sayej, Thomas K. Swoveland and Michael Westaway 51

Additional Information and Observations of Neolithic al-Basīṭ, Wādī Mūsā, Southern Jordan
Gary O. Rollefson, with a contribution by Khairieh 'Amr 93

The Moab Archaeological Resource Survey: Test Excavations and Faunal Analysis from the 2001 Field Season
Stephen H. Savage and Mary L. Metzger 107

The Karak Resources Project 1999: Excavations at Khirbat al-Muḍaybi'
Stephen J. Andrews, David R. Berge, John I. Lawlor and Gerald L. Mattingly 125

Preliminary Report of the Excavations at Jabal al-Qal'a (Lower Terrace): The Iron Age Walls
Sahar Mansour 141

Preliminary Report on the Wādī ash-Shkāfiya Survey 2001
Friedbert Ninow 151

Tall Zar'a in Wādī al-'Arab: The "Gadara Region Project"
Dieter Vieweger, with contributions by Jens Eichner and Patrick Leiverkus 157

The Survey in the Regions of 'Irāq al-Amīr and Wādī al-Kafrayn, 2000
Chang-Ho C. Ji and Jong Keun Lee 179

The 2001 Season of the Jarash City Walls Project: Preliminary Report
Ina Kehrberg and John Manley 197

A Sixth Century Water-Powered Sawmill at Jarash
Jacques Seigne 205

A Thamudic E Text from Mādabā
Pierre Bikai and Fawwaz al-Khraysheh 215

A Fortified Suburb of Ancient Petra: Shammāsa
Manfred Lindner and Elisabeth Gunsam 225

La Chapelle d'Obodas à Pétra. Rapport préliminaire sur la campagne 2001
Laila Nehmé 243

The International Wādī Farasa Project (IWFP). Preliminary Report on the 2001 Season
Stephan G. Schmid 257

Swiss-Liechtenstein Excavation at az-Zanṭūr/Petra: The Twelfth Season
Bernhard Kolb and Daniel Keller 279

The Monumental Entrance to the Upper Market and the Trajanic Inscription at Petra. The Architectural Context
Chrysanthos Kanellopoulos 295

New Excavations in the Qaṣr al-Bint Area at Petra
Christian Augé, François Renel, Laurent Borel and Chrystelle March 309

The Brown University 2001 Petra Great Temple Excavations Offer More Surprises

Martha Sharp Joukowsky 315
Recently Discovered Relief Sculptures from the Great Temple at Petra, Jordan
Joseph John Basile 331
Stucco Decoration from the South Corridor of the Petra Great Temple: Discussion and Interpretation
Emily Catherine Egan 347
Excavations at the Petra Small Temple, 2000-2001
Sara Karz Reid 363
The Petra Garden Feasibility Study, 2001
Leigh-Ann Bedal 381
The 2001 Finnish Jabal Hārūn Project: Preliminary Report
Jaakko Frösén, Zbigniew T. Fiema, Katri Koistinen, Jacqueline Studer, Christina Danielli, Richard Holmgren, Yvonne Gerber, Nina Heiska and Antti Lahelma 391
The Roman 'Aqaba Project: The 2000 Campaign
S. Thomas Parker 409
The Rujm Ṭāba Archaeological Project (RTAP): Preliminary Report on the 2001 Field Season
Benjamin J. Dolinka, with contributions by R. James Cook, Sean C. Fraser, Daniel Keller and Khalil Hamdan 429
Khirbat at-Tannūr in the ASOR Nelson Glueck Archive and the Reconstruction of the Temple
Judith McKenzie, Andres Reyes, and †Sheila Gibson 451
The Ṭafīla-Buṣayra Archaeological Survey: Phase 3 (2001)
Burton MacDonald and Wayne Sawtell 477
A Brief Ground Survey of Ruwāth (Robatha), South Jordan, 28 October - 16 November 2000
Alan Walmsley and Hugh Barnes 485
Preliminary Report on the First Survey Campaign at Ancient ar-Rabba (Rabbathmoab/Aeropolis)
Jacqueline Calzini Gysens 493
A Byzantine Greek Inscription from Qaṣr ar-Rabba (Karak District)
Tommaso Gnoli 499
New Light on Late Antique Pella: Sydney University Excavations in Area XXXV, 1997
Kate da Costa, Margaret O'Hea, Lachlan Mairs, Rachel Sparks and Pat Boland 503
The Ecclesiastical Complex of Saint Paul at Umm ar-Raṣāṣ - Kastron Mefaa
Michele Piccirillo 535
Recent Discoveries in the Baptism Site: The Pottery
Adeib Abu Shmais and Mohammad Waheeb 561
Une mosquée à Quṣayr 'Amra
Denis Genequand 583
The Sugar Industry in the Southern Jordan Valley: An Interim Report on the Pilot Season of Excavations, Geophysical and Geological Surveys at Ṭawāḥīn as-Sukkar and Khirbat ash-Shaykh 'Īsā, in Ghawr aṣ-Ṣāfī
Effie Photos-Jones, Konstantinos D. Politis, Heather F. James, Alan J. Hall, Richard E. Jones and Jerry Hamer† 591
Ayyubid/Mamluk Archaeology of the 'Ajlūn Area - A Preliminary Typology
Neil D. MacKenzie 615
Islamic Settlement in Umm Qays (Gadara)
Dia'eddin A. Tawalbeh 621

NOTES AND REVIEWS

Book Review: *Cromlechs, Dolmen und Menhire*, by Udo Worschech
Zeidan Kafafi 629
Comments on Some Recent Articles Published on Gerasa/Jarash
Jacques Seigne 631

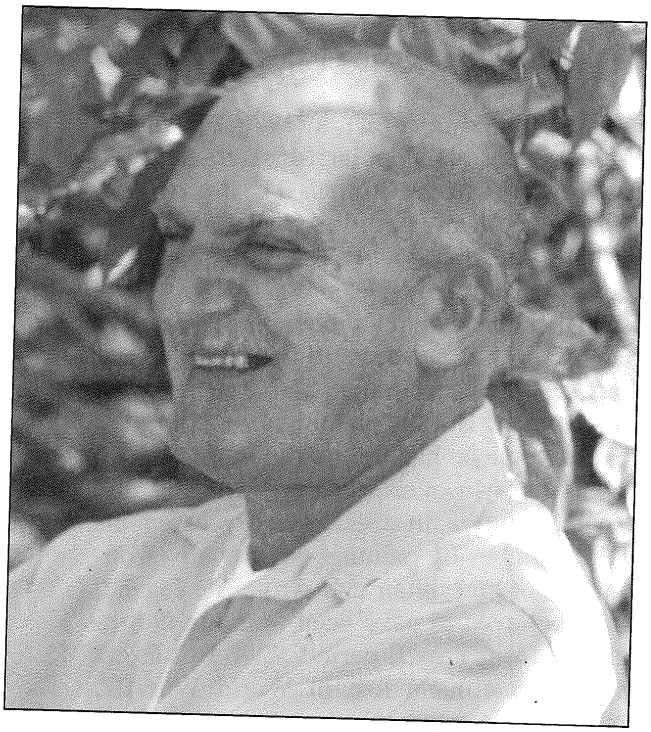
ARABIC SECTION

In Memoriam: Jum'a Kareem
Zeidan Kafafi 7
Preliminary Report on the Results of the Excavations at al-Mabrak/ East 'Ammān (1994)
Ebrahim Al Zaben 11
Report on the Khirbat Brāq Excavations
Suleiman Farajat, Mohammad Marahleh and Hani Falahat 21
Results of the Excavations at Bethany East of the Jordan River: A Preliminary Report
Mohammad Waheeb 31
Preliminary Report on the Results of the Excavations at al-Baṣṣa/ 'Irāq al-Amīr (1996/1997)
Ebrahim Al Zaben 41
Preliminary Results of the Excavations and Restoration at Khallit 'Īsā/ Bayt Īdis - The 2001 Season
Isṃaeel Melhem with a contribution by Abdel-Qader al-Husan 51
Bayt Rās-Irbid Archaeological Project 2002
Ahmad Al-Shami 61
The New Archaeological Discoveries of the al-Fudayn and Raḥāb - al-Mafraq Excavation Projects, 1991-2001
Abdel-Qader al-Husan 71
The Archaeological Surveys in the at-Tannūr Dam Basin/ Wādī al-Ḥasā
Adeib I. Abu Shmeis, Ahmad Al-Shami and Khaled Tarawneh 95
Preliminary Report of the Restoration Works at Jabal al-Qal'a (1/7-31/12/2001)
Mohammad Uthman 107
Procedures of Mosaic Floor Conservation and Restoration in Jordan
Riham Haddad 113
Religious Life of the Ancient Arabs (the Safaitics) through their Inscriptions
Rafe M. Harahsheh 119
Umayyad Dirhams from Jarash
Aida Naghaway 127
A Statistical Study of the Jordan Archaeological Museum Numismatic Collections
Aida Naghaway and Ahmad Ajaj 133
The Computerisation of the Jordan Archaeological Museum Collections (Phase 1)
Ahmad Ajaj 153
Traditional Sites of the Ma'ān District/ash-Sharāh
Qais Tweissi 159

IN MEMORIAM

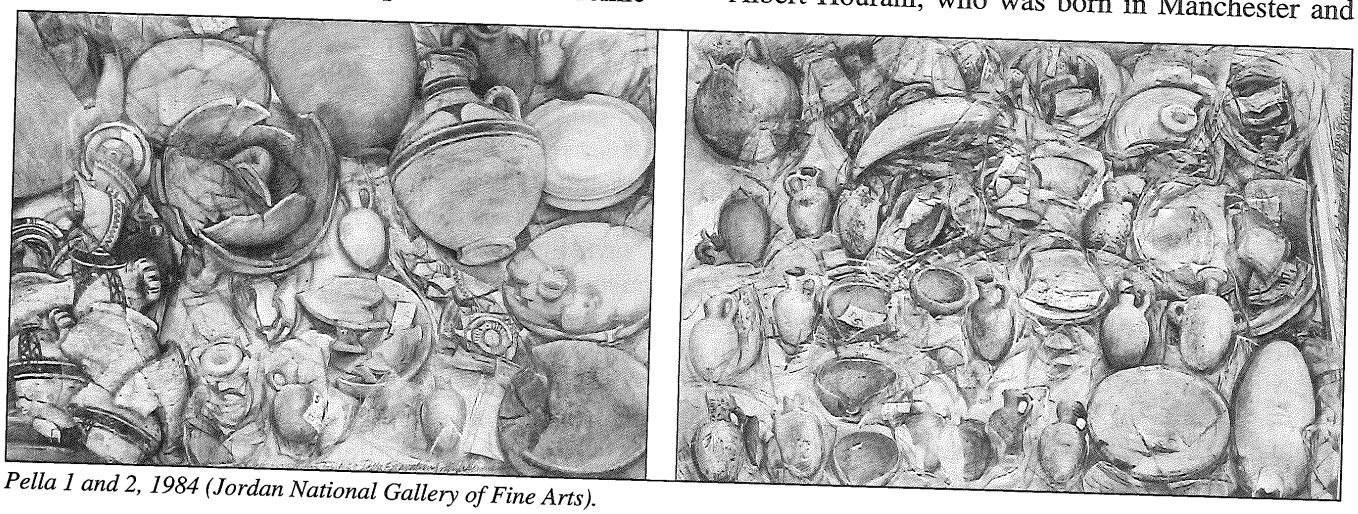
ALI AL-JABIRI

One of the most gifted artists of modern Jordan, Ali Al-Jabiri, tragically died on November 28th, 2002. He was born in Jerusalem in 1945, the elder son of a famous family, originally from Aleppo in Syria, which generated intellectuals, technocrats and politicians. His father, Majdel-din was a civil engineer who was trained in Turkey and in Chicago. He was elected Mayor of Aleppo and became Minister of Public Works in the Syrian Government. His maternal grandfather, Ihsan Al-Jabiri, was appointed chief chamberlain in the government of King Faisal the First, king of Syria in 1920. Later, President Abdel-Nasser designated him as president of the union between Syria, Yemen and Egypt. He entertained in the past excellent relations with Yemen, since Imam Yahya Hamid al-Din, the former ruler of this country, presented him with an old dagger. This he offered to his daughter Sa'diya, the wife of the late Prime Minister Wasfi Al-Tal. This precious gift ended in the Popular Museum for Costumes and Jewelry in Amman.



(Photo: Bill Lyons).

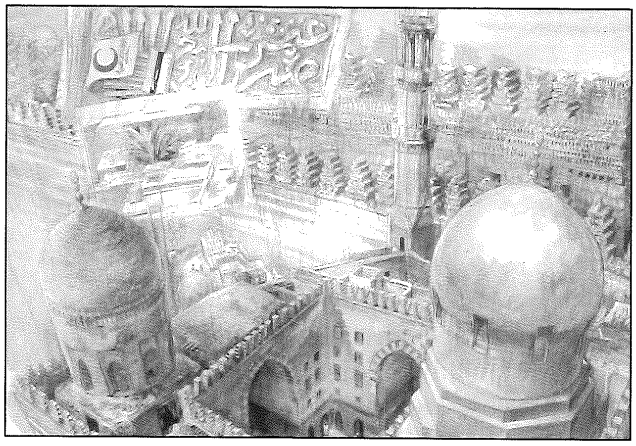
Ali received a profound education: He completed his secondary school at Victoria College in Alexandria, where the Palestinian historian Edward Said was educated, amongst other brilliant figures. He was then sent to Rugby School in England, where his artistic talents were admired by his masters. He did not continue his art studies but was convinced by his father to study architecture, although he was not prepared for this field: he lacked the Mathematics O-Level to pursue this academic major. So he left for Standford University in California where art became his major attraction, and he was introduced into a group of artists. Influenced by his new colleagues, Ali adopted a bohemian lifestyle. His family were alarmed and sent him back to the U.K. where he was sent to Bristol University to read English Literature. In England, Albert Hourani, who was born in Manchester and



Pella 1 and 2, 1984 (Jordan National Gallery of Fine Arts).

had graduated from Magdelen College Oxford in philosophy, politics and economics, became Ali's mentor. Hourani published eight books, the most known of which is *The History of the Arab Peoples*. Ali was no doubt influenced by his keen knowledge of the Middle East history and his love for the eastern civilization. In 1970, he graduated from Bristol University and worked at the Embassy of Jordan in London, but he virtually lived at the British Museum where he was fascinated by the ancient artefacts.

When he returned to Jordan in 1976, he was invited to reorganize the Popular Museum for Costumes and Jewelry in the Roman Theatre of Amman. This pioneering exhibition was founded by his maternal aunt, Sa'diya Al-Tal, in 1971-72, at the suggestion of Prime Minister Wasfi Al-Tal. The officials at the museum remember his work very well: Because he was sensitive to the works of traditional art, he was very hesitant and rather moody, the employees say. But his technique of exhibition was splendid, since he had training in museology at the Metropolitan Museum of New York and was invited to the Louvre in 1982. He expressed his love for the antiques by painting two panels of objects from the Metropolitan and wrote the legend: "Four vases believed to have been found in North-West Anatolia from Troy II period, 2200 BC, Exact counterparts, Schleimann lost in World War II". The second panel is titled: "Graeco-Roman Treasury, Metropolitan Museum". His love for antiquities urged him to participate in the fieldwork of the archaeological missions in Jordan. He spent good time in Pella, in the Jordan Valley, and produced several paintings of landscape and pottery objects.* His paintings of Khirbat adh-Dharīḥ excavations he presented to Dr. François Villeneuve who admired him and was shocked by his untimely death; he sent condolences to his sister Diala who lives in Amman. Ali spoke excellent French and was the friend of the French community in Jordan. The former ambassador to Jordan, H.E. Patric Leclaire and his wife Alice as well as Bernard Emié and his wife sent their deep regrets for the loss of a genius artist and a faithful friend. They appreciated his wide knowledge of international culture and his attractive personality. Ali hated to show up in the social receptions of Amman, although he was much in demand. He attended some national celebrations of embassies out of courtesy. As a matter of fact, he was a bitter critic of the inefficiency of officials in Jordan, and of the loss of many vernacular old houses in Amman: He tried hard to salvage the old



Cairo Mosque (Jordan National Gallery of Fine Arts).

house of Hajj Suleiman al-Bilbeisi in the downtown area, at the foot of Jabal al-Jawfah that was built at the end of the 19th century. His drawings of the house remain exquisite works of art, but he failed to save the monument. When he was living in 'Aqaba and preparing the drawings of the Arab Revolution of 1916-18, he fought to convince the responsible officials to protect the old streets of this port of Jordan that date to World War I. He also tried hard to preserve the palm groves of the city in the area called al-Ḥafāyir. He succeeded in drawing the attention of the 'Aqaba Authority to the beauty of the old gardens.

It is difficult to characterize the art of Ali. People describe it as "modern realism". His education as an Orientalist made him love the mosques of Cairo, of which he executed beautiful paintings, now in the Jordan National Gallery of Fine Arts in Jabal al-Luwaybidah. He was attracted by the old houses of Ma'an and reproduced old mudbrick streets of the city. Every object, an old wall, a window, was a subject of artistic painting for Ali. His drawings were mostly pastel, water colours, acrilic and collage. The soft and beige hues of the pastel and water colours are most appropriate to the desert tones and the rosy landscape of Petra.

He spent a long time in Petra, reproducing the Nabataean façades and living at Umm Ṣayḥūn, the Bdūl village where he was later buried. Everyone remembers him: He hired a donkey to reach the Wādī Mūsā market and bring fodder for his donkey. To save the animal the trouble of the road, people remember he went on foot and carried the bag of barley on his back. The donkey was thankful and started to bray loudly when he saw his master.

The art of Ali was of simplicity and genuine sensibility. He made a few portraits: The portrait of

* Thanks to Mr. Tariq Obeidat of the Jordan National Gallery of Fine Arts for providing us with pictures of Ali's work in electronic format.

Princess Wijdan Ali is probably the most perfect because it exhibits an idealization of the human person. The portrait of Umm Isa, sister of Mamduh al-Bisharat, is more realistic and represents a beautiful and healthy lady who lived at the family mansion in Umm al-Kundum.

Ali was close to the Royal family. With H.R.H. Prince Ra'd Bin Zeid, he was a founding member of the Petra National Trust, an NGO to protect the Petra National Park. He was an active member of this organization, an architectural conservationist with outstanding ability in site interpretation and development, while maintaining a balance between tourism requirements and site preservation.

A memorial service was held for Ali at Umm al-Kundum, which was attended by H.R.H. Prince al-Hassan Bin Talal, Ra'd Bin Zeid, Princess Alia Bint al-Hussein and Dr. Taleb al-Rifa'i, then Minister of Tourism and Antiquities. The Bdūl of Umm Ṣayḥūn built a tent near his tomb at the entrance of the village to receive condolences on the day of his burial. They also offered a copious meal to the people who came to salute his generous soul and prayed for him at the mosque of the village. He will certainly be remembered forever by his friends in Jordan and abroad.

Fawzi Zayadine
Department of Antiquities
Amman – Jordan

QĀ' ABŪ ṬULAYḤA WEST, 2001
AN INTERIM REPORT OF THE FIFTH SEASON

Sumio Fujii

Introduction

The fifth excavation season at Qā' Abū Ṭulayḥa West (QATW) (قاع أبو طليحه) — a Late Neolithic (LN) and Early Bronze Age (EBA) site in the northwestern part of the al-Jafr basin (الجفر), southern Jordan — was conducted from August 13 through September 29 in 2001, with the kind cooperation of the Department of Antiquities of Jordan.

The main goal of this season was to obtain further evidence for the pseudo-settlement hypothesis (Fujii 2001: 33-37; 2002a) — a likely explanation of the formation process of this unique desert site. For that purpose, a total of twelve LN burial cairns and a large EBA structure were excavated in the Southwestern Complex (SW Complex). As a result, it has become clearer that the hypothesis has a reliable base. Another objective — a chronological reassessment of the Jafr blade assemblage — was also attained with the excavation of Structure 1001, and it was attested that the assemblage, which has often referred to within the Upper Palaeolithic context, is in fact dated to the EBA. The purpose here is to present a brief summary of this season focusing on these two issues mentioned above.

The Excavations of Layer 4 Burial Cairns

The SW Complex includes no less than twenty burial cairns that were constructed on the upper surface of Layer 4 dated to the LN. They are lined N-S, roughly at a regular interval (**Fig. 1**). On the basis of their techno-typology, construction material, and general orientation, they can be divided into four groups, BC-100s to BC-400s, roughly in order from north to south. Three of the first group, BC-102 to BC-104, have already been excavated during the last season (Fujii 2001: 30-33); the BC-200s and southward were our main concern in this season.

BC-200s

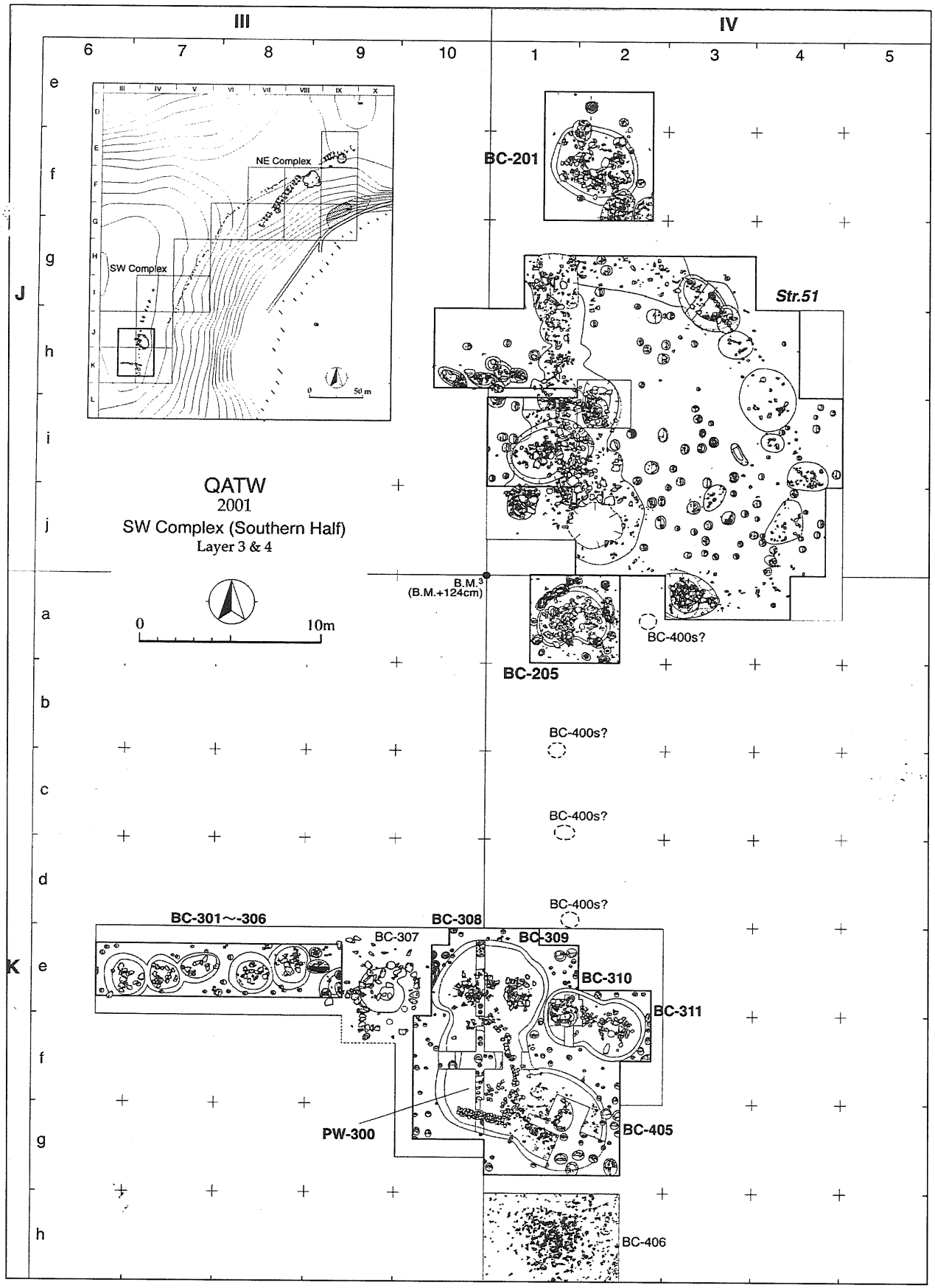
The BC-200s are defined by a series of techno-typological differences from the BC-100s: 1) the use of limestone cobbles and boulders, instead of limestone and flint slabs; 2) an incorporation of the two major components comprising a burial cairn entity (i.e., a burial cairn and its annexed pseudo-walls); 3) a shift in mound plan resulted from the second modification (i.e., a transformation from a smaller, twin-type mound to a larger, oblong mound). Thus, overall, the BC-200s present a more or less disorderly appearance in comparison with the rather neat profile of the BC-100s. Besides, as will be referred to, another difference can be found in the general orientation, which indicates a shift from the NW-SE direction in the BC-100s to the WSW-ENE in the BC-200s.

To date, two examples, BC-201 and BC-205, have been identified as belonging to this group, of which the former was excavated down to the original mound surface and the latter examined further down to an under-mound feature. In addition, a few more examples appear to lie between the two, but they have not yet been given individual numbers due to the preliminary state of examination.

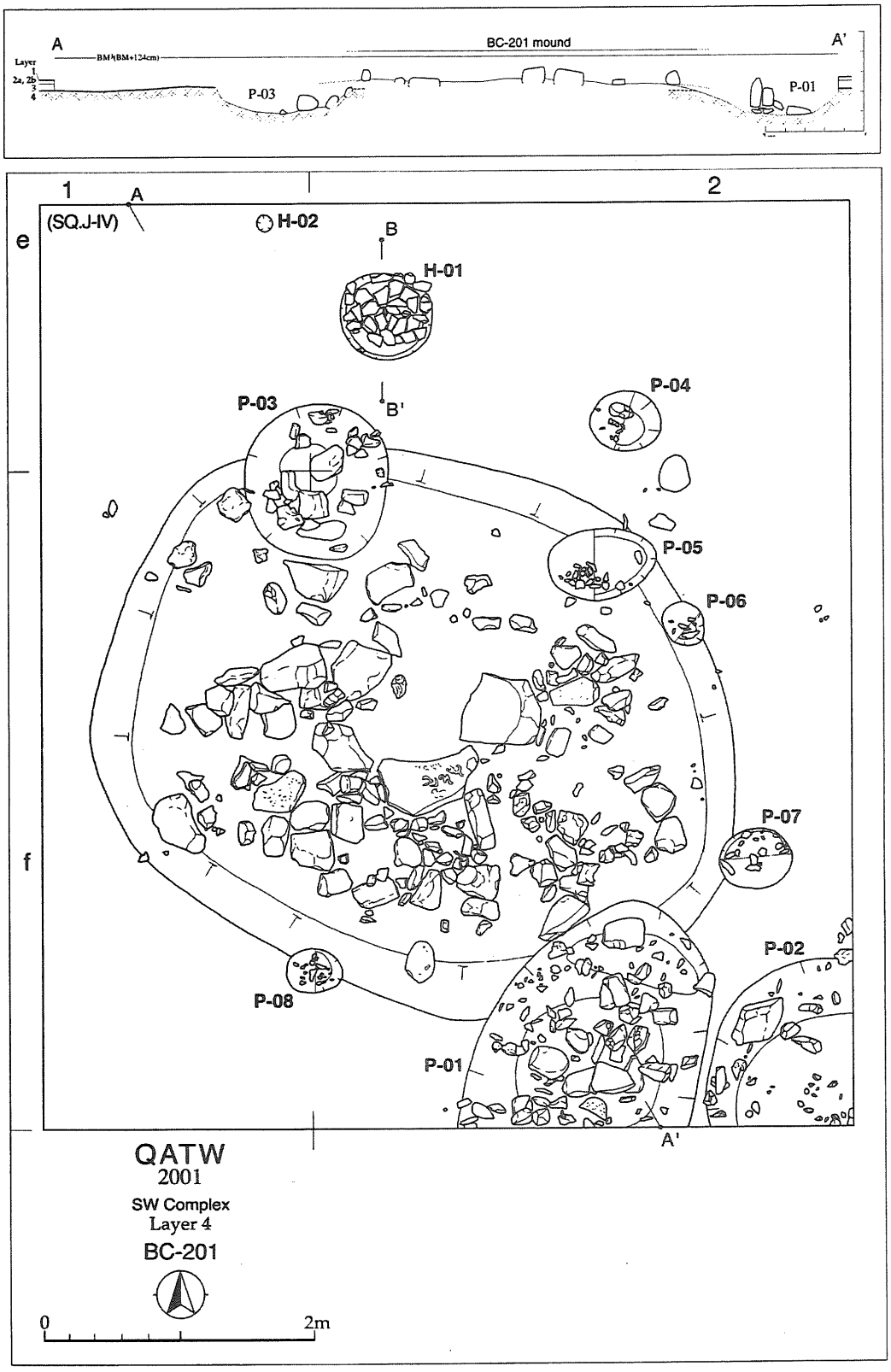
BC-201: Located ca. 10m south of BC-106, BC-201 has a slightly oblong mound ca. 5m (NW-SE) by 4m (NE-SW) in two major axes and ca. 15cm in height (**Fig. 2**). A large number of limestone and sometimes flint cobbles, placed either in a horizontal or in an upright position, form concentric circles ca. 1.5–3m in diameter. Limestone and flint slabs — construction material long preferred among Layer 4 structures — are no longer used here.

The two major components of a burial cairn entity are still barely traceable. The small concentric stone circle in the center probably represents the main body of this burial cairn, and a few lines of limestone cobbles to the west correspond to a pseudo-wall annexed to the former. Given this, it follows that the main axis of this burial cairn entity is oriented WSW-ENE, which accords well with the gradual orientation shift among the Layer 4 structures (Fujii 2001: 30-32). Although this burial cairn was not examined further down, the excavation of the southern counterpart (BC-205) suggests that the concentric stone circle were constructed on a shallow pit dug in the center of the mound.

A total of eight pits were found within the context of this burial cairn, six at the circumference of the mound and the rest at the periphery (of particular interest is the location of the former, the archae-



1. The southern half of the SW Complex (Layers 3 and 4).



2. BC-201: plan and section/ elevation.

ological implications of which will be referred to below; we only need to mention here that the mound edge was intentionally cut by these pits). Typologically, they are divided into the following two: 1) larger and deeper pits containing upright limestone cobbles either in the center or on the wall (P-01 to -03); 2) smaller and shallower ones including many abraded flint pebbles and/or thermal-flaked flint flakes (P-04 to 08). Interestingly, the latter often contained a single or a few upright flint pebbles in the center — probably a reduced version of the former and, at the same time, a forerunner of

later examples encompassing the BC-300s.

In addition, a small and shallow hearth, H-01, was found at the northern periphery of the mound. Unlike several hearths so far found at Layer 4 structures, it was tightly paved with small limestone slabs. The fill layer, including ash and charcoal remains, was very thin and packed with red-brownish silty sand of Layer 4, suggesting that this hearth was used for a short term, possibly only once. The existence of this elaborate but ephemeral hearth, coupled with a series of unique pits, implies that some funerary ritual was held in connection with this burial cairn.

BC-205: This burial cairn is located ca. 20m south of BC-201 with the western walls of Structure 51 just in between. It is slightly smaller in mound size than BC-201, measuring ca. 4m (E-W) and 3m (N-S) in two major axes (**Figs. 3, 4**). The mound is roughly oblong in general plan, but a slight concavity at the southern flank causes a broad bean-like contour.

An examination of the internal structure has clarified that the mound was associated with a shallow pit where a large volume of limestone cobbles were filled out. The tight arrangement of the cobbles makes it difficult to trace the precise picture, but it appears that they form concentric circles in the eastern half and two straight lines in the western one. The former probably represents the main body of this burial cairn entity, and the latter corresponds to a short pseudo-wall attached to the former. It is therefore likely that the main axis of this burial cairn entity is oriented WSW-ENE, as was also the case with BC-201. It is also interesting to note, in passing, that the pseudo-wall was constructed along a side of the pit, not in the center. This may have been a device to keep the construction material in an upright position — a tradition long inherited among Layer 4 structures at QATW.

Of special interest are a total of eighteen pits encompassing the mound. As was the case of the pits around BC-201, a dichotomy in size and contents can also be recognized in these pits. Specifically, they consist of the following two types that make a good contrast: 1) larger, oblong pits containing one or a few upright limestone cobble(s) mostly in the center but sometimes on the pit wall nearer to the mound; 2) round and smaller pits containing a large number of abraded flint pebbles and/or thermal-flaked flint flakes (it must be noted, however, that the former is far smaller in size than the counterparts at BC-201). The dichotomy in arrangement is also in common with BC-201; the former type pits are always located on the circumference of the mound and cut the edges, whereas the latter are usually located at the periphery and do not disturb the mound flanks. Although the reason for this dichotomy is still unknown, it is apparent that these pits represent some funerary ritual held by early pastoral nomads who repeatedly visited this place for symbolic burial.

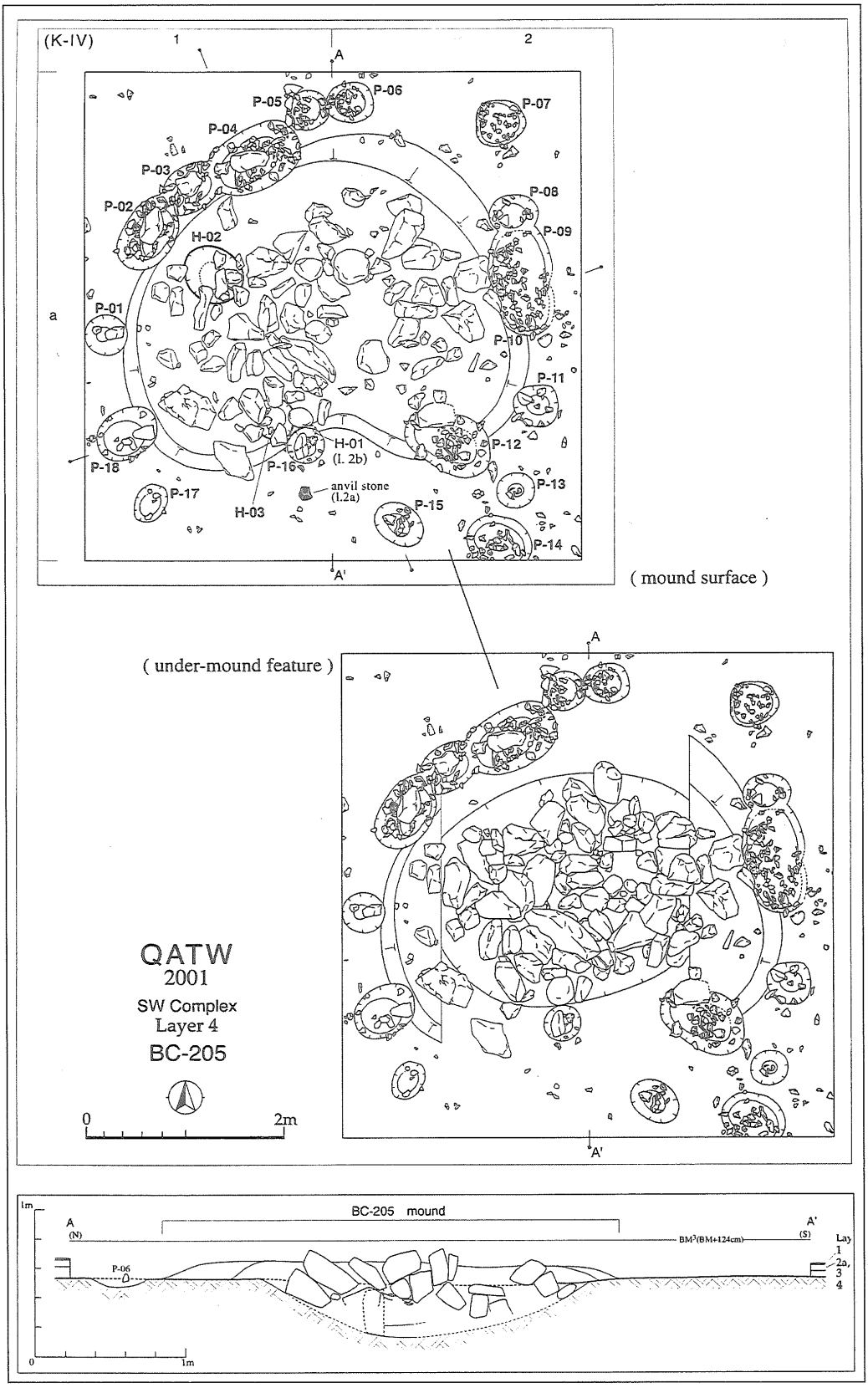
In addition to these pits, two small hearths, H-02 and H–03, were found on the mound. However, their archaeological contexts are somewhat equivocal, since the upper part of the mound has long been exposed and was therefore susceptible to later re-use.

BC-300s

BC-300s, defined as smaller and simpler burial cairns associated with a hollow, on-mound stone circle, are located ca. 20m south of BC-205 and lined E-W at a tight interval. To date, a total of 11 examples have been identified, although a few of them, as referred to below, are somewhat different in character thus possibly susceptible to a subdivision. To the south of these burial cairns, a long pseudo-wall, PW-300, extends with the main axis being oriented N-S. It appears that this single pseudo-wall was shared among the BC-300s.

BC-300s can be divided into the following three groups: the west wing (BC-301-307), the central part (BC-308 and -309), and the east wing (BC-310 and -311), of which the first was located in the western excavation sector and the latter two in the eastern sector (**Fig. 1**). Two of the eleven examples, BC-306 and BC-307, were heavily disturbed by an illicit excavation, thus they were merely surface-cleaned and drawn at that state. The other nine examples were excavated down to the original mound surface, and five of them, BC-301, -302, -305, -308, and -310, were further examined down to the mound base. The large mound of PW-300 was also scanned using two crossed trenches.

West Wing (BC-301 to BC-307): The west wing of the BC-300s consists of seven small burial cairns, BC-301 to BC-307 (**Fig. 5**). Their mounds are roughly round to oblong in general plan, measuring ca. 2-2.5m in diameter and ca. 15-20cm in relative height. The tight arrangement of these burial cairns often causes a connection with two adjacent mounds, resulting in the formation of three clusters. As noted above, these burial cairns are characterized by a small, hollow stone circle constructed on the mound surface. No under-mound features were found so far as three examined examples (BC-301, -302, and -305) were concerned. However, the mounds themselves comprised at least two



3. BC-205: plan and section/ elevation.

to three sub-layers, suggesting a relatively elaborate workmanship.

Here again, a cluster of small pits was found encompassing the mounds. However, unlike the BC-200s, no clear-cut dichotomy in morphology, size, and contents was recognized among them. They were all roughly round in general plan and small in size, usually ca. 10-20cm in diameter and often



4. BC-205: the under-mound feature (from S).

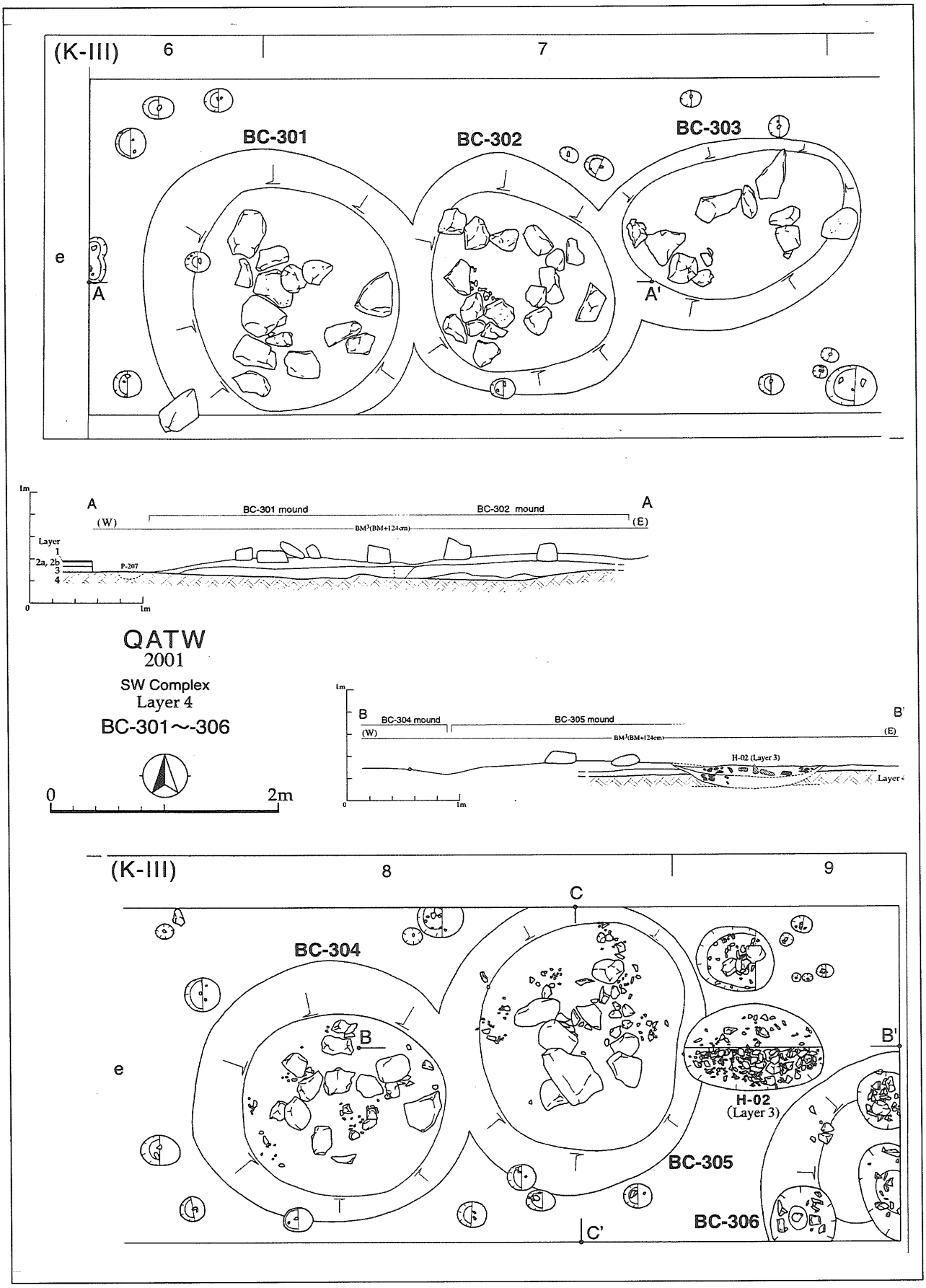
less than 5cm in depth. Also homogenous were the contents, which were simplified into only one or a few abraded flint pebble(s) that often stood upright in the center of a pit (**Fig. 6**) (it must be noted, however, that there are some exceptions to this: three pits on the mound of BC-306, for instance, were relatively larger in size and contained a larger number of abraded flint pebbles — a suggestion of a different character).

Central Part (BC-308 and BC-309): BC-308 and BC-309 form another cluster that is united with PW-300 (**Figs. 7, 8**). As suggested by their location, both examples bear an intermediate character between the west wing burial cairns and the east wing burial cairns. Specifically, their on-mound features, when compared with those of the west wing burial cairns, contain a larger volume of limestone cobbles, thus probably forming a double concentric circle — a similarity to the east wing burial cairns. In contrast, the absence of under-mound features, which was confirmed in the N-S trench running through the center of BC-308, is in common with the west wing burial cairns.

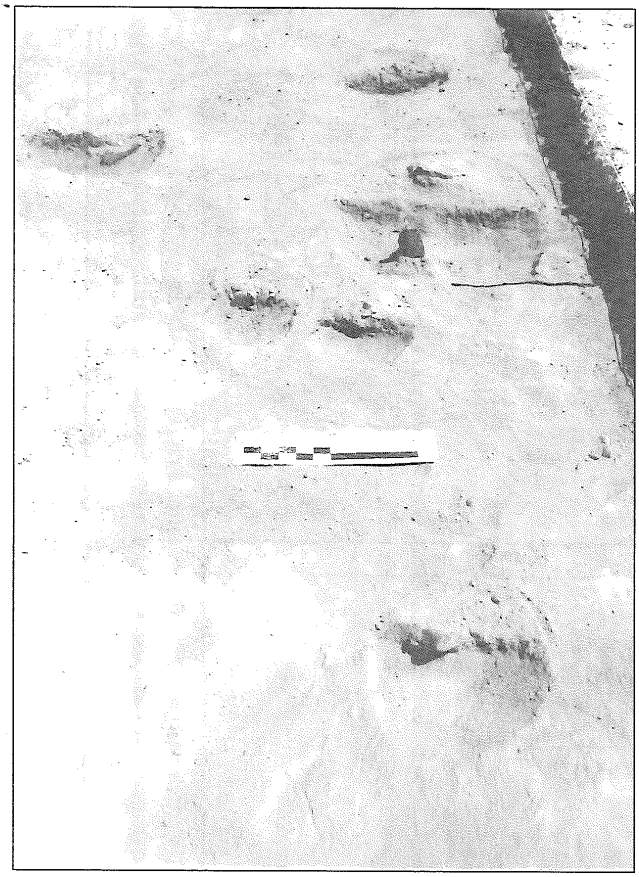
Interestingly, some small pits, which, as was the case of similar examples around the west wing burial cairns, often include only one or a few abraded flint pebble(s) standing upright in the center, were found at various levels under the mound. Of particular relevance is the micro-stratigraphy of the trench, which illustrates that at least four sub-layers were concerned with the formation of the mound. This may suggest that some brief ritual was held at each stage of the mound formation (however, this does not necessarily mean that the construction extended over a long period, since all the sub-layers are very thin and similar to each other both in color and texture).

East Wing (BC-310 and BC-311): The east wing burial cairns are characterized by the existence of a unique under-mound feature, which consists of a short pseudo-wall and a shallow pit dug beside it (**Fig. 9**). The former is ca. 2m in total length, being bent at a right angle at the southwestern corner. The banking of this pseudo-wall is constructed with the silty sand of the Layer 4, on which flint and limestone pebbles were driven roughly in two-rows — a tradition long inherited among the Layer 4 structures at QATW. The orientation of this pseudo-wall is NW-SE, when the longer wall is viewed as a remnant of a facade. This orientation, coupled with the basic techno-typology of the under-mound feature, possibly represents a reversion to the original form of the Layer 4 structures (Fujii 2000: fig. 17).

The same holds true of the shallow pit. It disturbed the left corner of the facade (i.e., the longer wall), which in turn was subsequently reconstructed on the pit — again a deep-rooted tradition among the QATW Layer 4 structures but threatened to oblivion after the BC-100s. A number of flint and limestone cobbles and slabs, some of which stood upright, were found in this pit. Besides, a small hearth, H-10, was found in the southwestern corner at an intermediate level between the



5. BC-300s: plan and section/elevation of the west wing burial cairns.



6. BC-303: mourning pits (from W).

on-mound feature and the under-mound feature. A large limestone slab was set in the center of this pit, but nothing was found underneath.

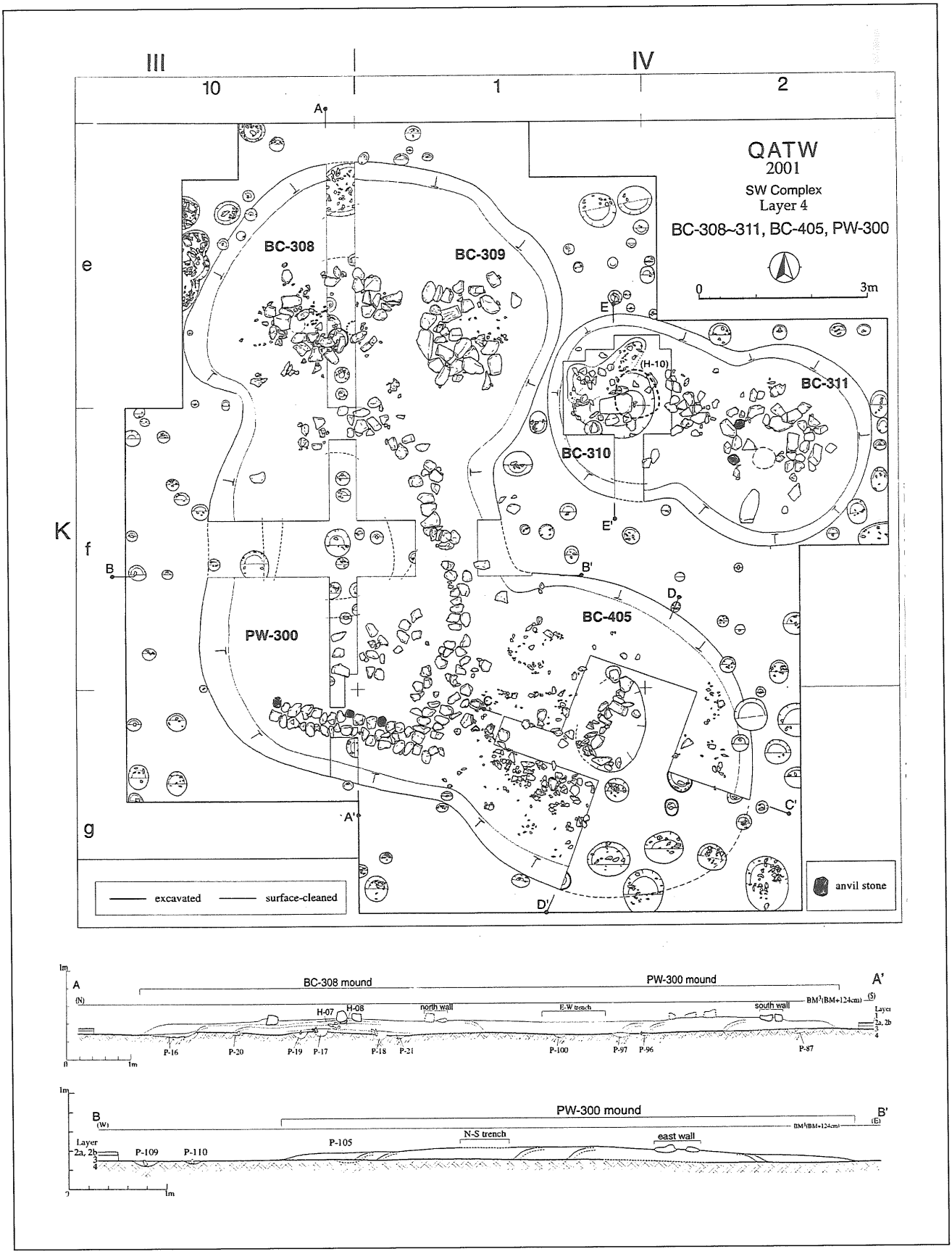
Incidentally, three limestone anvils were found *in situ* from the on-mound features of BC-310 and BC-311, one from the former and two from the latter. This puzzled us, because the excavations in the NE Complex had already attested that they belonged to Layer 3 and were used as indispensable equipment for the tabular scraper production (Fujii 1999: fig. 9). Thus it happened that the Layer 3 artifacts were found *in situ* at Layer 4 structures. A probable explanation for this dilemma would be that the Layer 3 population, especially those related to Structure 51, modified the on-mound features using their own material including discarded anvils. This is all the more likely because the upper part of the mounds, as it is still now, had been exposed above the then ground surface when the Layer 3 population visited this place.

PW-300: PW-300 extends southward from BC-308, probably the parent body of this symbolic wall. It is ca. 10m in total length and consists of the following four parts: 1) a 2m long, heavily disturbed wall to the north; 2) a 6m long, slightly outcurved wall to the east; 3) a 3m long, well-preserved, straight wall to the south; and 4) a short, isolated wall in the southeastern corner. In comparison with the original in the NE Complex (e.g. Fujii 2001: fig. 3), it is apparent that the first wall represents a facade associated with a burial cairn, BC-308 in this case, and the subsequent two walls correspond to a side and rear wall respectively. Equally, the last component can securely be regarded as a bent wall of small cells that are usually equipped in the rear left corner when viewed from a facade.

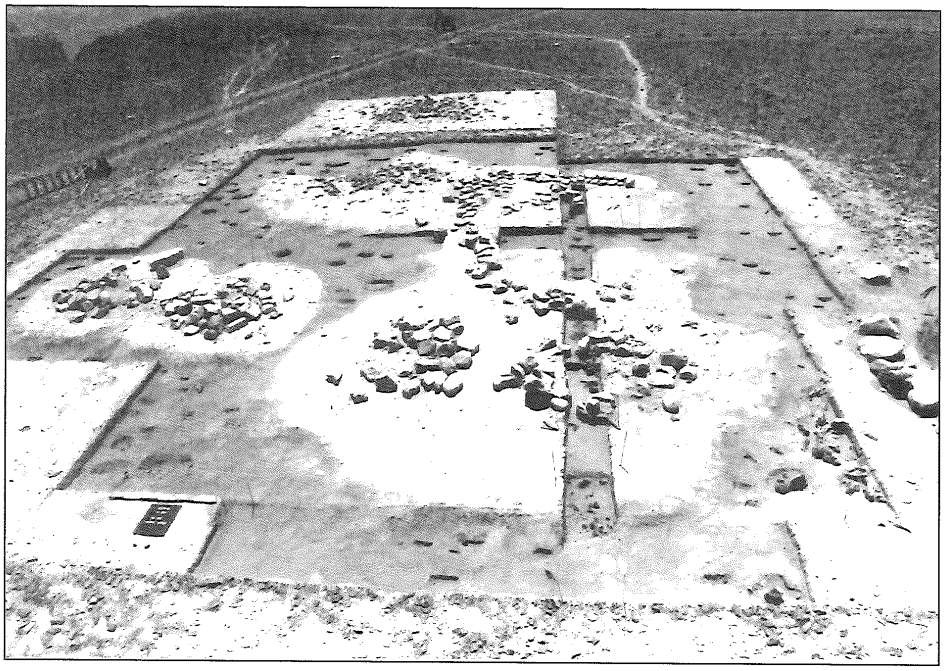
As suggested above, it appears that this long pseudo-wall was shared among the BC-300s, especially those without any under-mound pseudo-wall. It is therefore possible that the BC-300s, as a whole, were the first to deviate from the deep-rooted principle that one burial cairn must be associated with one pseudo-wall (or pseudo-house). It is therefore evident that the BC-300s and PW-300 are assigned to an ending phase of the Layer 4 long structural sequence. Also suggestive in this regard is the general orientation of this pseudo-wall, which is roughly oriented N-S, thus fitting well into the gradual orientation shift from the pseudo-houses in the NE Complex (NW-SE), through the BC-100s (WNW-ESE or E-W), to the BC-200s (WSW-ENE). The same holds true of the technology. Although the two-rowed arrangement of the construction material is in common with the other Layer 4 structures, the use of limestone cobbles, instead of slabs, and their horizontal rather than upright position clearly indicate a technological degeneration at an ending stage of the long sequence.

The final point to note is three limestone anvils that were found again *in situ* among the construction material of the southern wall (**Fig. 10**). As suggested above in connection with the east wing burial cairns, it appears that the intervention of a Layer 3 population, probably that of Structure 51, was concerned with their occurrence. Highly suggestive in this regard are the elaboration and better preservation state of the wall in question, which contrast well with the other three walls. This, coupled with the total absence of anvils in the latter, probably argues for the above interpretation.

Mourning Pits: More than one hundred small pits, probably pits for mourning, were found around the BC-300s, a few dozens in the western sector and about one hundred in the eastern one (**Fig. 11**). Interestingly, they were different in character between the two sectors. The examples in the western sector were characterized by the uniformity both in morphology and contents, whereas those in the eastern sector still retained the dichotomy that was



7. BC-300s (the central part) and PW-300: plan and section/elevation.



8. BC-300s (the central part) and PW-300 (from N).

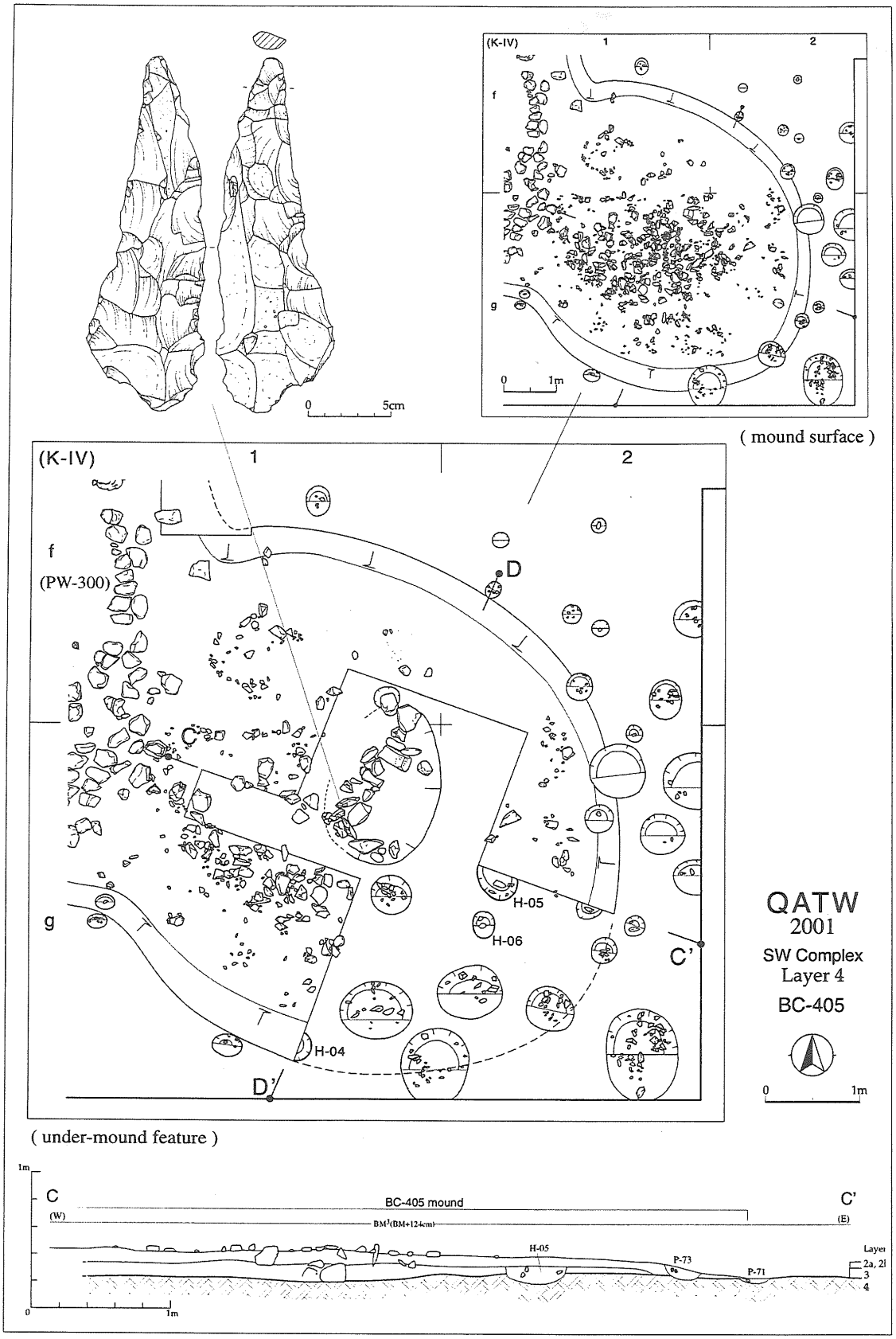


9. BC-310: the under-mound feature (from SW).

recognized at the BC-200 (it must be stressed, however, that the larger pits, as well as smaller ones, no longer contained upright limestone cobbles and, instead, include merely small flint and/or limestone pebbles). The continuity of the dichotomy, the relative complexity of the on-mound features, the existence of the under-mound features (BC-310), and the nearer location to PW-300, all these suggest that the central part burial cairns and the east wing burial cairns were constructed earlier than those in the west wing — a key to the intra-complex chronology of the BC-300s.

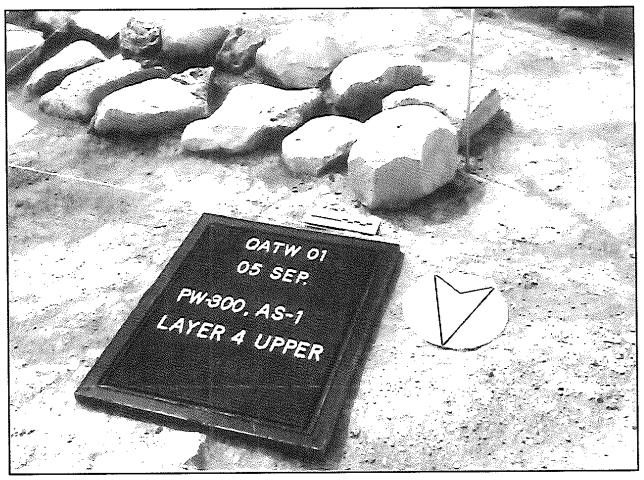
BC-400s

The BC-400s have two characteristics: the absence of any conspicuous on-mound features but the presence of under-mound features. Thus, the single key to the identification before excavation is a somewhat denser scatter of abraded flint pebbles on a slight convexity. To date, two examples have been identified in connection with the excavation of PW-300. Of the two, BC-405 adjacent to PW-300 was examined partly down to the under-mound feature, and BC-406, located ca. 5m south of the former, was merely surface-cleaned and drawn at

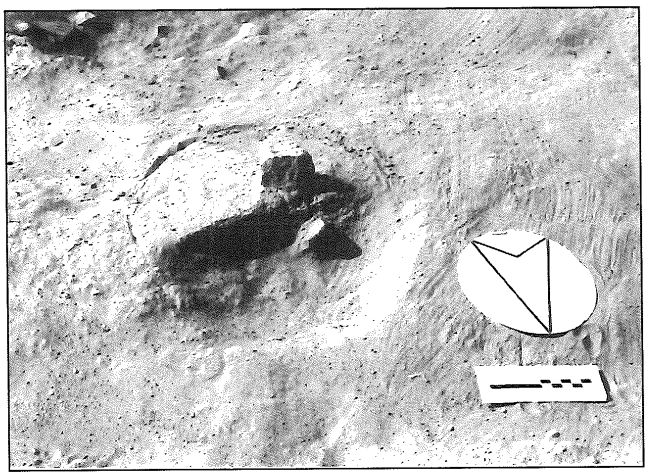


12. BC-405: plan and section/elevation.

stood merely in some courses (**Fig. 13**). An exception to this is the western wall, where a series of limestone boulders were put upright on a shallow pit and supported by a solid banking — another



10. PW-300: a limestone anvil (from NW).



11. BC-300s: a mourning pit.

that state in preparation for the next season. In addition to these two, several candidates have been located, four between BC-205 and BC-310 and a few east of BC-405 (**Fig. 1**). However, they have not yet been given a structure number due to the preliminary state of examination.

BC-405: This burial cairn has a large, oblong mound, ca. 6 by 5m in two major axes, of which the western edge is joined with the eastern flank of the mound of PW-300 (**Fig. 12**). As the definition says, no conspicuous on-mound features were present; only a dense scatter of abraded flint pebbles and limestone flakes was recognized on a slight convexity. Under the mound, however, was found a short, two-rowed upright slab pseudo-wall and a shallow pit dug beside — a commonality to BC-310. Besides, more than twenty mourning pits were unearthed within the context of this burial cairn. Interestingly, they were relatively large in size and included a larger number of abraded flint pebbles — another similarity to BC-310 (and BC-311). It appears that this burial cairn, as was the case with BC-310, exhibits a partial reversion to the original form of the Layer 4 structures.

The Finds from the Layer 4 Burial Cairns

As repeatedly noted in the previous reports (Fujii 2000: 163; 2001: 32-34), the extreme scarcity of the finds and the net absence of human skeletal remains are characteristic of the Layer 4 (and Layer 3) burial cairns at QATW. A series of Layer 4 burial cairns excavated during this season are no exception to this. The finds consist largely of flint artifacts, including a few dozen tabular scraper components and undiagnostic flakes found in a secondary context. Also found were a fragment of a small saddle quern and a dozen animal bone fragments, all of which, again, occurred in somewhat equivocal contexts. Besides, a total of seven limestone anvils were recovered from the on-mound feature of BC-205, BC-310, BC-311 and PW-300, although, as noted above, they apparently represent later disturbance by a Layer 3 population.

The single artifact worth noting is a pick that was found *in situ* on the pseudo-wall of BC-405 (**Fig. 12**). It was presumably left there in commemoration of the construction of the pseudo-wall. It is interesting to note that a similar example occurred elsewhere in the same context (Fujii 2001: fig. 15). It may also be interesting to suggest that parallel examples have also been found at Kilwa, a PPNB site in northernmost Saudi Arabia (Rhotert 1938: 112, no. 1), and Hamifgash III, a Tuwailan site in an-Naqab (Goring-Morris *et al.* 1994: fig. 5, no. 8).

The Excavation of Structure 51 (Layer 3)

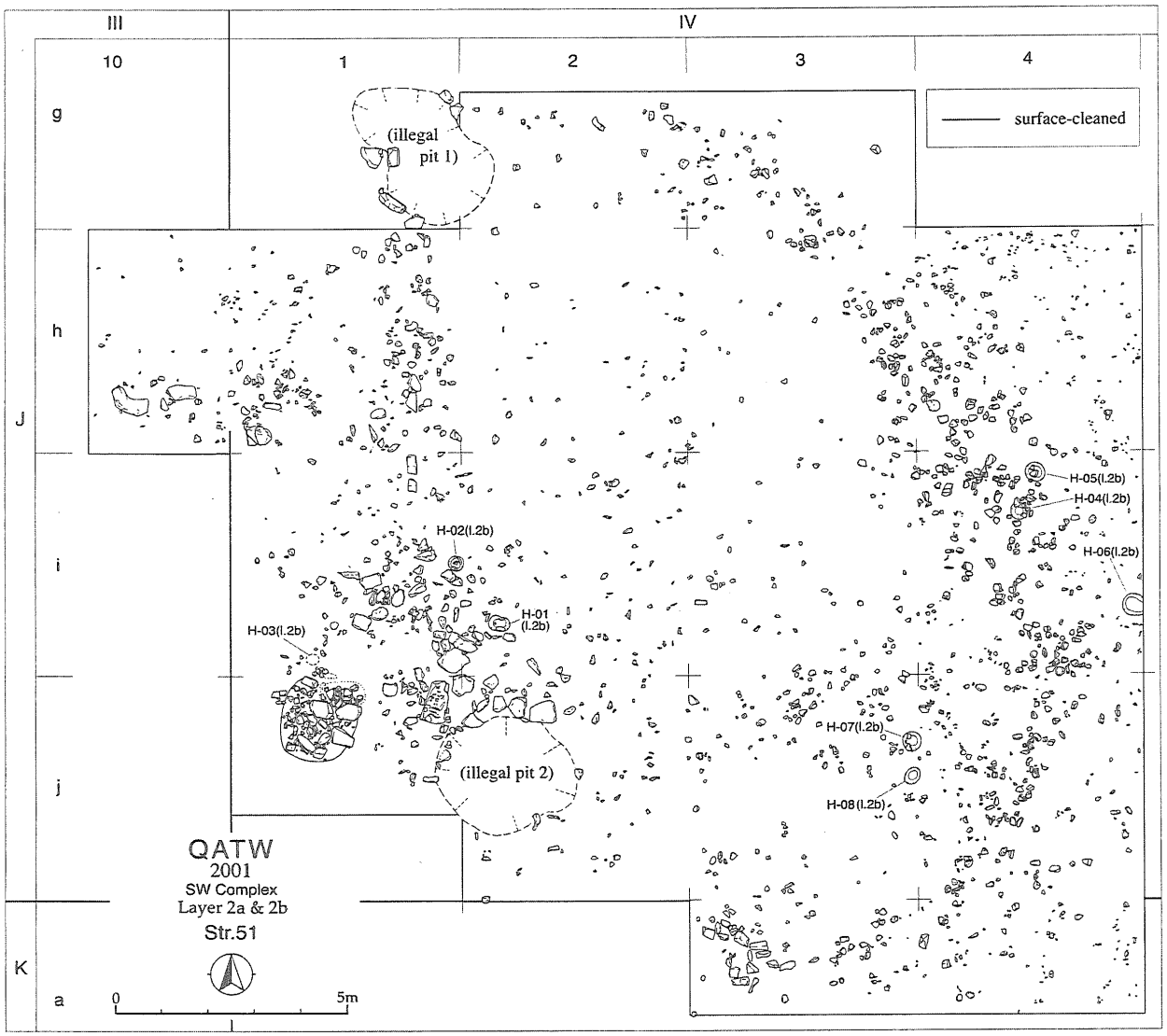
Structure 51 is located between BC-201 and BC-205 with the western wall overlapping with the N-S axis of the Layer 4 burial cairns in the SW Complex. Of the more than twenty structures that comprise the Complex, it is a single example that belongs to Layer 3. Typologically, it is a large, ground-type structure with an oblong plan and measures ca. 20m in the NW-SE major axis and ca. 12m in the SW-NE short one (**Figs. 13, 14, 15**). The most salient feature of this structure is the repeated interruption of the wall by a series of pit-type burial cairns, the archaeological implications of which will be discussed below.

The construction method of the wall was very simple; limestone and flint cobbles were merely put in a single row on the then ground surface. It appears that the original wall height was very low, since the volume and number of fallen stones around the wall (**Fig. 13**), along with the experimental reconstruction of Structure 07 in the NE Complex (Fujii 2000: fig. 5), indicate that the wall

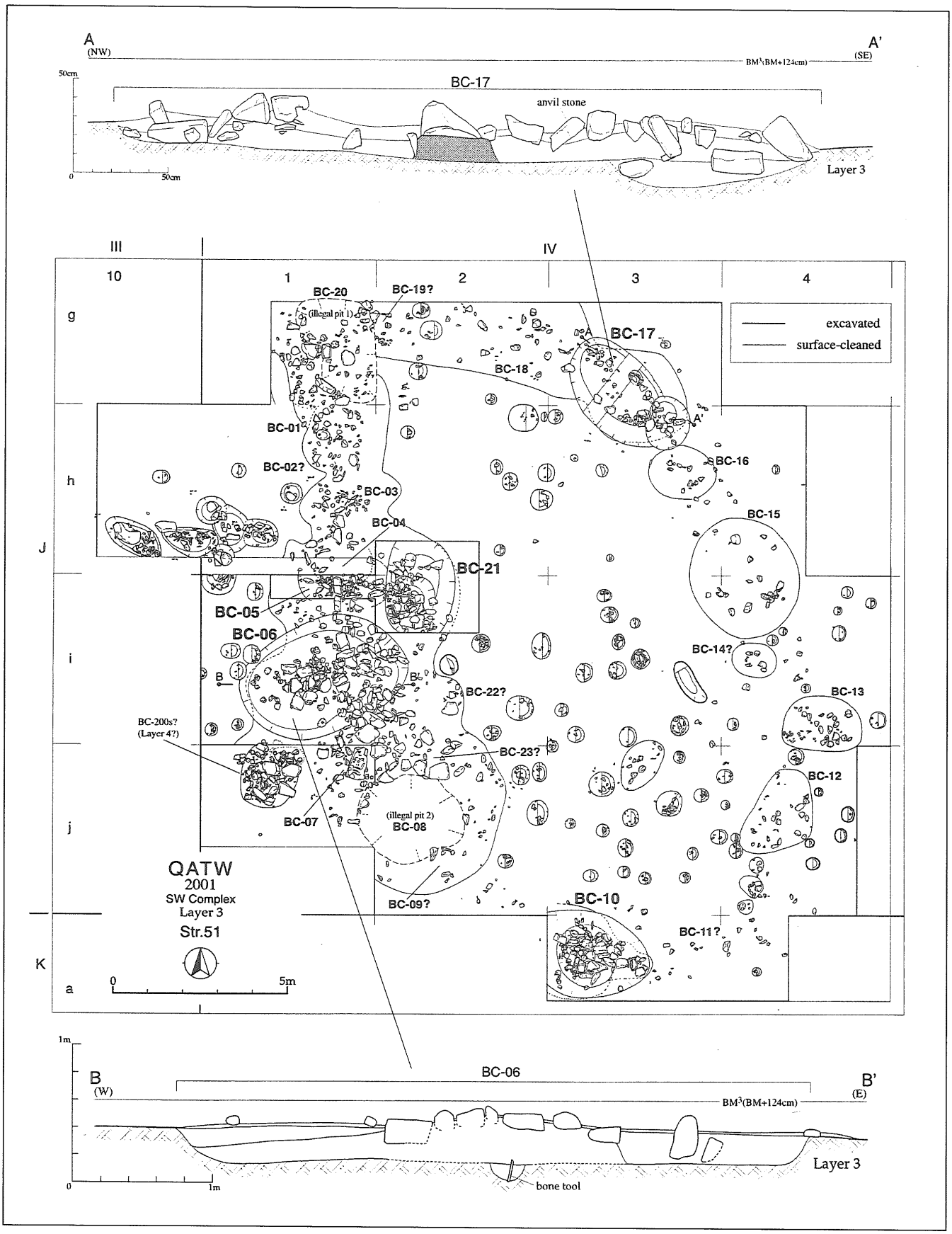
similarity to the other Layer 3 structures (Fujii 1998: 128-129; 1999: 70-72; 2000: 149-153).

A key to deciphering this unique structure is the number and location of burial cairns that often interrupt the wall. Based on the two, this large structure can be divided into about twenty units, each of which comprise a small pit-type burial cairn and a curvilinear pseudo-wall ca. 2-5m long. The point of discussion is whether these units were constructed all at once or added one by one at some time interval, and, if the latter is the case, where the first unit was constructed and to which direction the subsequent units were developed. Suggestive in this regard are the followings: 1) as noted above, upright boulders are concentrated on the western walls; 2) burial cairns are arranged at relatively longer intervals in the southern quarter, and at shorter intervals in the northeastern and northern corners; 3) the Layer 4 pseudo-settlement, probably the proto-type of the Layer 3 one, was developed from right to left when viewed facing a facade (Fujii 2001: 33-34). These facts, when taken together, suggest that this large, composite structure was gradually developed counterclockwise, probably with the starting point at one of the western units.

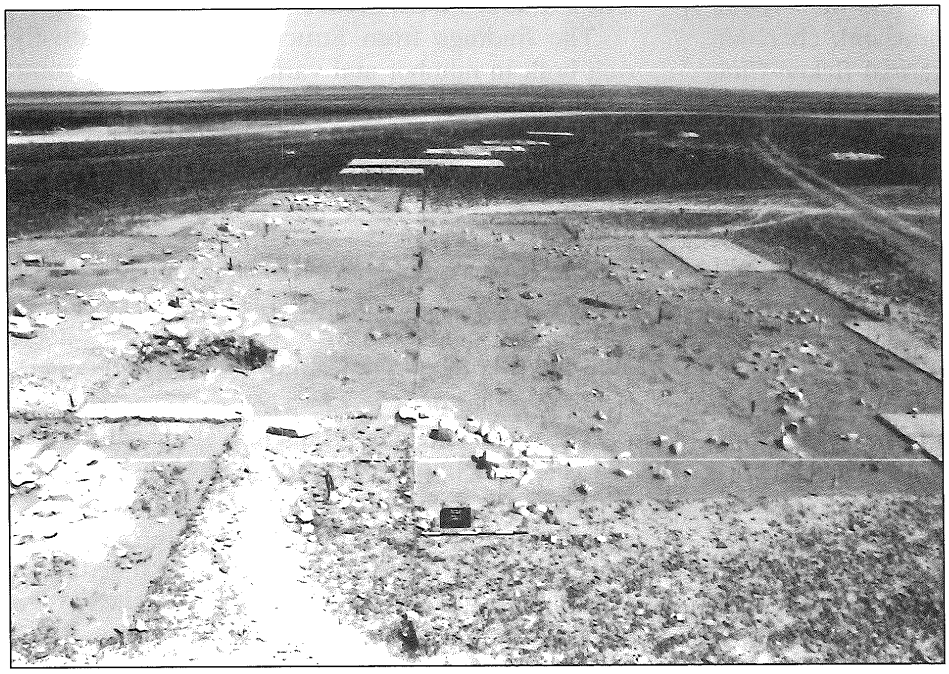
Another support for this reconstruction comes from the intra-pit features of BC-10, where the western wall was once disturbed by the burial pit but was soon reconstructed on its base, whereas the eastern wall was built on the lower fill layer of this pit and, at the same time, partly resting against the western wall (**Fig. 16**). Both phenomena illustrate the west to east (i.e., counterclockwise) development of the walls related this burial cairn. Also indicative is the fact that a dozen stone hoes (see **Fig. 18**) occurred exclusively around an illicit excavation pit that disturbed BC-20. This



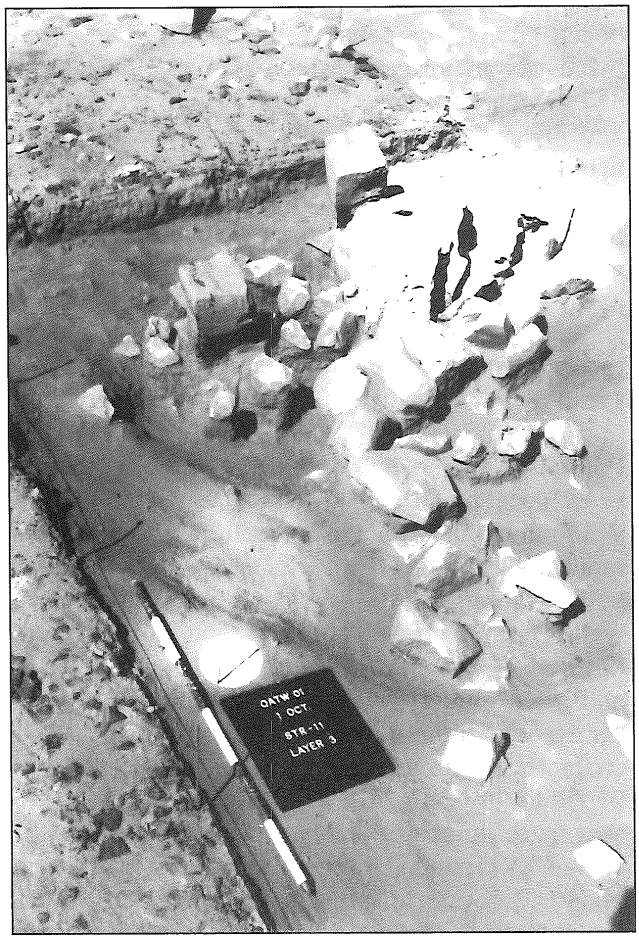
13. Structure 51: plan of Layer 2a and 2b.



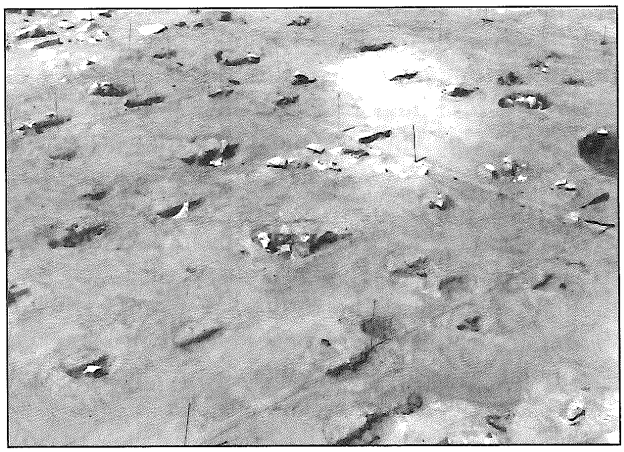
14. Structure 51: plan and section/elevation of Layer 3.



15. Structure 51 (from S).



16. Structure 51: BC-10 (from SE).



17. Structure 51: mourning pits (from SE).

might suggest that the counterclockwise development of this composite structure, despite the effort of narrowing intervals in the later half, finally came to an end at this corner and, therefore, these digging tools were discarded. It is also possible that they were left in commemoration of the completion of the circular development.

Whatever the case, it is now evident that Structure 51, as is the case of the other Layer 3 structures (Fujii 2001: 35-37; 2002a: 194), represents a pseudo-house — the final picture of the circular development of a burial cairn associated with a short, curvilinear pseudo-wall. Thus, the cluster of such pseudo-houses (i.e., the Layer 3 structural complex at QATW) must be viewed as a pseudo-settlement without practical habitation.

Hearths and Mourning Pits: Aside from several hearths dug from Layer 2b, a total of nine hearths were found within the original context of Structure 51. Most of them were round or slightly oblong in general plan and small in size, measuring ca. 30-

50cm in diameter or long axis and less than 15cm in depth. They contained ash, burnt soil, charcoal remains, abraded flint pebbles, thermal-flaked flint flakes, limestone flakes, or their various combinations depending on the case. However, no clear evidence for food processing were retrieved. It is therefore more likely that these hearths, as was the case of similar examples at the BC-200s, were concerned with some funerary ritual rather than a domestic use.

In addition to these hearths, a total of 82 mourning pits were found on the floor (**Fig. 17**). They are generally smaller and shallower than the hearths, and usually include only one or a few abraded flint pebble(s) often standing upright in the center, although some contained a few upright limestone cobbles. The occurrence of these unique pits clearly indicates the continuation of the mourning ritual held by the Layer 4 population. However, the following question arises here: why were mourning pits found merely at Structure 51, probably the youngest among the Layer 3 structures, and why did they rarely occur at the other Layer 3 structures? Central to this issue is the reason why the mourning pit ritual once became popular among the Layer 4 population, and why, after a few millennia of silence, it was suddenly restored at Structure 51.

A key to this enigma is the location of Structure 51. Of the four Layer 3 structures, Structure 51 is the only example to lie in the SW Complex where the mourning pit ritual flourished among the Layer 4 population (no clear evidence for the ritual has been found at the Layer 4 structures in the NE Complex). This leads us to a hypothesis that the population related to the Structure 51, while interfering with on-mound features such as the southern wall of PW-300, took an interest in and imitated the ancient ritual whose traces were still present around them. This hypothesis, if accepted, may explain why mourning pits of Structure 51 are rather concentrated on the southern floor — a zone closer to the BC-300s where the mourning pit ritual was most prevalent. It may also elucidate why larger pits containing upright limestone cobbles are limited on the western periphery — a locality nearer to the BC-200s where similar examples were found.

It is, however, most questionable whether the population fully understood the original significance of the mourning pit ritual. Highly suggestive in this regard is the fact that the mourning pits of Structure 51 are rarely located at mound flanks, to say nothing of their bases. This means that the Layer 3 population imitated merely what they could see — another support for the imitation hypothesis.

The Finds from Structure 51 (Layer 3)

The findings from Structure 51 are relatively rich both in number and variety, comprising some hundreds of flint artifacts, several anvils and hammer stones, a few dozen pottery sherds, and some miscellaneous artifacts described below.

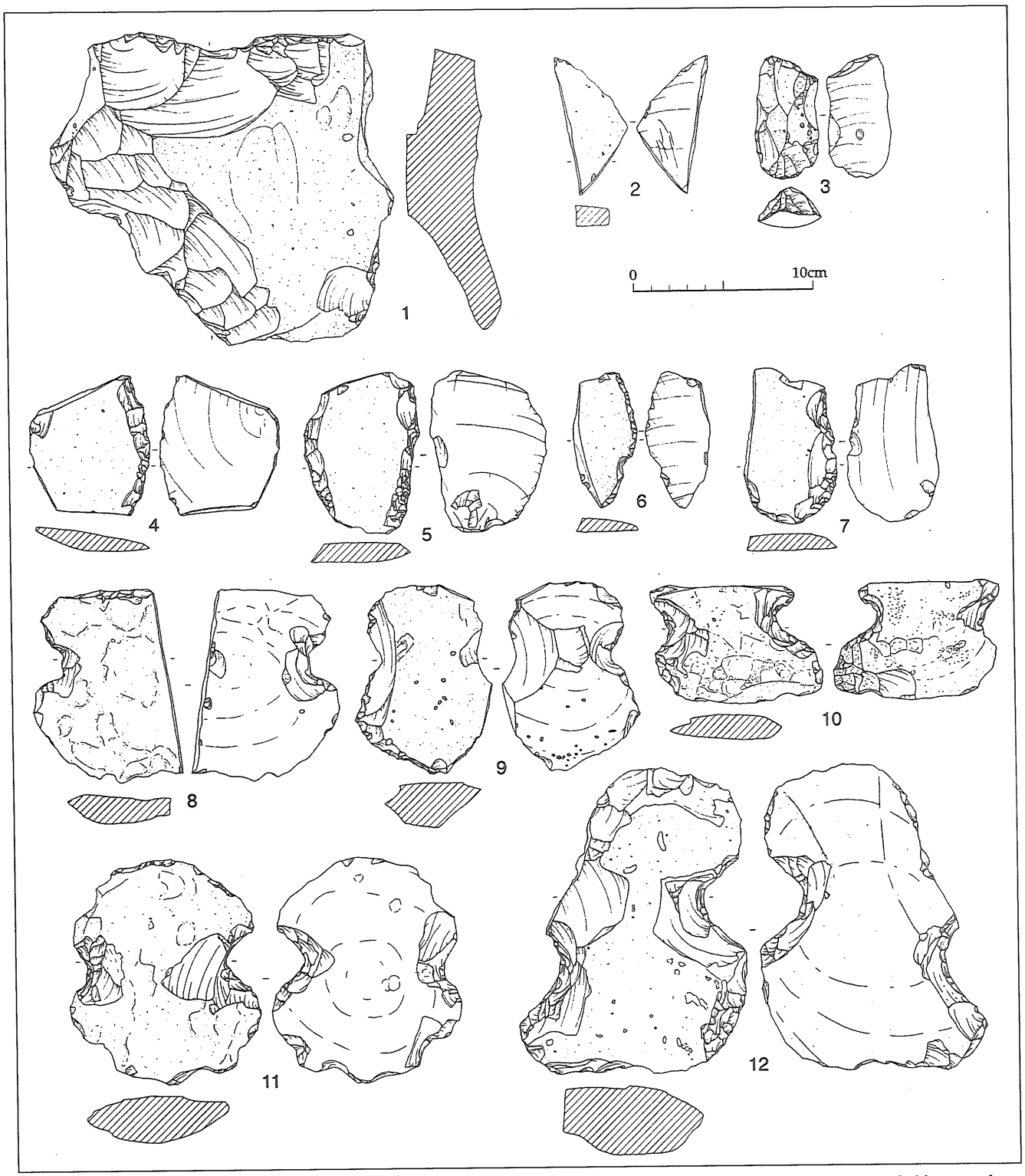
Flint Assemblage

The flint assemblage recovered from Structure 51 comprises four components: tabular scrapers, Jafr blades, undiagnostic flakes, and stone hoes, with the first being the leading element and the latter three minor ones.

The tabular scraper production at Structure 51 is characterized by a marked decline both in quality and quantity. First, the quantitative decline is represented in the fact that the tabular scraper components, even if cores and debitage are included, total up to merely some hundreds — a contrast with Structure 01 and -07, where some thousands of samples were recovered. Of further significance is the infrequency of finished products. Only a few dozen tabular scrapers are included in the assemblage, the majority of which is made up of cores and debitage — again, a contrast with Structure 01 and -07, where several hundreds of finished products were found.

The qualitative decline, on the other hand, is represented by typological simplification, although it may partly mirror the infrequency of the finished products themselves. The assemblage still includes an endscraper (**Fig. 18:3**), denticulates, and retouched flakes as well as tabular scrapers (Fig. 18:4-7); however, TSTE (Tabular Scraper Trimming Element) and QATP (Qa' Abu Tulayha Points) — diagnostic implements of the assemblages of Structure 01 and -07 (Fujii 2000: 155-159) — are fading out with the exception of several unmodified examples (**Fig. 18:2**).

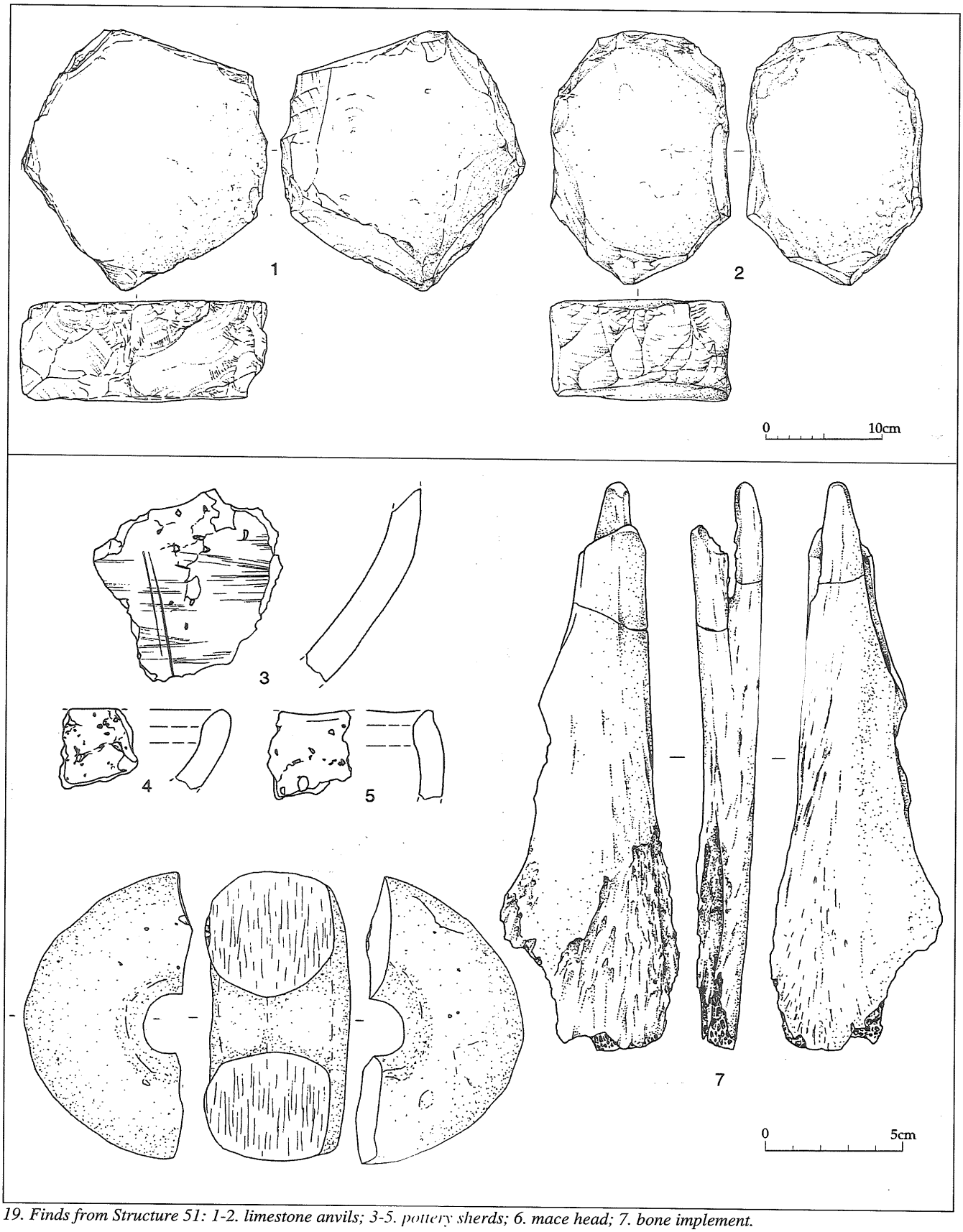
Deterioration can be found in technology as well. Tool blanks for tabular scrapers that were recovered at Structure 51 are usually small in size and often crudely snapped at one or two edge(s). Larger and longitudinally trimmed blanks, which characterize the assemblage of Structure 01 and -07 (Fujii 1998: fig. 10; 2000: fig.9), are nearly absent there (this is probably the reason for the scarcity of TSTE and QATP in the Structure 51 assemblage). Relevant to this techno-typological shift in tool blanks is the core reduction strategy. Cores from Structure 51 usually have smaller flaking scars (**Fig. 18:1**), whereas those from Structure 01 and -07 often exhibit invasive and/or wider flaking scars that produced longer and/or larger blanks (Fujii 1998: fig. 10:2-5; 2000: fig. 8:1). All these



18. Finds from Structure 51: 1. tabular scraper core; 2. TSTE; 3. carinated endscraper; 4-7. tabular scrapers; 8-10. stone hoes (flint); 11-12. stone hoes (limestone).

are responsible for the qualitative decline of the flint assemblage of Structure 51.

Incidentally, the flint assemblage of Structure 51 includes Jafr blades and stone hoes as minor components. No special comments are needed about the former, since it has already been referred to elsewhere (Fujii 2000: 159-160). Thus, the main concern is stone hoes — bi-laterally notched, heavy-duty tools probably used for digging a pit on *ḥammāda* surface (**Fig. 18:8-12**). A total of 17 samples were recovered around BC-20, although, unfortunately, no *in situ* finds were included due to the heavy disturbance by an illicit excavation. According to the preliminary examination by Masashi



19. Finds from Structure 51: 1-2. limestone anvils; 3-5. pottery sherds; 6. mace head; 7. bone implement.

Abe, a member of the staff, they are divided into two types: smaller ones made of flint (11 pieces) and larger ones made of limestone (6 pieces). Interestingly, the latter often bears heavier edge damage, probably suggesting the use for harder work. Of another interest is the exclusive use of thermal-

flaked blanks, which is probably due to their morphology suited for the production of stone hoes. Also intriguing is the total number of stone hoes (17 pieces), which possibly indicates that a small population consisting of ca. 20 persons was concerned with the construction of BC-20 — a suggestion of a single extended family of pastoral nomads (Avner 1990: 132).

To summarize, the flint (and partly limestone) assemblage of Structure 51 is marked by the drastic techno-typological decline of tabular scraper production and the appearance of a new component — stone hoes. Given the general consensus that the tabular scraper production ended with the EB III (Rosen 1997: 75), the former phenomenon suggests that the assemblage (and Structure 51 related to it) is dated to the final phase of EB III. This, in turn, would be a reliable base for the chronology of the stone hoes.

A few comments should be made about another archaeological implication of the poor state of lithic production at Structure 51. This phenomenon is highly significant in that it attests that the Layer 3 structures functioned primarily as symbolic cemeteries, not as tabular scraper workshops as suggested in the previous report (Fujii 1998: 137-138). When considering the formation process of this composite structure, it is more likely that the lithic production was conducted on the occasion of constructing a burial cairn. Or conversely, the lithic production might have come first and the construction next. The rich occurrence of tabular scrapers and the absence of structural remains at Qā' Abū Ṭulayḥa *East* may support this view (Fujii 1998: 126-127). Whatever the case, it is now apparent that the tabular scraper production and the Layer 3 structures, though often coexisting, were not the same in essence. The marked decline of lithic production at Structure 51 indicates that the essential function of the Layer 3 structures was related to funerary ritual, and not lithic production.

Anvils and Hammerstones

A few limestone anvils and several flint or basalt hammerstones were found at Structure 51 (**Fig. 19:2**). The general description of these heavy-duty tools has been made elsewhere (Fujii 1998: 133-134; 1999: 79-80; 2000a: 160). We need only note here that the occurrence of these implements as well as edge-trimmed tabular scrapers indicates that the blank-trimming technique, though much less frequently and elaborately, was still in use.

Pottery Sherds

A total of 49 pottery sherds were found, mostly from the surface and fill layers but five *in situ* finds from BC-06. A preliminary examination suggests that they comprise the following four classes: 1) dark red to reddish-brown, 1-5mm flint-tempered, slightly wet–smoothed, and relatively well fired coarse wares; 2a) grayish brown to dark brown, 1-5mm limestone-tempered, but sometimes flint-included, slightly wet-smoothed, relatively thick-walled, and worse-fired coarse wares; 2b) similar to the second, but less densely limestone-tempered coarse wares (**Fig. 19:3-5**); 3) light reddish to reddish-brown, minute particle-tempered, wheel-made, and well-fired, fine wares with 2-3mm thick, often carinated walls.

The last class is small in number and apparently represents a later contamination, probably from the Roman/Byzantine or possibly from the Nabataean context. Thus, the remaining three are our main concern here. Among them, the third class (class 2b) includes five *in situ* finds from BC-06, thus being most informative. It is, however, difficult to utilize them for chronological markers due to their fragmentary state and the scarcity of comparative material from steppe and desert sites. My tentative view is that the reddish color, heavy grit-tempering, hand-made manufacturing, and simple vessel shapes are all in a line with the general traits of EBA pottery assemblages in the southern Levant (Hendrix *et al.* 1996).

Others

A large fragment of a macehead (or a loom-weight), made of limestone, was found on the mound surface of BC-03 (**Fig. 19:6**). It is relatively large in size, measuring ca. 10cm in diameter and ca. 5cm in thickness, and has a central hole, ca. 2cm in diameter, bored from both directions. The two sections are artificially smoothed, hinting at the possibility that the breakage was not accidental.

In addition, a long bone, possibly a part of an ilium of a medium-sized animal (Hitomi Hongo: pers. communication), was recovered from BC-06 where five pottery sherds mentioned above were found *in situ* (**Fig. 19:7**). It was found stuck into a small mourning pit (**Figs. 14, 20**), suggesting that it was substituted for an upright flint pebble, an essential element of a mourning pit. The distal end, which were driven into the pit base, is forked and elaborately smoothed, hinting at its use as a handle or a shaft for a flint implement. Also suggestive is the proximal surfaces, which are also partly ground and presents a very flat profile. Besides, several animal bone fragments were found, but they are still under examination.

The Excavation of Structure 1001 (Layer 3)

Structure 1001 was already identified during the

second excavation season in 1998, and the surface collection was also carried out during the same season (Fujii 1999: 83-86). The excavation was planned for the next season, but it was unfortunately abandoned due to the heavy damage caused by recent limestone quarrying (Fujii 1999: 149). However, during the last week of this season, a final effort was made to remove a pile of limestone rubble covering the structure. Fortunately, it turned out to be still partly intact, and a rescue excavation was conducted for a couple of days.

Structure 1001

Structure 1001 is located ca. 200m south of the NE Complex and ca. 250m west of the SW Complex (Fujii 2000: fig. 1). Topographically, it lies below a gentle hill on which these Complexes extend, thus facing a small playa, Qā' Abū Ṭulayḥa, ca. 3km to the east. It must also be noted that it stands on a flint outcrop, a material source for the lithic production at QATW.

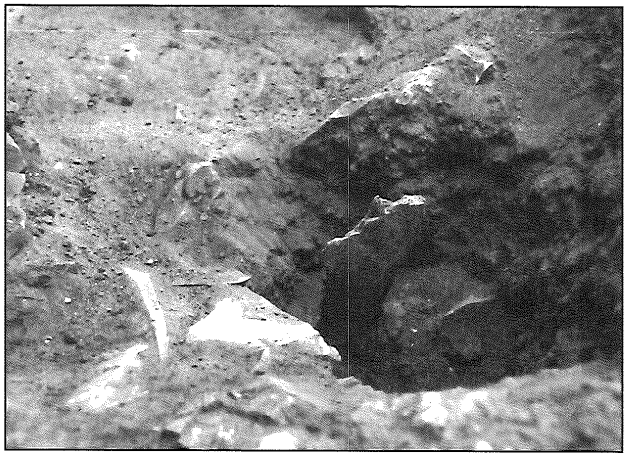
This structure was constructed on the upper surface of Layer 3, thus indicating that it was roughly contemporary with the other round structures located on the hilltop. However, it is far smaller in size than the latter and measures ca. 4.5m in the NW-SE major axis and ca. 3m in the NE-SW minor axis (**Figs. 21, 22**). Nevertheless, it bears a wide range of techno-typological similarities to them. First, it is a ground-type, stone built structure with an oblong general plan. Second, the wall was made of a single row of limestone and flint cobbles, some of which were put in an upright position, especially on a burial cairn pit. The third and most essential similarity consists in the combination of a pit-type burial cairn and a short, curvilinear wall extending from the former. The examination of BC-01 and BC-02 has revealed that a shallow pit once cut a part of an original wall, which in turn was soon reconstructed on the pit in question — a deep-rooted tradition inherited from Layer 4 structures to Layer 3 structures at QATW (Fujii 1999: 72-73; 2000: 153-154). It is, however, noteworthy that a series of burial cairns along the southern wall were constructed as ground-type features. It is therefore likely that this structure was associated with two types of burial cairns that are technologically different from each other — a similarity to Structure 07 (Fujii 2000: fig. 7).

Whatever the case, it is apparent that Structure 1001, though far smaller in scale than the contemporary parallels on the hilltop, also represents a pseudo-house. The existence of upright stones in BC-01 and BC-02 (in contrast to their absence at the southern burial cairns), the gradual decrease in cairn size ordering from BC-01 toward BC-07, and the tight arrangement of burial cairns in the southern quarter, all these hint at the counterclockwise development of this composite structure as suggested by Structure 51. Unfortunately, the damage in the southwestern corner and the existence of rubble still piled up at the northern end make it difficult to trace precisely how many burial cairn entities were concerned with the formation of this pseudo-house.

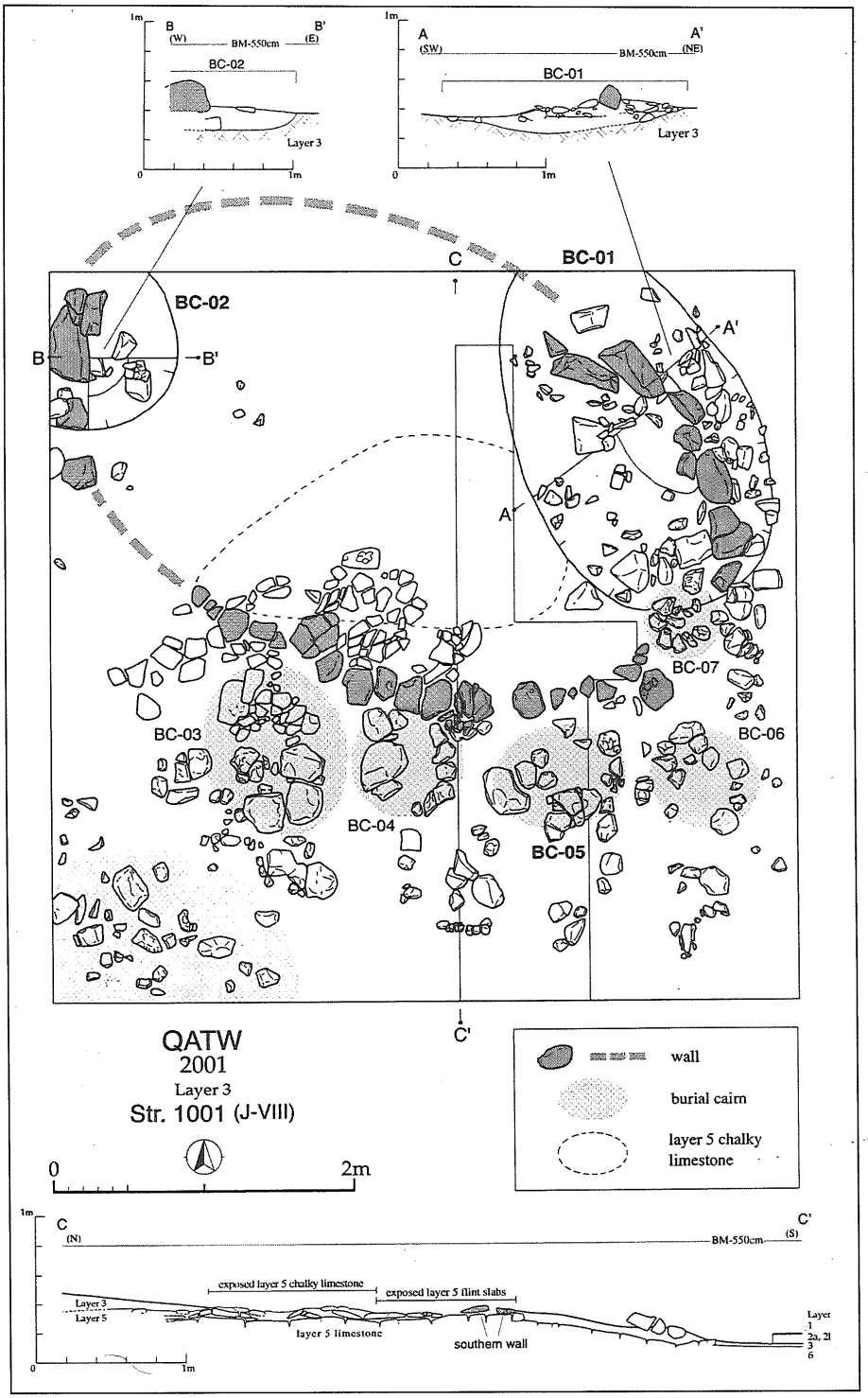
The Finds

The finds from Structure 1001 are small in number, consisting merely of a dozen Jafr blades components and several tabular scraper components. The general techno-typology of these finds has already been described in connection with the surface collection in 1998 (Fujii 1999: 83-86). Central to the discussion is the chronology of the Jafr blade assemblage.

The Jafr blade assemblage has often been referred to in the Upper Palaeolithic context (Huckriede and Wiesemann 1968), but the stratigraphy of Structure 1001 has clearly attested that it dated to the EBA. A possible question would be concerned with the contextual relation between the structure and the finds. Of particular importance in this regard is the existence of two *in situ* finds (**Fig. 23:1, 2**), which were found tightly incorporated into the pseudo-wall of BC-01. This, coupled with the frequency of similar components in the fill and surface layers (**Fig. 23:3-7**) and the net absence of heterogeneous components other than several tabular scrapers belonging to the same period, demonstrates the close ties between the structure and the Jafr blade components. In addition, upward contamination from Layer 4 is most unlikely, because the layer is nearly absent around this structure, and, even if exists, it is extremely poor in artifacts as



20. Structure 51 (BC-06): bone implement stuck in a mourning pit.



21. Structure 1001: plan and section/ elevation.

suggested by the hilltop Layer 4 complex. Also negligible is a contamination from Layer 5 and the lower layers, since the former represents a flint and limestone layer, thus apparently belonging to a pre-human age. It is also important to note that neither heavy abrasion nor patination can be recognized on the surfaces of the two *in situ* finds. This probably rules out the possibility that they had been long left on the slope and got incorporated into the pseudo-wall by chance.

Another line of evidence for the dating of the Jafr blade assemblage derives from: 1) the coexistence of Jafr blades and tabular scrapers — a widely attested phenomenon among Layer 3 hilltop structures as well as Structure 1001; 2) the existence of a reused core on which a Jafr blade flaking scar cut a tabular scraper scar (Fujii 2000: figs. 8–7) — a *terminus a quo* for the Jafr blade assem-

blage; 3) the subsequent conversion of this core for the construction material of a Layer 3 structure — a *terminus ad quem* for the same (Fujii 2000: 159-160); 4) the general similarities in patination between the Jafr blade components and the tabular scraper components at QATW; 5) the sharing of raw material between the two. All these reinforce our revised chronology.

Incidentally, the associated occurrence of Jafr blades and tabular scrapers has repeatedly been confirmed at flint knapping stations that were located during our 2001-2002 winter season survey (Fujii 2002b). Hence, it seems to be a phenomenon common to many sites in the Jafr basin, not peculiar to QATW. Also suggestive is techno-typological similarities between Jafr blade cores and Canaanean blade cores (Shimelmitz *et al.* 2000). As previously noted (Fujii 1999: 84), the Jafr blade industry could be viewed as a desert-version of the Canaanean blade industry. In any event, a line of evidence from QATW clearly attests that the former industry can be dated to the EBA, not to the Upper Palaeolithic horizon.

A Brief Overview of Intra-Site, Intra-Complex Chronology

In order to summarize the five seasons of excavation, a brief overview of the intra-site and intra-complex chronology of QATW will be given below on the basis of the available evidence.

Layer 4 Structures

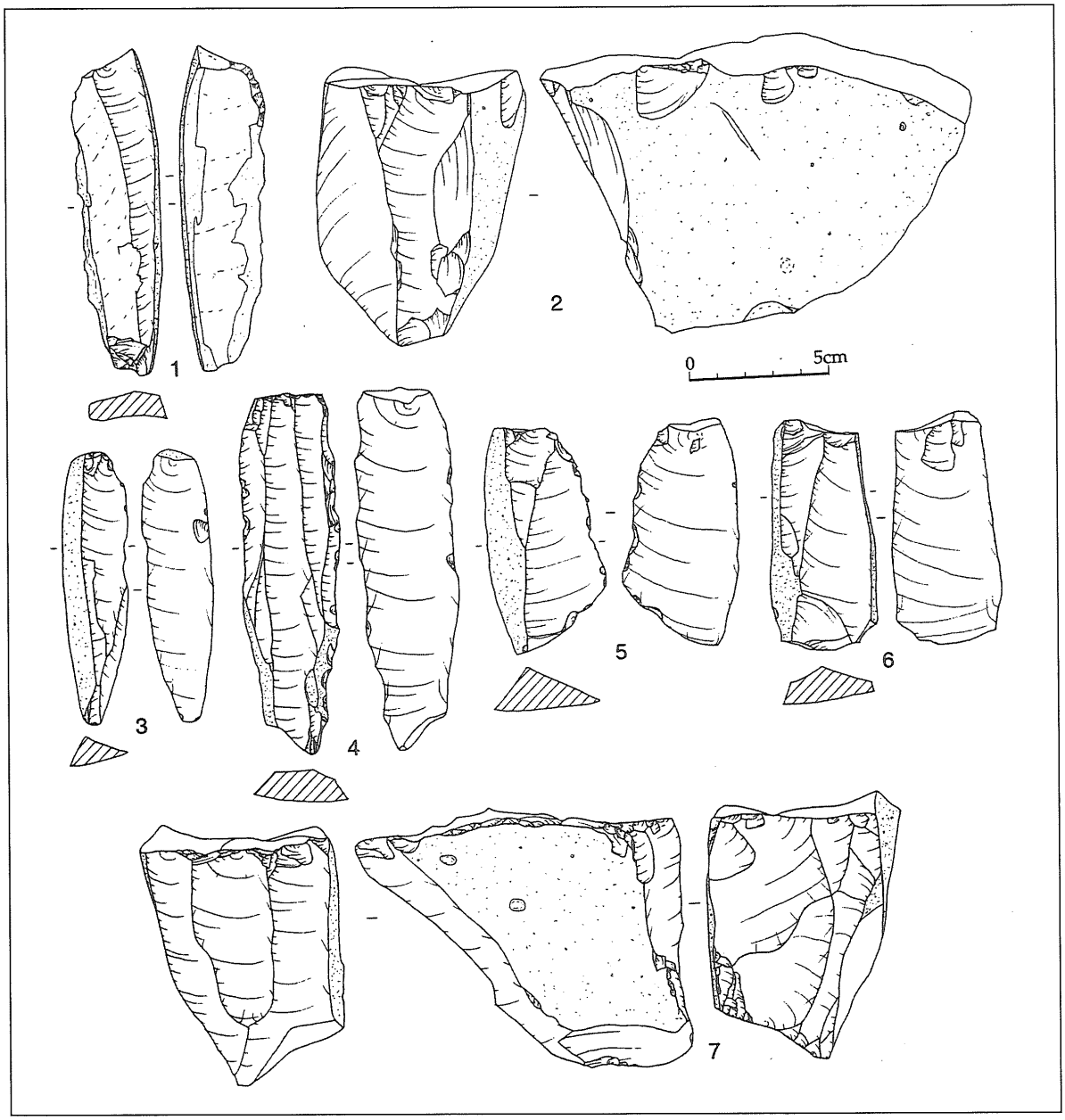
As previously suggested (Fujii 2001: 33-34), it is apparent that the linear development of the Layer 4 structural complex began with the Northern Continuum of the NE Complex, where the original form of a rectangular pseudo-house associated with a pit-type burial cairn can be found. Subsequently, the gradual addition of a similar structural unit led to the formation of three long continua. However, a wide range of techno-typological changes took place during their formation, including the partial invasion of a burial cairn into a pseudo-house, the relaxation of the connection of two adjacent units, and the unification of foundation mounds that originally followed the precise contour of a pseudo-house. These shifts finally culminated in Unit E' in the Southern Continuum, which in turn caused the appearance of isolated burial cairns, the BC-100s in the SW Complex, that are characterized by a twin-type mound and a remnant of two-rowed upright slab walls.

Next, too much approach between the two major components of a burial cairn entity resulted in their incorporation on a shallow pit — the appearance of the BC-200s. Finally, further simplification and a partial reversion to the original form, along with the flourishing of the mourning pit ritual, led to the establishment of the BC-300s and the BC-400s. The gradual orientation shift noted above would also corroborate this tentative reconstruction. One may therefore conclude that the Layer 4 structural complex developed following the horizontal stratigraphy from NE to SW.

However, a few questions must be addressed about the chronological relation between the BC-300s and the BC-400s. A key to this issue is a series of burial cairns that intervene between the BC-200s and the BC-300s. As noted above, they are



22. Structure 1001 (from S).



23. Finds from Structure 1001: 1. Jafr blades (in situ); 2. Jafr blade core (in situ); 3-6. Jafr blades; 7. Jafr blade core.

more similar to the BC-400s than to the BC-300s, thus indicating the possibility that the BC-200s were followed by the BC-400s including these candidates. Suggestive in this regard is the fact that the BC-400s (including these candidates) are lined on the southern extension of the BC-200s (**Fig. 1**). It is therefore more likely that the BC-400s were earlier in horizontal stratigraphy than the BC-300s.

However, a new question arises about the existence of BC-310: why does this burial cairn intervene in the N-S line in question. Suggestive in this connection is the existence of similar under-mound features both at BC-310 and at BC-405. Also of interest is the location of BC-310, which, if it can be regarded as one of the BC-400s, fits well with the regular arrangement from BC-205 down to BC-406. Accordingly, it seems more reasonable to assume that BC-310 (and probably BC-311 also) was constructed as one of the BC-400s. The on-mound feature of this burial cairn is certainly similar to that of the BC-300s rather than that of the BC-400s, but this might be a reflection of a later modification by a Layer 3 population (as evidenced by the occurrence of limestone anvils on the mound).

In summary, my tentative view is that the BC-200s were followed by the BC-400s (including the northern candidates), which in turn were followed by the BC-300s. The dichotomy both in typology

and in contents of the mourning pits, which were recognized in the eastern sector and not in the western one, may also support this view. An alternative option to be considered is that the development of the burial cairns branched off at BC-310 into the two directions. Excavation during the next season will hopefully provide a reliable clue to this issue.

Layer 3 Structures

The sequential development of the Layer 3 structural complex is easier to trace, since only four examples, three in the NE Complex and one in the SW, are included in this complex (the discussion here is limited to the hilltop structures, and therefore Structure 1001 is not included).

If one follows the horizontal stratigraphy suggested by the Layer 4 structures, the conclusion would be apparent: Structure 03 was the earliest among the three structures in the NE Complex, and Structure 01 and -07 followed it in this order, with Structure 51 in the SW Complex coming last. Importantly, this chronological order is roughly consistent with the techno-typological transition of tabular scrapers. A preliminary examination of thousands of samples (Hayasaka 2000) has suggested that the tabular scraper production at QATW was shifted from the earlier form based largely on whole blanks (Structure 01), through an intermediate one depending exclusively on trimmed blanks (Structure 01 and -07), finally to the overall decline at Structure 51.

However, here again, a few questions must be addressed about Structure 07. This structure is quite different both in typology and in size from the other three, thus possibly casting doubt on the linear model suggested above. Also problematic is the C-14 data, which provided an older date for Structure 07 than for Structure 01 (Fujii 2001: 22). With these in mind, further studies are needed before reaching a conclusion. In addition, the intra-site chronology of Structure 1001 must also be addressed. Although a line of evidence has clearly attested the dating to the Layer 3 (i.e., EBA) horizon, it is still open to question which phase of the structural sequence on the hilltop area it corresponds to.

Concluding Remarks

The fifth excavation season at Qā' Abū Ṭulayḥa West has provided critical evidence for the pseudo-settlement hypothesis (Fujii 2001: 33-37; 2002a). The formation process, intra-site chronology, and function of this unique desert site are now reasonably understood within the framework of this hypothesis. This may serve as a reliable base for the desert archaeology in the southern Levant. The establishment of a relative chronology of various burial cairns, the finding of the mourning pit ritual, and the chronological reassessment of the Jafr blade assemblage would also contribute to future studies. The next season is due from August to September 2002, focusing on the subsequent techno-typological transition of the Layer 4 burial cairns and the flint-mining activities of the Layer 3 population.

Acknowledgments

I would like to express my gratitude to the Department of Antiquities of Jordan for their kind cooperation, and to the Ministry of Education and Science, Japan, for their financial support (International Scientific Research Program: Grant No. 13571037 and 12571041). My special thanks go to Mr. Emsaytif Suleiman, representative of the Department, who has long supported us from the beginning of the project. Also, I wish to thank the members of the staff (Kazuya Yamauchi, Chizu Maeda, Masashi Abe, Aya Takahashi, and Makoto Ohta) for their helpful support both in the field and laboratory.

S. Fujii
Faculty of Letters
Kanazawa University
Kakuma-machi, Kanazawa
920-1192, Japan

Bibliography

Avner, U.
1990 Ancient Agricultural Settlement and Religion in the Uvda Valley in Southern Israel. *BA* 53/3: 125-141.

Fujii, S.
1998 Qa' Abu Tulayha West: An Interim Report of the 1997 Season. *ADAJ* 42: 123-140.
1999 Qa' Abu Tulayha West: An Interim Report of the 1998 Season. *ADAJ* 43: 69-89.
2000 Qa' Abu Tulayha West: An Interim Report of the 1999 Season. *ADAJ* 44: 149-171.
2001 Qā' Abū Ṭulayḥa West, 2000: An Interim Report of the Fourth Season. *ADAJ* 45: 19-37.
2002a The Pseudo-Settlement Hypothesis: Evidence from Qa' Abu Tulayha West, Southern Jordan. *Archaeozoology of the Near East* 5: 183-196.
2002b A Brief Note of the 2001-2002 Winter Season Survey of the Jafr Basin, Southern Jordan. *ADAJ* 46 (this volume).

Goring-Morris, N., Gopher, A. and Rosen, S.
1994 The Neolithic Tuwailan Cortical Knife Industry of the Negev. Pp. 511-524 in H.G. Gebel and S.K. Kozlowski (eds.), *Neolithic Chipped Stone Industries of the Fertile Crescent*. Berlin: Ex Oriente.

Hayasaka, Y.
2000 *The Technology and Chronology of Tabular Scrapers from Qa' Abu Tulayha West.* M. A. Thesis (University of Kanazawa).
Hendrix, R.E., Drey, P.R. and Storfjell, J.B.
1996 *Ancient Pottery of Transjordan.* Berrien Springs: Andrews University.
Huckriede, R. and Wiesemann, G.
1968 Der Jungpleistozäne Pluvial-See von El-Jafr und Weitere Daten zum Quartät Jordaniens. *Geologica et Paleoentologica* 2: 73-95.
Rhotert, H.
1938 *Transjordanien: Vorgeschichtliche Forschungen.* Stuttgart: Verlag Strecher und Schröder.
Rosen, S.A.
1997 *Lithics after the Stone Age.* London: Altamira Press.
Shimelmitz, R., Barkai, R. and Gopher, A.
2000 A Canaanean Blade Workshop at Har Haruvim, Israel. *Tel Aviv* 27/1: 3-22.

A BRIEF NOTE ON THE 2001-2002 WINTER SEASON SURVEY OF THE AL-JAFR BASIN IN SOUTHERN JORDAN

Sumio Fujii

Introduction

In order to collect basic information on the general occupational history of the al-Jafr basin, a brief reconnaissance survey was conducted from 27 December 2001 to 6 January 2002, focusing on the northwestern part where Qā' Abū Ṭulayḥa West (QATW) (قاع ابو طليحة), our main concern for these five seasons (Fujii 1998; 1999; 2000; 2001; 2002a; 2002b), is situated. As a result, about thirty archaeological sites were located for the first time.

The purpose here is to present a brief summary of this survey. A comprehensive description of surveyed sites is beyond the scope of this paper, since the examination of the finds is still in progress. This paper focuses on several sites worthy of special comments, including a Pre-Pottery Neolithic B (PPNB) settlement (JF-0116), a few Late Neolithic (LN) and Early Bronze Age (EBA) pseudo-settlements (JF-9705 and JF-0104), a few K-lines (JF-0118 and JF-0125), and a tabular scraper knapping station located in Bāyir (باير) (JF-0126).

JF-0116 (Jabal Juḥayra جبل جحيرة)

JF-0116 is a small PPNB settlement that was located in the southeastern flank of Jabal Juḥayra, a dormant volcano a few kilometers northwest of al-Ḥusayniyya الحسينية (**Fig. 1**). Aside from al-Jafr-17, a flint scatter located in the northeastern hilly country in the al-Jafr basin (الجفر) (Quintero and Wilke 1998: 120-121), and an unconfirmed candidate south of Ma'ān (معان) (pers. communication from Dr. A. Garrard), this is the first PPNB site that has so far been firmly identified in the basin. Furthermore, it is the first PPNB settlement site with clear evidence for structural remains.

The site extends below a cluster of small rock-shelters opening in the southeastern flank of Jabal Juḥayra (**Fig. 2**), thus being protected from the predominant wind in this area. A flint scatter and several wall lines of stone-built structures, both rectangular and sub-rectangular, were found on the southern, steep slope along a small ravine. Based on the range of this flint scatter, the site area was estimated at ca. 0.5ha, suggesting that the site represents a small settlement comprising about a dozen dwellings.

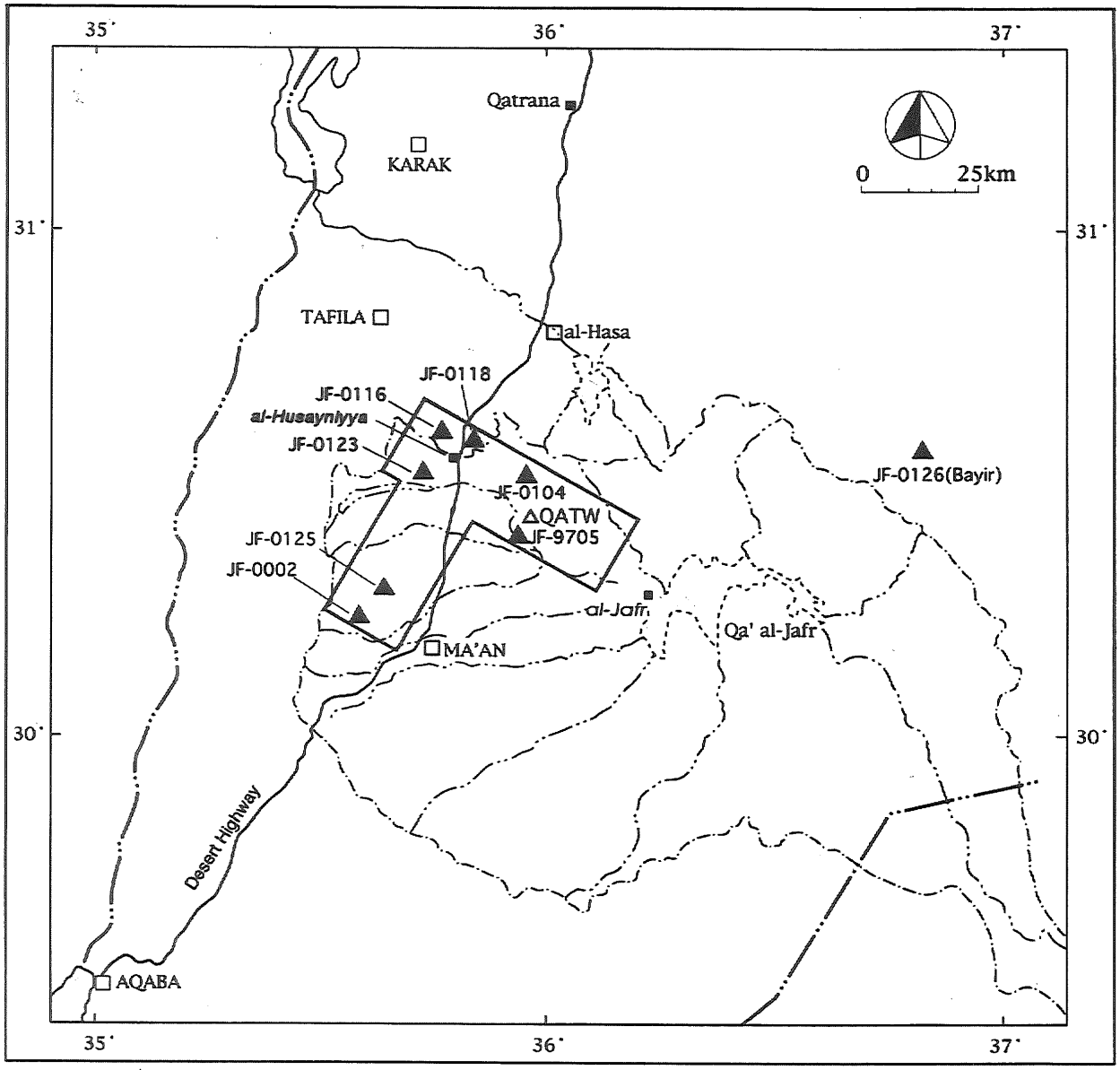
The surface finds consists of some dozens of flint artifacts, which are characterized by bidirectional cores and blades (**Fig. 3:1-5, 10-17**). It must be noted that the former includes a few typical samples of naviform cores (**Fig. 3:4, 5**), a chronological marker of the PPNB entity. Also noteworthy is the occurrence of a Byblos type (?) point, which has a long, slightly offset, semi-abruptly retouched tang (**Fig. 3:8**). In addition, a few small axes/chisels (**Fig. 3:6, 7**) and an amorphous implement (**Fig. 3:9**) are also included in the finds.

It is therefore evident that the site is dated to the PPNB, although it is still difficult to assess what phase of the PPNB it belongs to. However, the occurrence of non-naviform type bidirectional cores (**Fig. 3:1-3**), which resemble the opposed platform wedge-shaped cores from Jabal Quwaysa (جبل قويسة), an Early Neolithic site in Wādī Ḥismā (وادي حسمى) (Henry 1995: fig. 14.4 and 14.6), might suggest the existence of a layer (or layers) assigned to the Early and/or Middle PPNB. Also suggestive is the probable existence of sub-rectangular (or oblong) structures, which are characteristic of the earlier stage of the PPNB, as evidenced by similar examples at Bayḍā (بيضا) (Kirkbride 1967: fig. 1) and 'Ayn Abū Nukhayla (عين أبو نخيلة) (Kirkbride 1978: fig. 2).

Whatever the case, the finding of this site is highly significant in that it demonstrates that the westernmost hilly country in the al-Jafr basin was inhabited by a PPNB (semi-) sedentary population. It might be possible that the site represent a trans-watershed counterpart of the Wādī Faynān (وادي فينان) PPNB entity (Najjar 1994; 2001; Simmons and al-Najjar 1996; Finlayson and Mithen 1998; Barker 2000).

Pseudo-Settlements

The pseudo-settlement is a settlement-like entity formed by a linear or circular combination of burial cairns. It is critically different from a simple cairn cluster or a simple cairn field in that: 1) the burial cairns are generally associated with a rectangular pseudo-house or a curvilinear pseudo-wall; 2) thus, overall, the linear or circular combination of these burial cairns presents a settlement-like ap-



1. The survey area and the sites referred to in the text.

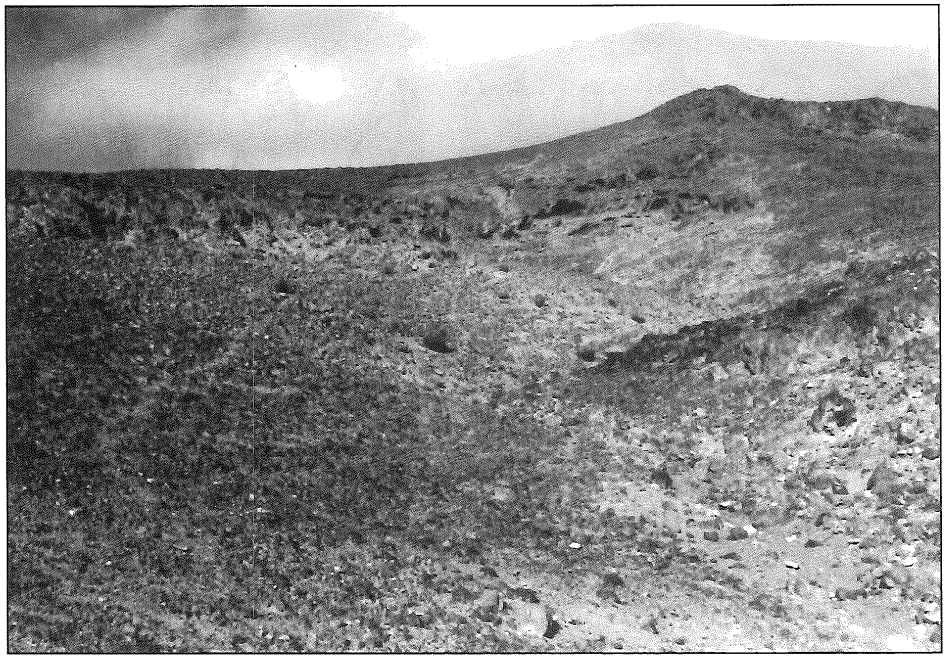
pearance; 3) nevertheless, what it represents is, in fact, the final picture of a gradual addition of a burial cairn entity to an adjacent lot.

The internal structure and archaeological implications of the pseudo-settlement were first clarified in the excavations at QATW, although a circular combination of burial cairns and curvilinear walls had already been noted elsewhere, especially in an-Naqab النقب (e.g., Haiman 1992). Advanced on this base was the pseudo-settlement hypothesis (Fujii 2001: 33-37; 2002a; 2002b). The formation process of the Layer 4 structural complex (i.e., linear combinations of burial cairns and two-rowed upright slab walled, rectangular pseudo-houses) and the Layer 3 structural complex (i.e., circular combinations of burial cairns and curvilinear pseudo-walls) at QATW is now reasonably understood within the framework of the pseudo-settlement hypothesis.

The 2001-2002 winter season survey has identified several more pseudo-settlements, a few of which will be introduced below. The existence of these examples demonstrates that the hypothesis is applicable to a broader context beyond the type-site, QATW. This, in turn, would further corroborate the validity of the pseudo-settlement hypothesis.

JF-9705 (Wādī Abū Ṣafāh وادي أبو صفاه)

JF-9705 is a composite site that was located ca. 3km WSW of QATW. It extends over both banks of Wādī Abū Ṣafāh, one of the major drainage systems of the al-Jafr basin. The site includes both a QATW Layer 4 type pseudo-settlement and a Layer 3 type pseudo-settlement, of which the former lies on the western, higher elevation, bank and



2. JF-0116 (Jabal Juḥayra) (from E).

the latter on the eastern, lower elevation bank, respectively.

As is the case with QATW, the Layer 4 type pseudo-settlement in this site comprises a straight chain of a rectangular structure that is associated with a small burial cairn at the left corner of a facade. However, this pseudo-settlement is much less elaborate in construction quality than that of QATW in that small limestone pebbles, instead of large slabs, are used for the construction material and the wall lines often fade out in the *ḥammāda* surface. This makes it difficult to trace the profile precisely, although the overall layout clearly supports the identification as a QATW Layer 4 type pseudo-settlement. The surface finds were very poor both in number and variety — another similarity to the QATW Layer 4 pseudo-settlement.

The Layer 3 type pseudo-settlement at this site consists of a few large, round structures ca. 10-15m in diameter. The walls of these structures are constructed with a large volume of limestone and flint cobbles, and still remain standing ca. 1m high. A small burial cairn, usually round in general plan, often intervenes in the walls, thus suggesting a similarity to a QATW Layer 3 type pseudo-settlement. Here again, the surface finds were very poor, comprising a dozen undiagnostic flint artifacts and pottery sherds, including a few samples probably dated to the EBA.

JF-0104

(Wādī ar-Ruwayshid ash-Sharqī وادي الرويشد الشرقي)

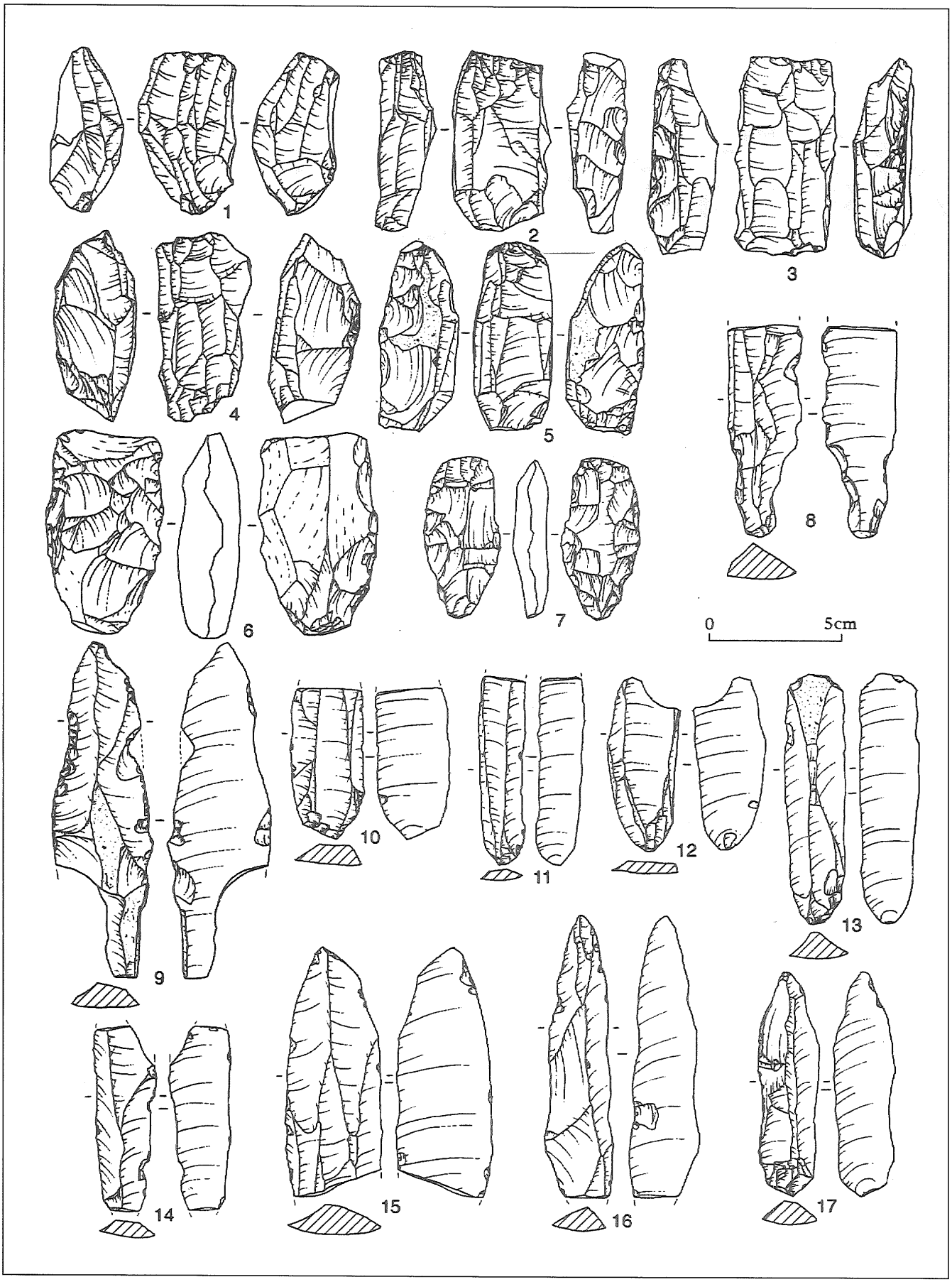
This site was located on a flat *ḥammāda,* flint pavement desert, below the hilly country that extends north of the Ḥusayniyya-Jafr road. It lies on the western bank of Wādī ar-Ruwayshid ash-Sharqī, a tributary of Wādī ar-Ruwayshid, one of the major drainage systems in the al-Jafr basin. This is another composite site involving two types of a pseudo-settlement. However, as was the case with JF-9705 mentioned above, two pseudo-settlements are situated ca. 50m apart from each other.

The Layer 4 type pseudo-settlement at this site consists of a single, short combination of rectangular pseudo-houses with a small burial cairn at the left corner of a facade and a few cells at the rear left corner of a room. However, as was the case with JF-9705, the precise profile of these pseudo-houses was often difficult to trace due to the poor quality of construction (**Fig. 4**).

The Layer 3 type pseudo-settlement, on the other hand, is entirely exposed on the *ḥammāda* surface, thus being discernible without any difficulty. It is represented by a large round structure that combines a dozen small burial cairns, ca. 1-2m in diameter, and curvilinear pseudo-walls (**Fig. 5**). It is interesting to note that these cairns and walls often include upright limestone boulders — another similarity to the QATW Layer 3 pseudo-settlement. No diagnostic artifacts were found at this site, but this may also support the identification as a pseudo-settlement.

Other Examples

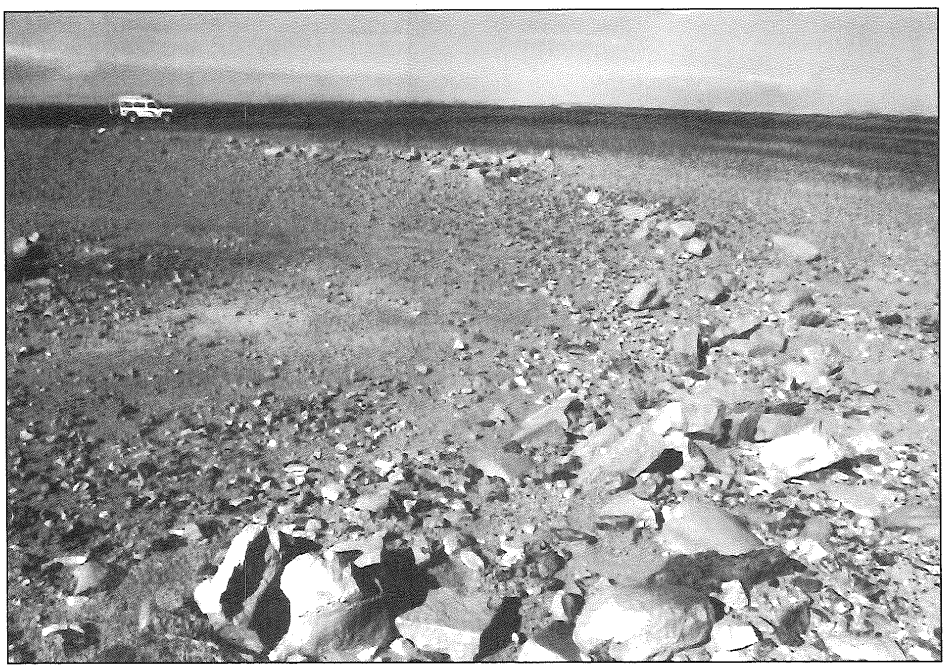
To date, a composite pseudo-settlement has been limited to these two (or three if we include QATW). However, the evidence for a Layer 3 type



3. JF-0116 (Jabal Juḥayra): the flint collection.



4. JF-0104 (Wādī ar-Ruwayshid ash-Sharqī): the Layer 4 pseudo-settlement (three members of the staff signify the location of a burial cairn).



5. JF-0104 (Wādī ar-Ruwayshid ash-Sharqī): the Layer 3 pseudo-settlement.

pseudo-settlement were found at some other sites including JF-9701, -0001, -0108, and -0113. This, coupled with the frequency of K-line sites, and tabular scraper and Jafr blade production sites mentioned below, clearly indicates that the al-Jafr basin was often utilized by the EBA pastoral populations for symbolic burial and flint exploitation as well as seasonal pasturing. In contrast, the evidence for a Layer 4 type pseudo-settlement still remains scarce, probably suggesting a low population density in that period.

K-Lines

The K-line represents an elongated, free-standing, stone-built feature that comprises a long chain of cairns and walls. This unique feature was first identified in the western Naqab Highland (Evenari *et al.* 1958; Glueck 1958; 1959; Haiman 1999) and recently dated, though still tentatively, to the EBA (Haiman 2000). The distribution of the K-line has so far been limited to the Naqab Highland, but the identification of a few similar examples in our survey area would necessitate modification of this picture.

JF-0118 (Tall Burma تل برمة)

The first example of a K-line in the Jordanian plateau was found on a gentle basalt slope west of

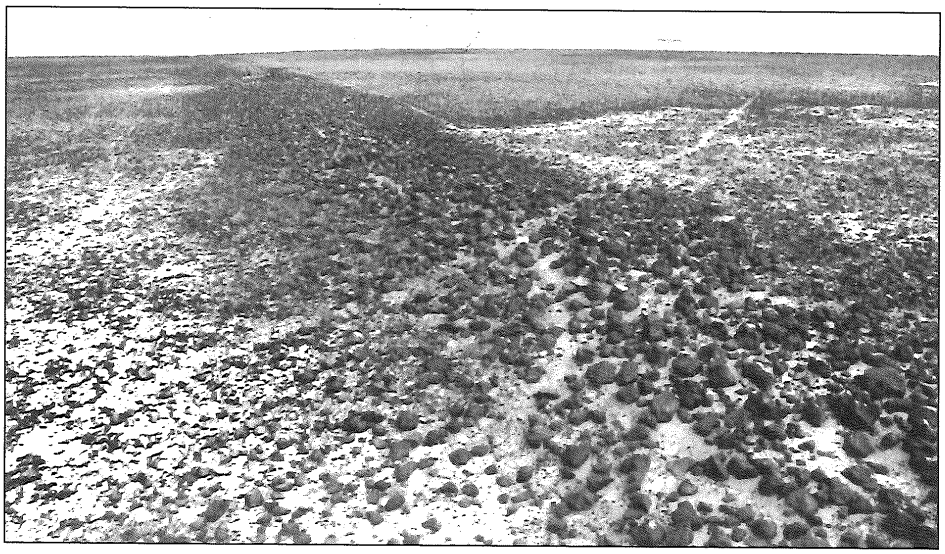
Tall Burma, an isolated volcanic hill a few kilometers northeast of al-Ḥusayniyya (**Fig. 6**). It extends roughly in a straight line from the southern skirt of Tall Burma down to the eastern bank of Wādī Burma, measuring ca. 0.8km in total length.

This K-line is constructed exclusively with basalt cobbles, eruptions of Tall Burma. Although the wall of this K-line is collapsed all over, the number and volume of fallen cobbles suggest that the original height was less than 1m. As is the case with the Naqab examples, the wall is often interrupted by a cairn-like small link either round or sub-rectangular in general plan. An examination of a well-preserved example (**Fig. 7**) has suggested that, as noted by Glueck (1959: 9), the cairns are wider (ca. 3m in diameter or depth) than the wall (ca. 1m). Also noteworthy is the present height (ca. 0.5m) of the cairn, which suggests that it was originally a little higher than the wall. It may also be interesting to note that this cairn has a hollow center ca. 1m in diameter, although it might have resulted from an illicit excavation.

JF-0125 (Tall ʻĀbūrā تل عابورا)

The second example of the K-line was located on the southern flank of Tall ʻĀbūrā, an isolated limestone hill near Udhruḥ (أذرح), a small town ca. 20km northwest of Maʻān (**Fig. 8**). A landmark is the pumping station G1215, which is situated ca. 0.5km northeast of the site.

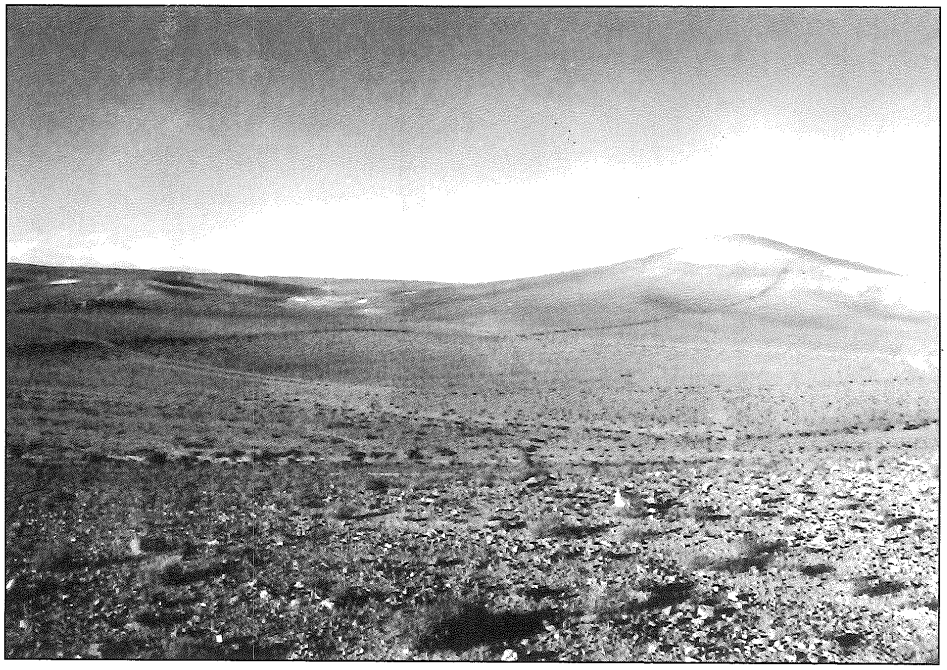
This is a typical K-line in terms of both the site setting and the scale. It extends roughly in a straight line from the southern flank of Tall ʻĀbūrā down to its skirt and further passes over an undu-



6. JF-0118 (Tall Burma): the K-line (from E).



7. JF-0118 (Tall Burma): a cairn (round link) in the wall of a K-line.



8. JF-0125 (Tall 'Ābūrā): the K-line (from S).

lating plain to the south, thus measuring a few kilometers in total length. Echoing the site setting, limestone and sometimes flint cobbles and boulders were used for the construction material. A brief examination has confirmed that a small cairn, ca. 1-2m in diameter, often intervenes in the wall. Interestingly, upright limestone and flint boulders are often included both in the cairns and in the wall.

Other Examples

A possible example of a K-line (JF-0002) was located on a hilltop ca. 1km east of Bīr Abū Dannah (بير أبو دنّه) , a small village ca. 20km west of Ma'ān. This site includes a cluster of large round structures as well as a possible K-line. The K-line, though partly disturbed by recent agricultural activities, extends some hundreds of meters passing over the northern slope of the hill (**Fig. 9**). As was the case with the two K-lines mentioned above, cairn-like small, round links often intervene in the wall, thus providing a qualification for the third example of the K-line in the Jordanian plateau.

Another possible example (JF-0123) was found on the southern flank of "Ḥarra as-Sayyiya", an isolated volcanic hill some kilometers southwest of al-Ḥusayniyya. However, this elongate stone pile runs largely along a dirt road, possibly suggesting that it resulted from the road construction.



9. JF-0002 (Bīr Abū Dannah): the K-line (from S).

JF-0126 (Bāyir بایر)

Although omitted from this paper, more than ten knapping stations for tabular scrapers and Jafr blades have been located in the hilly countries extending north of the Ḥusayniyya-Jafr road. Most, if not all, of them are probably dated to the EBA on the basis of a line of evidence from QATW. The high frequency of these EBA lithic production sites, along with the occurrence of a variety of burial-related sites, suggests a full-scale re-activation of pastoral nomadism in the fourth millennium BC



10. JF-0126 (Bāyir): the flint outcrops (foreground) and a tabular scraper knapping station (background) (from N).

— a general trend in the southern Levantine arid peripheries (Finkelstein 1995).

Of special interest in this regard is JF-0126, which was located by chance during our one-day excursion to Bāyir, an ancient crossroad in the Jordanian Bādiya. This site lies on the western slope of a gentle hill ca. 1km north of a police station that has recently gone out of use. A dense scatter of tabular scraper and Jafr blade cores and debitage was found beside a series of flint outcrops (**Fig. 10**). This is the first tabular scraper production site to be located west of the Azraq-Jafr road. The finding of this site suggests that the EBA pastoral population expanded further deep into the Bādiya beyond the range suggested by a recent synthesis (Baird 2001: 649-650).

Concluding Remarks

The 2001-2002 winter season survey has revealed that the al-Jafr basin, though seemingly poor in archaeological potential, is in fact rather rich in archaeological occurrences. This paper merely referred to a few aspects of it. A comprehensive report, which incorporates the results of the previous surveys conducted from 1997 to 2001 and the next one planned in the 2002 summer season, is to be published in the near future.

Acknowledgments

I would like to express my gratitude to the Department of Antiquities of Jordan for their kind cooperation, and to the Ministry of Science and Education, Japan, for their financial support (The al-Jafr Basin Prehistoric Project is funded by the Monbusho Grant-in-Aid International Scientific Research Program: Grant No. 12571041 and 13571037). Also, I must express my many thanks to Mr. Ahamad Sharma, representative of the Department, and the members of the staff (Ryouichi Kontani and Masashi Abe), who withstood the terrible weather during that winter.

S. Fujii
Faculty of Letters
Kanazawa University
Kakuma-machi, Kanazawa
920-1192, Japan

Bibliography

Baird, D.
2001 The Analysis of Chipped Stone. Pp. 639-651 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press.

Barker, G.
2000 Farmers, Herders and Mines in the Wadi Faynan, Southern Jordan: a 10,000-year Landscape Archaeology. Pp. 63-85 in G. Barker and D. Gilbertson (eds.), *The Archaeology of Drylands*. London: Routledge.

Evenari, M., Aharoni, Y., Shanan, L. and Tadmor, N.H.
1958 The Ancient Desert Agriculture of the Negev: III. Early Beginnings. *IEJ* 8: 231-268.

Finkelstein, I.
1995 *Living on the Fringe*. Sheffield: Sheffield Academic Press.

Finlayson, B. and Mithen, S.
1998 The Dana-Faynan (South Jordan) Epipalaeolithic Project: Report on Reconnaissance Survey, 14-

22 April 1996. *Levant* 30: 27-32.

Fujii, S.

1998 Qa' Abu Tulayha West: An Interim Report of the 1997 Season. *ADAJ* 42: 123-140.

1999 Qa' Abu Tulayha West: An Interim Report of the 1998 Season. *ADAJ* 43: 69-89.

2000 Qa' Abu Tulayha West: An Interim Report of the 1999 Season. *ADAJ* 44: 149-171.

2001 Qa' Abu Tulayha West, 2000: An Interim Report of the Fourth Season. *ADAJ* 45: 19-37.

2002a Qa' Abu Tulayha West, 2001: An Interim Report of the Fifth Season. *ADAJ* 46 (this volume).

2002b Pseudo-Settlement Hypothesis: Evidence from Qa' Abu Tulayha West. *Archaeozoology of the Near East* 5: 183-196.

Glueck, N.

1958 The Seventh Season of Archaeological Exploration in the Negeb. *BASOR* 152: 18-38.

1959 An Aerial Reconnaissance of the Negev. *BASOR* 155: 2-13.

Haiman, M.

1992 Cairn Burials and Cairn Fields in the Negev. *BASOR* 287: 25-45.

1999 *Map of Har Hamran Southeast (199)* (Archaeological Survey of Israel). Jerusalem: Israel Antiquities Authority.

2000 The 'K-Line' at Har Romem in Light of the Survey of the Map of Har Ramon (203). *'Atiqot* 39: 21-29.

Henry, D.O.

1995 *Prehistoric Cultural Ecology and Evolution: Insights from Southern Jordan.* New York: Plenum Press.

Kirkbride, D.

1967 Beidha 1965: An Interim Report. *PEQ* 99: 5-13.

1978 The Neolithic in Wadi Rumm: 'Ain Abu Nekheileh. Pp. 1-10 in R. Moorey and P. Parr (eds.), *Archaeology in the Levant.* Warminster: Aris & Phillips Ltd.

Najjar, M.

1994 Ghwair I, a Neolithic Site in Wadi Feinan. Pp. 75-85 in *The Near East in Antiquity* 4. Amman.

2001 Towards a Commonly Accepted Chronological Framework of the Pre-Pottery Neolithic B Period in Jordan. Pp. 101-105 in *SHAJ* 7. Amman: Department of Antiquities.

Najjar, M., Abu Dayya, A., Suleiman, E., Weisgerber, G. and Hauptmann, A.

1988 Tell Wadi Feinan, the First Pottery Neolithic Tell in South Jordan. *ADAJ* 34: 27-56.

Quintero, L.A. and Wilke, P.J.

1998 Archaeological Reconnaissance in the Al-Jafr Basin, 1997. *ADAJ* 42: 113-122.

Simmons, A.H. and al-Najjar, M.

1995 Test Excavations at Ghwair I, a Neolithic Settlement in the Wadi Faynan. *ACOR Newsletter* 8/2: 7-8.

ARCHAEOLOGY AND ENVIRONMENT OF THE DEAD SEA PLAIN: PRELIMINARY RESULTS OF THE SECOND SEASON OF INVESTIGATIONS BY THE JOINT LA TROBE UNIVERSITY/ ARIZONA STATE UNIVERSITY PROJECT

Phillip C. Edwards, Steven E. Falconer, Patricia L. Fall, Ilya Berelov, John Czarzasty, Christopher Day, John Meadows, Cathryn Meegan, Ghattas Sayej, Thomas K. Swoveland and Michael Westaway

Introduction

The 'Archaeology and Environment of the Dead Sea Plain' project, directed by Phillip Edwards, Steven Falconer and Patricia Fall, conducted its second joint field seasons at Ẓahrat adh-Dhrā' (ظهـرة الذراع) in January and February 2001.[1] The Ẓahrat adh-Dhrā' region is located near the south-eastern corner of the Dead Sea, between al-Mazra'a village (المزرعـة) to the west and the Jordan Valley margin to the east, on the low-lying and hyper-arid Dead Sea Plain (**Fig. 1**). The project is currently investigating the cultural and natural history of the Dead Sea Plain from the latest Pleistocene through the Holocene, by combining geomorphological and palaeoenvironmental studies with archaeological investigations of sites representing two of the region's most significant eras of prehistoric agricultural intensification; namely the Pre-Pottery Neolithic A (PPNA) and Middle Bronze Age (Edwards *et al.* 2001). The earlier of the two periods is represented by the site of Ẓahrat adh-Dhrā' 2 (ZAD 2), dating to 9,600–9,300 BP (9,100-8,550 calibrated years BC); and the second by Ẓahrat adh-Dhrā' 1 (ZAD 1), an unusual Middle Bronze Age village (ca. 2000-1600 BC) situated only 200 metres from ZAD 2.

This report begins with a synopsis of the geoarchaeological survey by Christopher Day, begun in order to provide palaeolandscape contexts for both ZAD 1 and ZAD 2 and the palaeoenvironmental core data. It continues with an account by Patricia Fall and Tom Swoveland of the ongoing AMS, isotope, varve, and palynological analyses of sediment cores obtained from the Lisān Peninsula (اللسان) in 2000, proceeds to a description of the sec-

1. The project's 2001 field seasons were made possible by the kind cooperation of Dr Fawwaz al-Khraysheh and the Department of Antiquities of Jordan. The project is an ASOR affiliate, and we thank the staff of ACOR in 'Ammān for their help and hospitality.

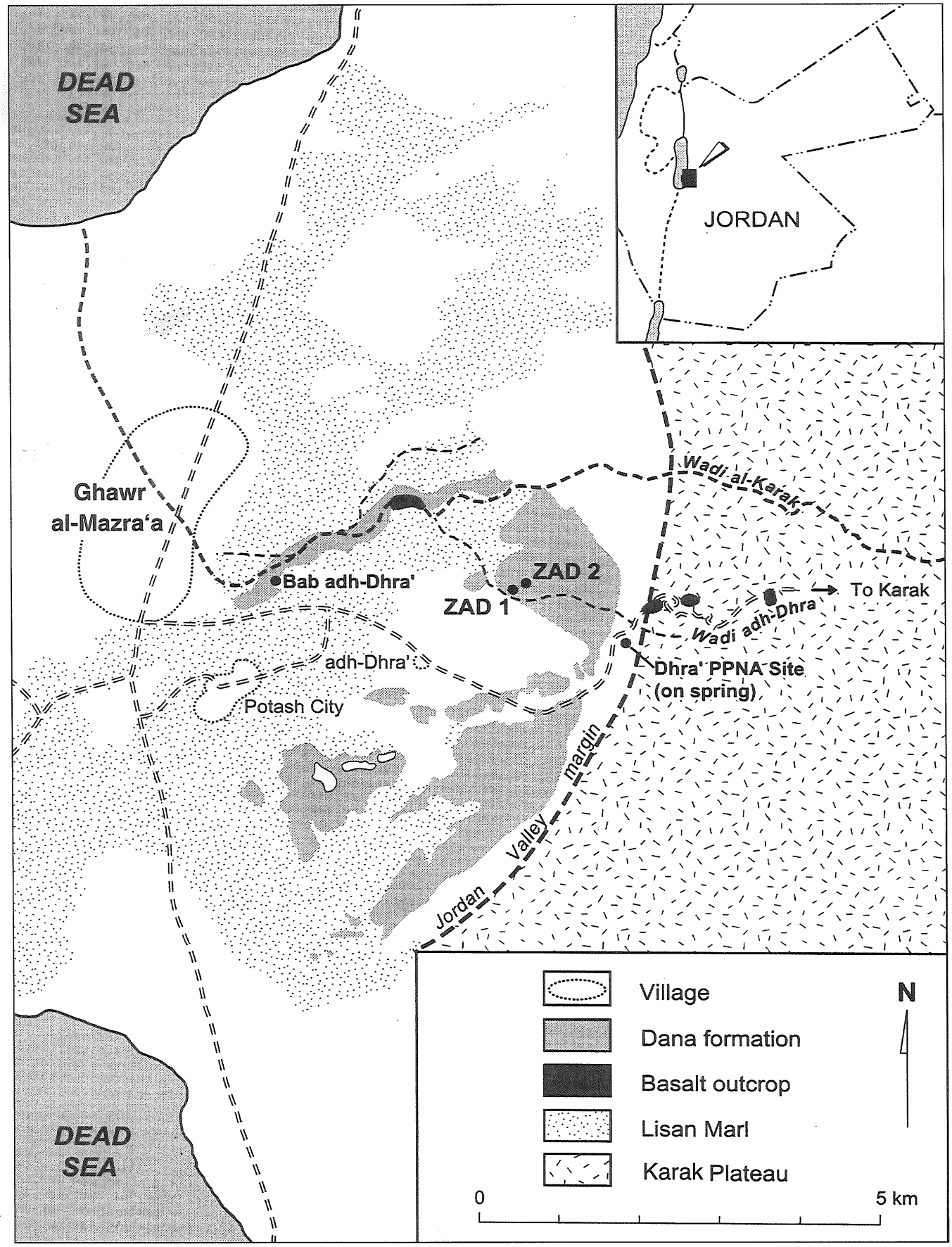
The site of ZAD 2 was excavated by the La Trobe University (LTU) team between January 16 and February 13 under Permit No. 2001/ 3. The La Trobe University team consisted of Phillip Edwards (director), Rebecca Brodie (excavation supervisor), Matthew Chamberlain (excavation supervisor), Rudy Frank (surveyor and photographer), Christopher Day (geoarchaeologist), Ali al-Khayyat (Department of Antiquities representative and excavation supervisor), John Meadows (archaeobotanist), Ghattas Sayej (excavation supervisor and lithics analyst), Zvonka Stanin (excavation supervisor), Michael Westaway (excavation supervisor and physical anthropologist) and Abu Faisal (cook). Six local workmen: Salim Salim al-Hubeiri, Bassam Khalil, Juma'a Khalil, Ibrahim Khalil, Khalid Khalil and Salman Salame, were employed in the excavation, as well as our donkey 'Umm Sabr II'.

We thank Dr Lutfi Khalil, Dr Maysoon al-Nahar, and their students for their kind cooperation in processing some of the ZAD 2 finds in the Department of Archaeology at the University of Jordan.

The 2001 Arizona State University (ASU) ZAD 1 survey crew consisted of Steven Falconer (director and ceramic analyst), John Czarzasty (surveyor), Ilya Berelov (ceramic analyst and surveying assistant) and Ahmed al-Tawahiyeh (Department of Antiquities representative). Our thanks go to our representative Mr. Tawahiyeh. Special thanks go to Hanan Hamdan for her wonderful dinners and to Umm Ashraf for handling our laundry.

Major funding for the excavations at ZAD 1 and ZAD 2 was provided by a Large Grant from the Australian Research Council (ARC) for 1999-2001 and a Research Grant from the Wenner-Gren Foundation for Anthropological Research. Funding for the sediment coring on the Lisān Peninsula was provided by a Research Grant from the National Geographic Society. We are grateful to both the Australian Institute of Nuclear Science and Engineering (AINSE - Special Grant 99/158S), and the La Trobe University Small 1999 ARC Small Grants Scheme for funding that enabled the AMS radiocarbon dating program for ZAD 2.

Both LTU and ASU crews are very grateful to the Jordan Valley Authority (JVA) and its Secretary-General Awadies Serpikian for its continuous support in providing us with accommodation in the JVA housing compound at Ghawr al-Mazra'a. Thanks are due to Khalil Hamdan, the Department of Antiquities Inspector for the Ghawr aṣ-Ṣāfī region for his help, and JVA staff member Na'il Habashne for his aid in maintaining the services in our house. Many thanks are due to Associate Professor Ziad al-Sa'ad, Director of the Institute of Archaeology and Anthropology at Yarmouk University and Dr Gerrit Van der Kooij of the Leiden University Faculty of Archaeology for the generous loan of house and excavation equipment from the Dayr 'Alla Research Station, and to Mr Ahmed Faris for facilitating its loan there; also thanks to Dr Stephen Bourke and the University of Sydney for lending us excavation equipment from Pella. Finally, thanks go to the ever-dependable Ahmad Faris for providing neighbourly hospitality, logistical help, and storage space for our project.



1. The Ẓahrat adh-Dhrā' sites (ZAD 1 and ZAD 2) in the Dead Sea Plain, Jordan, and other key sites and localities.

ond season of excavations of ZAD 2 by Phillip Edwards and then to the comprehensive surface architectural survey of ZAD 1 by Steven Falconer and John Czarzasty. It also includes progress reports on the analysis of excavated materials: the flaked and ground-stone lithics (Ghattas Sayej), plant macrofossils (John Meadows) and human bones (Michael Westaway) from ZAD 2; and the pottery (Steven Falconer and Ilya Berelov) and plant macrofossils (Patricia Fall and Cathryn Meegan) from ZAD 1.

Christopher Day's geoarchaeological work concentrated on the major Ẓahrat adh-Dhrā' region, situated between the al-Karak Road to the east and the roughly triangular area bordered to the west by the merging channels of Wādī al-Karak (وادي الكرك) and Wādī adh-Dhrā' (وادي الذراع). Surprisingly for a region with such a high archaeological profile, this particular area, which we have also christened the 'ZAD Triangle', appears to have never been made the subject of any previous comprehensive archaeological survey.

The Geoarchaeology of Ẓahrat adh-Dhrā' – the 'ZAD Triangle'

The location of a PPNA hamlet and an MB village (ZAD 2 and ZAD 1) on the arid and dissected Ẓahrat adh-Dhrā' plain represents two rare examples of settlement and agriculture in this region at critical junctures in the developmental trajectories of the Southern Levant. The aim of geoarchaeological investigation in the ZAD Triangle was to address several local and regional questions about the nature and rate of landscape change and adaptation to the peculiar geological setting and resources of Ẓahrat adh-Dhrā'. The evidence from two seasons of investigation implies a history of settlement and land use in an environment more benign than is suggested by the present badlands and deeply incised wadis that surround both sites.

This work involved reconnaissance survey of the regional geology — currently available at only 1:50,000 scale — and interpretation of local geomorphology by which archaeological visibility and past land use might be reconstructed. Several new sites were recorded during the course of the survey. Their distribution and dating will greatly assist our understanding of the timing of landscape change at Ẓahrat adh-Dhrā'. One specific and ongoing geoarchaeological issue at ZAD 1 is whether two large boulder walls at the northern and southern ends of the site were natural or human-made structures. Further, a sequence of low terraces in the channel of Wādī adh-Dhrā' below ZAD 1 which contain fine charcoal horizons was sampled in 2000. The prospect that this material might be a source of off-site colluvium was also investigated during the 2001 program.

Geological and Geomorphological Survey

A comprehensive geological survey revealed better resolution of the Dana Conglomerate Formation (DCF) and its relationship with overlying Pleistocene gravels. The lithological differences and landform development within the DCF provide data about past landscapes, land use and the survival of archaeological remains. The Dana Conglomerate (**Fig. 1**) outcrops at Ẓahrat adh-Dhrā' as a series of monoclines that dip gently to the southeast, capped by resistant silicified black cherts. Less resistant reddish and white sandstone units are exposed on the plains to the east of ZAD 1 and ZAD 2 but these are blanketed by Pleistocene gravels which thicken to the south beneath ZAD 1. Indurated sandstone beds some 1m thick outcrop near ZAD 2, above which the softer sandstones form a dissected badland terrain. Wādī adh-Dhrā' is a permanent stream and has incised some 20-30 metres below the level of neighbouring smaller wadis, exposing long sequences of the conglomerate and sandstone units within the DCF. Dissection also appears to be controlled by the Pleistocene gravels — the product of earlier outwash fan deposition from Wādī adh-Dhrā' at the Jordan Valley edge — which form a cap above the softer sandstones. According to the geological handbook for the region (Khalil 1992), the Dhrā' Plain is also shaped by several faults, one of which is continuous through Wādī adh-Dhrā'. The presence of a small doleritic basalt dyke some 300 metres upslope from ZAD 1 and ZAD 2 provides evidence that tectonic and volcanic activity — which is associated with this fault further east — continues through Ẓahrat adh-Dhrā'.

The Boulder Fields at ZAD 1

Investigation of the substantial alignments of boulders at both the southeast and northwest ends of ZAD 1 revealed that they were composed of silicified limestone, commonly sub-rounded, with dissolution pitting and honeycomb weathering. Some large boulders have become fragmented due to weathering. The issue about whether this alignment of boulders is a natural or human-made feature remained unresolved during the first season. The fact that no similar arrangement of large boulders existed anywhere else on the plain seemed to suggest that the boulders were transported from elsewhere. Excavation in and around the boulders, however (Falconer, in Edwards *et al.* 2001), seemed to indicate that they were set firmly within undisturbed natural gravels, suggesting a natural feature. Further survey during 2001 noted a similar wall built from the same material on the north bank of Wādī al-Karak about 1km away, providing a local ana-

logue for such a construction.

During geological mapping the presence of large limestone boulders (erratics) was noted scattered throughout the valleys in the mid and upper parts of the hills immediately behind ZAD 1 and ZAD 2. Limestone is not part of the Dana Conglomerate, hence dispelling any notions that this material outcrops in the area immediate to ZAD 1. The scatters of erratics were traced almost to the Jordan Valley edge and are the product of material breaking from the ASL (Amman Silicified Limestone) unit which outcrops in dramatic vertical sheets (flatirons) some 2km to the east of the sites.

Large fragments of ASL, mobilised during erosion or tectonic episodes, form coarse debris flows and accumulate as lag deposits at the break of slope and on the near plain. It is a preliminary suggestion that such lag deposits have been the source of large stone for both wall construction and building material. ZAD 1 appears to lie at the end of a valley within which large erratics have been confined. This is supported by the observation that the DCF is a poor source of building stone, with construction activities at Ẓahrat adh-Dhrā' instead enabled by the appropriation of plentiful scatters of limestone. The concentration of large boulders as terminal lag material could reasonably have been rearranged as a substantial wall or territorial marker.

Colluvial Terraces at Wādī adh-Dhrā'

The presence of multiple charcoal horizons within fine-grained sand and silty terrace deposits up to 3m thick on the northern side of Wādī adh-Dhrā' below ZAD 1 was attested during the first season. While undated, the fine lamination and cross bedding, and the succession of charcoal horizons suggested that these colluvial deposits might be a potential source of ancient cultural material. During the second season, charcoal within a colluvial section below ZAD 1 was sampled for dating. The exposure at this sampling site was extended to a depth of 215cm, revealing further thin charcoal horizons and silty material above basal cobbles. However, during final preparation of this section for description, a piece of black plastic was found embedded within the cobbles at about 200cm below the modern terrace surface, demonstrating the recent age of the sediments. The deposition of over 2m of alluvium or colluvium in recent times provides a clear example of the rapid rate of aggradation of sediment and complexity of deposition within these arid-land wadis. Up to four phases of deposition were recorded in the exposure with fine organic silty material (local colluvium) and continuous thin charcoal horizons separated by thick sequences of fine sandy silt (alluvium). The latter commonly contained evidence of cross bedding and fine lamination.

Landscape Archaeology

The region of Ẓahrat adh-Dhrā' between Wādī al-Karak, Wādī adh-Dhrā' and the Jordan Valley margin (the 'ZAD Triangle') appears to have remained unsurveyed in any systematic fashion. Reference to various past archaeological surveys in the region appear for the most part to have focused in and around Bāb adh-Dhrā' (باب الذراع) and further south (Rast and Schaub 1981), or to the north of Wādī al-Karak (Worschech 1985) or to the west (McConaughy 1981). However survey reports do not appear to have reviewed the ridge under discussion. During the second season four new major archaeological sites were discovered in the course of the geological mapping program:

a) A substantial limestone wall (mentioned above) constructed from large boulders some 100m above a parallel lower wall of smaller boulders on the northern bank of Wādī al-Karak, about 1km north of ZAD 1. Several curvilinear walls and internal structures were noted with a scatter of possibly Bronze Age pottery throughout, but most prominent on a hillock above the upper wall.
b) A rectangular enclosure about 80m x 150m, bounded by a loose and sparse scatter of cobbles and chert fragments on a gentle plain south of Wādī al-Karak and north of black chert hills in the northern part of Ẓahrat adh-Dhrā'.
c) A square enclosure, about 80m x 80m, located 300m to the northeast of ZAD 2 on a flat plain. Some 10 to 15 small stone features (3.5 x 1.5m) are aligned around the western and southern perimeters.
d) A landscape of curvilinear walls, straight walls, square structures, round walled enclosures (up to 26m in diameter) and 10 to 15 twin-chambered burial cairns extends over terrain rising from Ẓahrat adh-Dhrā' east of the black chert range, about 500m northeast of ZAD 2. Pottery scatters suggest a Chalcolithic to Early Bronze date range.

The accurate survey and dating of the multi-period settlement of the region immediately surrounding ZAD 1 and 2 will greatly enhance the understanding of the land use history and chronology of landscape change of the Dhrā' Plain. The relationship and date of these other features to local landforms, particularly the evidence of truncation, will provide better resolution to models of the timing and phases of erosion in and around ZAD 1 and ZAD 2.

Future Questions

(a) The Dead Sea level fluctuations modelled by Donahue (1985), and Frumkin and colleagues (1994), are yet to be fully reconciled with the archaeological timing of erosion through ZAD 1 and 2. Future work will involve a collation of previous interpretations of climatic and Dead Sea level change with new palaeoenvironmental data from the 2000 coring operation (see Fall and Swoveland, below) and the 2002 geomorphological survey.

(b) Air photographic interpretation of the region will greatly assist geological and geomorphic interpretation.

(c) The sequence and distribution of settlement and land use on the Dhrā' Plain has yet to be mapped and dated. This has considerable potential for constructing a chronology of landscape change at ZAD 1 and 2. Future work will include a regional survey of these features at Ẓahrat adh-Dhrā'.

The results of the 2001 geo-archaeological survey have placed the PPNA and MB sites in a better regional geological and geomorphological context. On a gentle plain at the fringe of the Jordan Valley both settlements benefited from the perennial spring-fed Wādī adh-Dhrā', and abundant sources of flint, and natural tumbles of building stone concentrated in break of slope lag deposits, were available for opportunistic use as town walls and building stone. The Dana Conglomerate Formation and structural features have produced a landscape of differential weathering shaped by phases of incision, the chronology of which will be better understood by a regional examination of both environmental data and wider settlement distribution.

(CD)

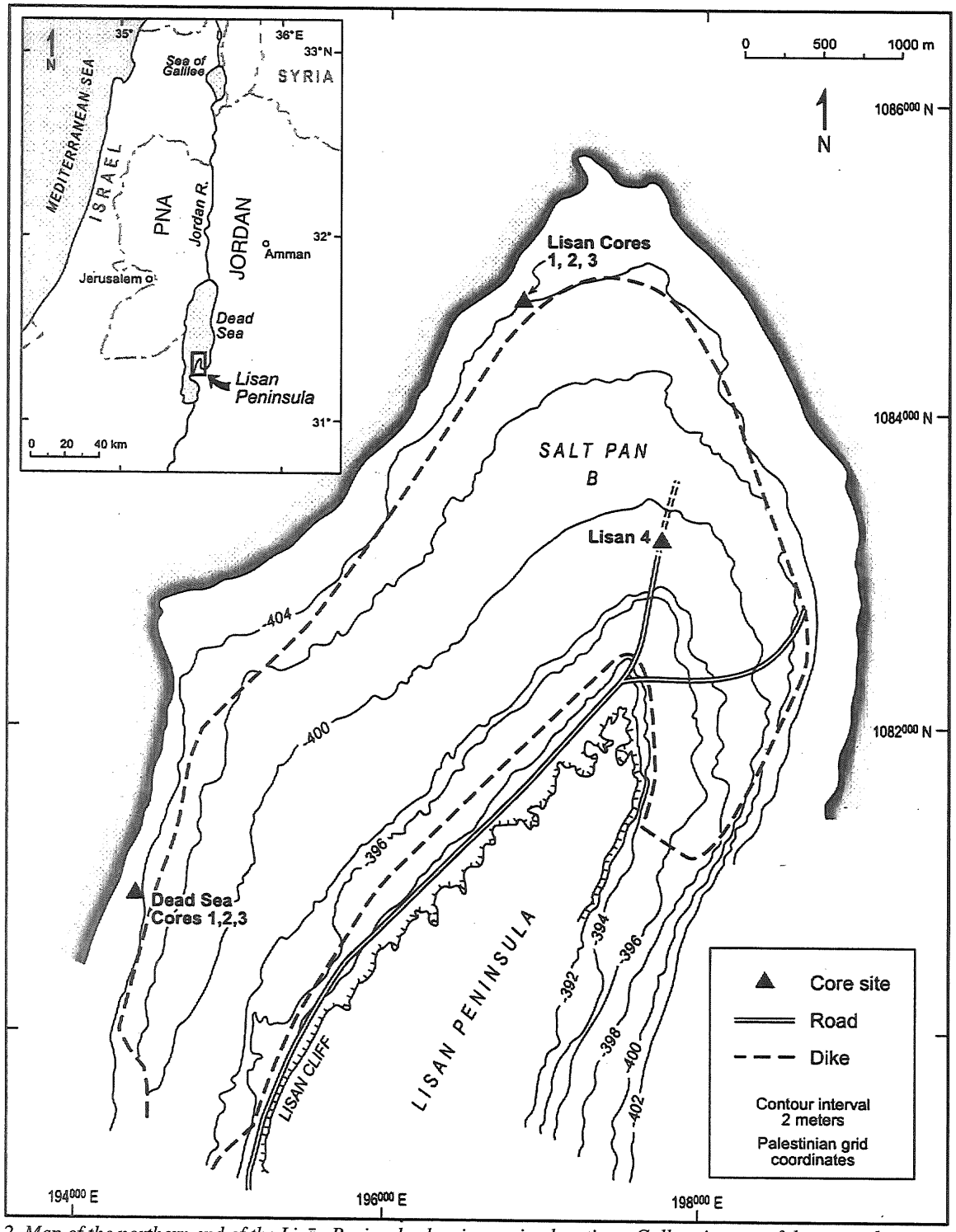
Palaeoenvironmental Investigations on the Lisān Peninsula, Dead Sea

An important aspect of the Archaeology and Environment of the Dead Sea Plain Project is to explain the sporadic settlement history on the Dead Sea Plain and the interaction of these human settlements with their past environmental landscape. Both ZAD 1 and ZAD 2 at approximately 160 metres below mean sea level lie adjacent to the ancient Pleistocene shoreline of Lake Lisan (70,000-11,000 years BP). As part of our ongoing investigations to interpret the palaeoclimate and past environments of this hyperarid region, Arizona State University (ASU) collected eight sediment cores from four localities on the north-western end of the Lisān Peninsula in January and February 2000 (**Fig. 2**). Four of the cores (Dead Sea Cores 1-3 and Lisan Core 3) were collected with a hand-operated, piston corer (a 5cm diameter Livingston corer). The four deepest cores (Lisan 1, 2, 4, and 6) and the top 5m of Lisan Core 3 were collected with a truck-mounted, rotary drill rig operated by the Natural Resources Authority, Hashemite Kingdom of Jordan.[2] The sediments are composed of up to 30m of laminated carbonate and detrital deposits. Eleven AMS ages (**Table 1**) reveal that the uppermost 18m span approximately the past 20,000 years BP (uncalibrated radiocarbon years before present). Carbon and oxygen isotope analyses of carbonate layers from varved sediments show changes in lake chemistry and hydrology of Pleistocene Lake Lisan (Swoveland 2001). Our focus for this report is based on Lisan Core 3 (691-1225cm depth) that covers the latest Pleistocene interval, from 20,000 to 12,000 years ago.

Lisan Core 3 was collected near the foreshore of the Dead Sea on the Lisān Peninsula about one metre above the modern water surface that lies 404m below sea level. Lisan Core 3 was chosen for analysis because it represents the least distorted (due to recovery by a piston corer) and most continuously laminated sediments that cover the latest Pleistocene. The top 5m of Lisan Core 3 were recovered with the mechanized rotary drill rig in order to penetrate the uppermost halite and dense aragonite layers. Sediments below this depth were recovered with the hand-operated piston corer. A maximum depth of 1225cm was reached with the Livingston corer. After being shipped in wooden core boxes to the Paleoecology Laboratory in the Geography Department at ASU, Lisan Core 3 was sectioned lengthwise to observe the depositional varves. Each core section was photographed with a high-resolution digital camera in 15cm long overlapping images to produce an electronic gallery image for the entire core.

Lisan Core 3 is comprised of laminated sediments consisting of alternating white carbonate and dark grey-green detrital laminae (**Fig. 3**). Three wood macrofossils embedded in the laminae show that Lisan Core 3 spans the period from 20,000 to 12,000 BP (**Table 1**). The white carbonate layers

2. We thank the Arab Potash Company and the Natural Resources Authority of Jordan for facilitating the drilling on the Lisān Peninsula; Bruce Howell who assisted PLF and SEF in collecting Lisan Core 3; Dr. Paul Knauth and Mr. Stan Klonowski of Arizona State University's Department of Geological Sciences Stable Isotope Lab for analysing the isotope samples; Dr. Tom Groy of ASU's Department of Chemistry for support in the XRD analysis; Dr. Hamdallah Bearat of ASU Center for Solid State Sciences for assistance interpreting the XRD data; and Emily Prud'homme who helped section and photograph the cores and produced the digital gallery images.



2. Map of the northern end of the Lisān Peninsula showing coring locations. Gallery images of the cores shown.

in the core were sampled approximately every 15 centimetres for mineral and isotope analyses. X-Ray Diffraction (XRD) was used to determine the carbonate mineral phases throughout the core. XRD showed that the white layers were comprised mainly of aragonite, with trace amounts of gypsum, anhydrite, calcite, and salts. Carbon and oxygen isotopes were analysed from 24 individual aragonite laminae. $\delta^{13}C$ data are presented as parts per thousand ($^{o}/_{oo}$) relative to the PDB (Peedee Belemnite) Standard. $\delta^{18}O$ data, presented as parts per thousand ($^{o}/_{oo}$), were converted from PDB by ASU's Department of Geological Sciences Stable Isotope Lab, and are expressed relative to Standard Mean Ocean Water (SMOW).

Palaeoclimatic Interpretation Based on Lisan Core 3

Carbon isotopes demonstrate variability in car-

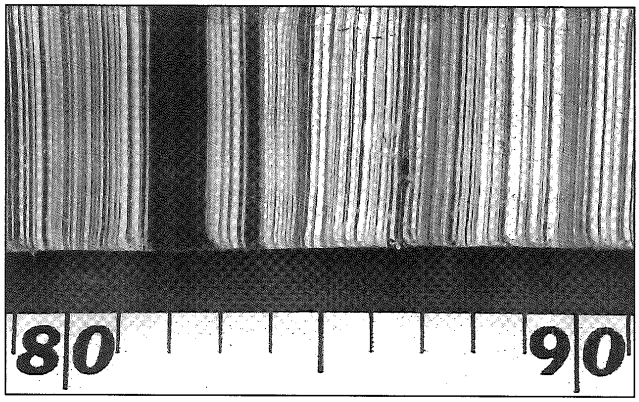
Table 1: *AMS age determinations from Dead Sea and Lisan Cores.*

Core	Depth (cm)	Age (uncalibrated yr BP)	Laboratory Number	Calibrated Age (95% probability) Stuiver et al. 1998
Dead Sea 3	8.5	1440 ± 40	Beta-160106	AD 550-660
Dead Sea 3	26	1590 ± 40	Beta-160107	AD 400-560
Dead Sea 3	45	1690 ± 40	Beta-153581	AD 250-430
Dead Sea 3	108	1820 ± 40	Beta-153582	AD 100-260 and AD 290-320
Dead Sea 2	361	7030 ± 50	Beta-155306	BC 6000-5790
Dead Sea 2	512	5020 ± 50	Beta-155307	BC 3960-3680
Lisan 2	1461	15,190 ± 50	Beta-156767	BC 16,510-15,850
Lisan 2	1673	18,690 ± 60	Beta-156768	BC 20,730-19,770
Lisan 3	698	12,460 ± 40	Beta-153583	BC 13,490-12,220
Lisan 3	1067	17,990 ± 60	Beta-155308	BC 19,900-18,970
Lisan 3	1186	19,020 ± 70	Beta-156766	BC 21,150-20,120

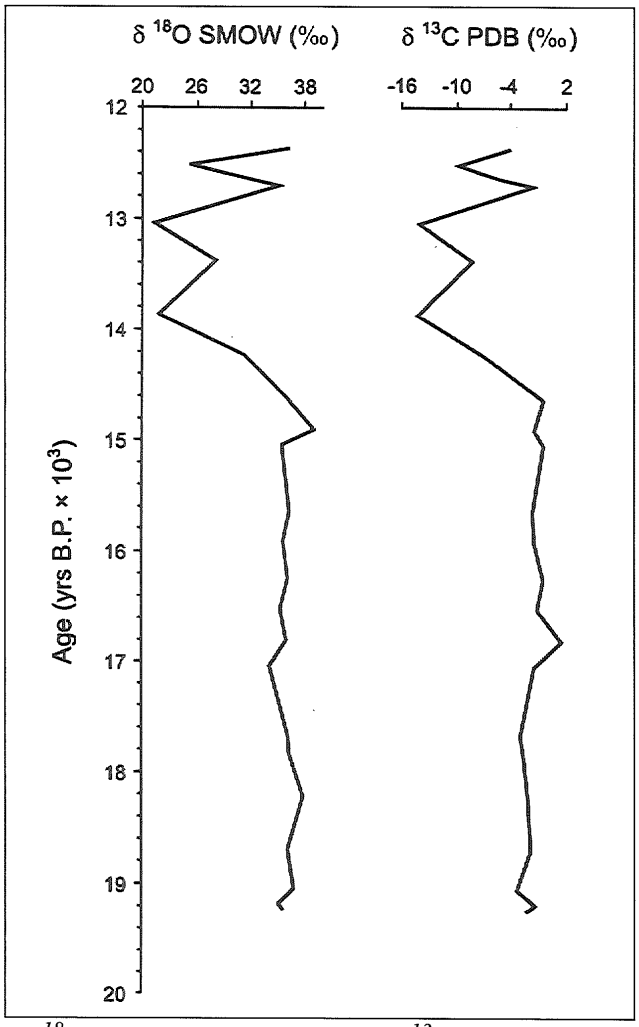
bon dilution and enrichment in the Dead Sea and are used as proxies for precipitation and/ or fluvial run-off to the basin. $\delta^{13}C/^{12}C$ ratios with higher ^{13}C values (-7.2 to 1.8 PDB) than the modern Jordan River (-7.2 PDB) (Stiller and Magaritz 1974) are interpreted as enriched. Dilution values vary from –14.2 to –7.2 PDB. Carbon isotopes from Lisan Core 3 show considerable enrichment for the period between 20,000 and 14,500 BP, as would be expected for a hypersaline lake (**Fig. 4**). Samples with ^{13}C values more dilute than the modern Jordan River are found after 14,000 BP. These dilution events are interpreted to represent the influx of organic material into Lake Lisan following an influx of water from runoff, flooding, and glacial melt water from the upper watershed of the Jordan River (the mountains of Lebanon).

Oxygen isotopes are used to provide relative temperature values. Enrichment and dilution of ^{18}O are interpreted using Jordan River water as a modern analog. Katz *et al.* (1977) reported an average ^{18}O value for the Jordan River of -2.9 SMOW (-7.2 PDB). ^{18}O for Lisan Core 3 (**Fig. 5**) shows the same enrichment and dilution seen in the ^{13}C data (**Fig. 4**). Between 20,000 and 14,500 BP the water of Lake Lisan is enriched in ^{18}O. Although absolute temperature values for the Dead Sea could not be assigned, this section of the core is interpreted to represent a relatively cold, stable period. Based on dilution of 18O starting about 14,500 BP, the temperature of the Dead Sea rose dramatically. More extreme temperature fluctuations are interpreted for the period between 14,500 and 12,300 BP.

Carbon and oxygen isotopes from Lisan Core 3 reveal that the late glacial climate of the Dead Sea region was relatively cold and dry with very little organic matter washed into Lake Lisan. This cool, dry interval ended about 14,500 years ago when precipitation and runoff into the lake basin increased greatly. This interpretation supports the recent study of stratigraphic sections in the Dead Sea area by Abed and Yaghan (2000) that hypothesizes that the climate during the Late Glacial Maximum



3. Close-up of varves in Lisan Core 3.

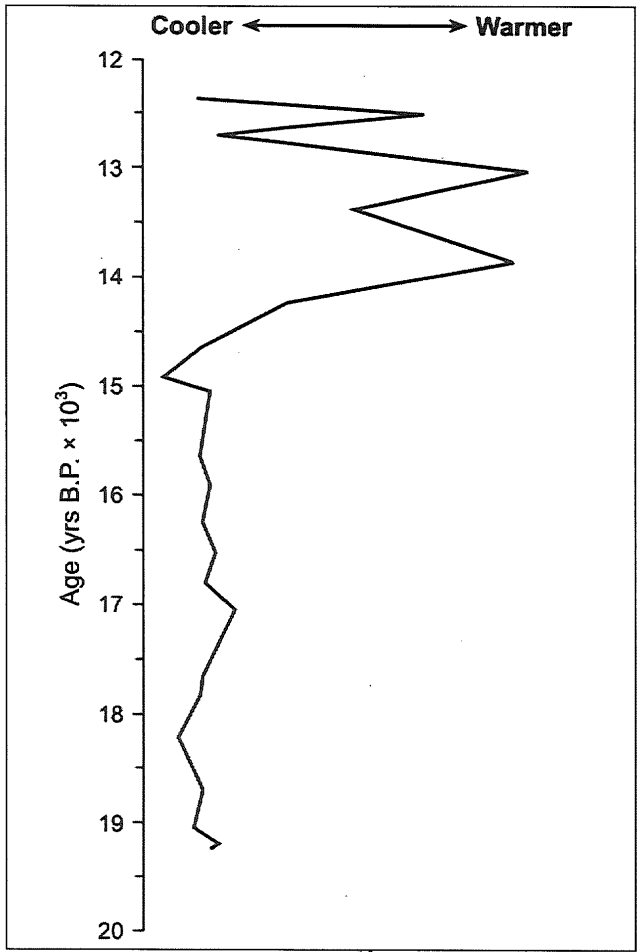


4. $\delta^{18}O$ SMOW (°/oo, left column) and $\delta^{13}C$ PDB (°/oo, right column) from Lisan Core 3 (data from Swoveland 2001).

(LGM) was cool and dry. No evidence for a pluvial climate during the period from 20,000 to 14,200 years ago, as suggested by Neev and Emery (1995), is seen in the Lisan Core 3 isotope data.

The cold and dry period identified in Lisan Core 3 between 20,000 and 14,500 years ago coincides with the Early Epipalaeolithic Period (20,000 to 15,000 BP) when the landscape was dominated by open steppe vegetation (Baruch and Bottema 1999) with Mediterranean forest refugia along wadis of the northern Jordan Rift Valley (Edwards 2001). During the Middle Epipalaeolithic (15,000 to 13,000 BP) locally moist environments continue along the Jordan Valley (Edwards 2001). Our results agree with palynological studies from the al-Ḥūlah Basin (حوض الحولة), in the upper elevation watershed of the Dead Sea, that show that deciduous oak forests expanded between 14,500 and 12,500 years ago in response to a warmer and wetter climate (Baruch and Bottema 1999). After about 12,500 years ago the climate of the region deteriorated, with dry conditions returning in the southern Levant (Baruch and Bottema 1999; Yasuda *et al.* 2001) as forests became more restricted and steppe lands expanded. Stream incision due to a lowering of base level began in the Late Epipalaeolithic (12,000 to 11,000 BP) when settlement sizes increased (Edwards 2001).

Ongoing AMS, isotope, varve and palynological analyses of both the Pleistocene and Holocene portions of the cores from the Lisān Peninsula will allow us to illuminate human interaction within the



5. Relative temperature based on $\delta^{18}O$ SMOW (°/oo) from Lisan Core 3 (data from Swoveland 2001).

context of the palaeoenvironmental landscape of the Dead Sea Plain and the greater Jordan Rift Valley.

(PLF and TKS)

A Second Season of Excavations at the PPNA Site of Ẓahrat adh-Dhrā' 2 (ZAD 2)

La Trobe University carried out a second season of excavations at ZAD 2 from January to February, 2001. The first season in late 1999 demonstrated ZAD 2 to be a small mound about two metres thick and 2,000 square metres in area. During that period, portions of three structures (Structures 1, 2 and 3) were excavated. Charcoal samples from successive phases of occupation in Structure 3 yielded three radiocarbon determinations of 9,490±50 BP (OZE 605); 9,440±50 BP (OZE 606) and 9,470±50 BP (OZE 607), indicative of a short-lived site.

The 2001 program succeeded in excavating Structures 1, 2 and 3 through to the underlying natural sediments; excavating a larger area of deposits in Structure 2, excavating a secondary burial in Squares I-J25, and beginning the excavation of Structure 4 in the northern part of the site (**Fig. 6**). Several new radiocarbon samples also were obtained.

Structure 1 (Square E28)

Structure 1 is a small, round stone hut located on the western edge of the settlement (**Fig. 6**). In the first season, a series of interleaved, red and dark grey deposits (Loci 1-18), which appeared to represent refuse tip lines, were excavated below it in Square E28. This sondage was continued in the second season (Loci 19-26), demonstrating a gradual decrease of artefact density with depth, until natural Dana Conglomerate Formation sediments (Locus 24) were encountered at 1.20m below the surface (**Fig. 7**). While no artefacts were found in the DCF, the remains of a child's skull were found dug into a small pit (Locus 25), some 10cm deep into the natural layers (**Figs. 7, 8**). The skull survived mainly as an endocast of sediment supplemented by a partial covering of thin cranial bone fragments, surmounted by a little molded dome of mud. Underneath this arrangement a number of loose, deciduous teeth were discovered.

Depth of Deposits in Structure 2 (Squares K22 – L23)

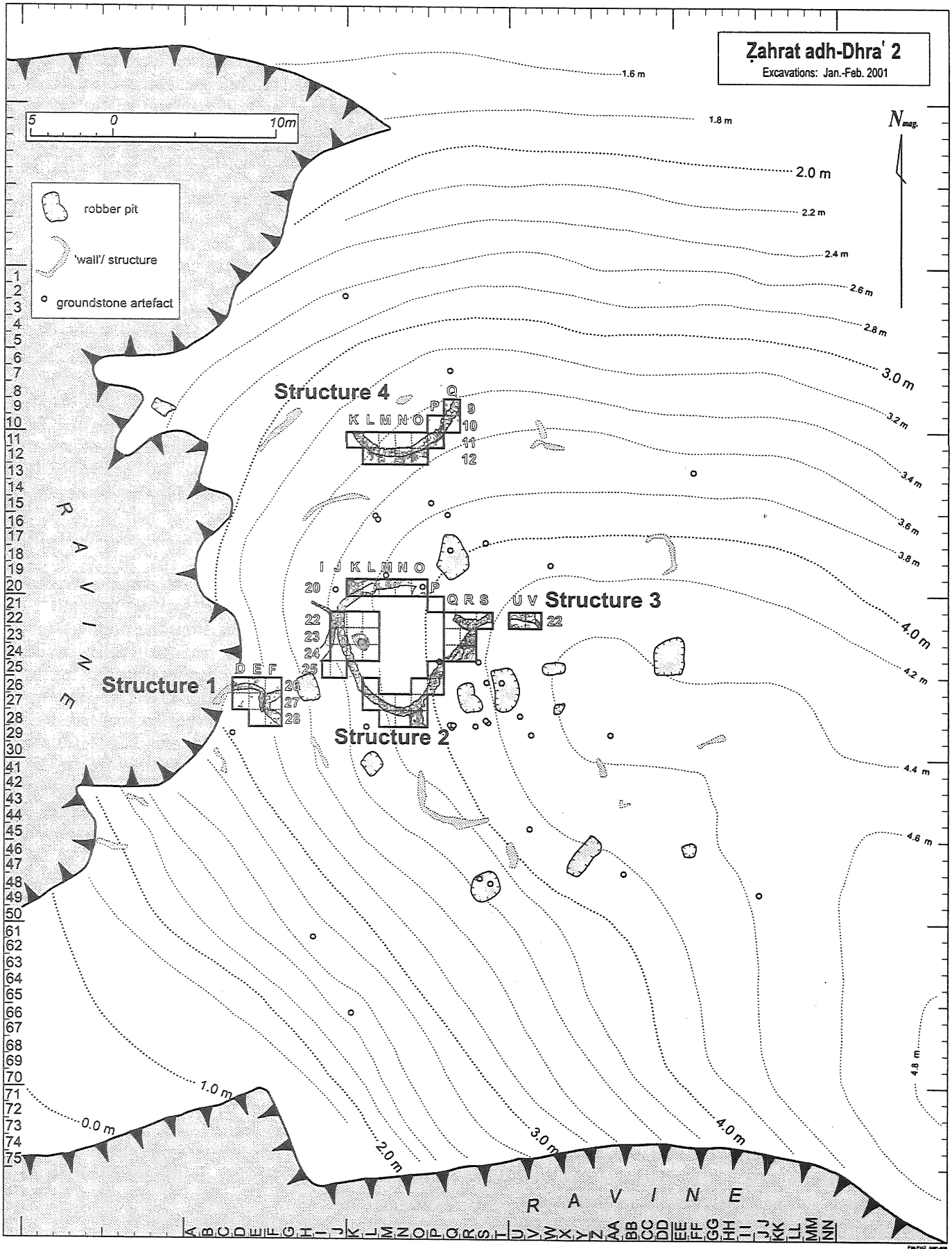
The first season of excavations showed Structure 2 to be associated with a plastered floor (Locus 3.1) and an interior hearth (F.4) set with stones and plaster in Squares K22 – L23. Excavations were extended here during 2001, revealing three additional superimposed floors between Locus 3.1 and the natural, some 60cm below (**Fig. 9**). The next floor (Locus 4.1) encountered below Locus 3.1 was varied in character (**Fig. 10**), changing from a hard plastered surface in the south to softer brown sediment in the north. The two regions were divided by a low, single coursed wall of stone, mudbricks and mortar (Feature 3 = F.3). The hearth (F.4), which was covered by Floor 3.1, proved to be founded on an underlying third floor (Locus 5.1). In the course of excavations beneath this locus a new feature (F.2) emerged: a U-shaped stone platform abutting the main wall (F.1). This was probably an earlier hearth and it rested on the fourth floor (Locus 6.1). The bottom of the wall (F.1) was associated with this lowest fourth floor, and final excavation revealed a six-coursed, double-rowed, well-mortared limestone wall standing to a height of 0.8m. No foundation trench was discovered at its base, although hard mortar and a number of stones associated with the base of the wall may have functioned to stabilize it. Finally, excavations in K22 reached the natural Dana Conglomerate at about 90cm below surface sediments. This (Locus 7.1) consisted of a shelf of hardened, lithified Dana sediment sloping up to the north.

Lateral Extent of Structure 2

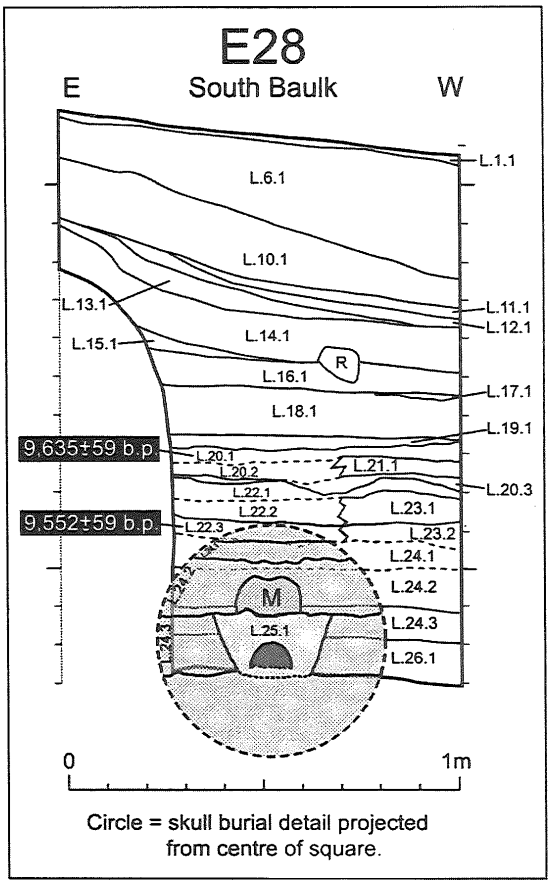
During the first season, excavations revealed that Structure 2 possessed a long curvilinear stone-wall arc (F.1), which curved from the northwest in Square J22 to the southeast in Square K24. In the second season this wall was further traced to reveal an entire walled enclosure (**Fig. 11**). The southern and eastern parts of the excavations proceeded in 18 squares (L26 – S22). In Squares L26 – O, the structure curved sharply around to the east. In this sector, where the wall was dug to the uppermost floor (Locus 5), the six-coursed wall reached a height of 80cm in Phase 1 alone. A single-coursed stone wall (F.8) was found running from F.1 to the south in Squares N/O –28, apparently connected to it at a later date (**Fig. 11**). Squares O26 – S22 saw F.1 straightening as it ran towards the northeast.

In the north, Feature 1 also ran sharply to the east through Squares K20 to O20. Square O20 touched on the edge of another human burial, inside the fill of Structure 2, which was left unexcavated. An old clandestine excavation pit precluded clarification of any further continuation of the wall to the northeast, but excavations in Square P19 demonstrated no linkage of the northern and eastern parts of the curvilinear wall, indicating the placement of a door or opening in this area. This is considered especially likely as the wall-section in Squares Q/R22 stops abruptly. It appeared to be finished to a squared face rather than destroyed.

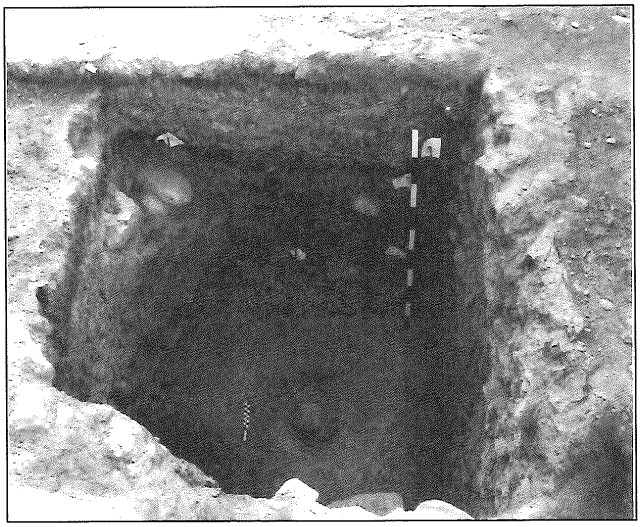
In summary, Structure 2 has proved to be a most unusual design, appearing as a constricted 'tear-



6. Site plan of ZAD 2.



7. South baulk section of Square E28 in Structure 1, ZAD 2.



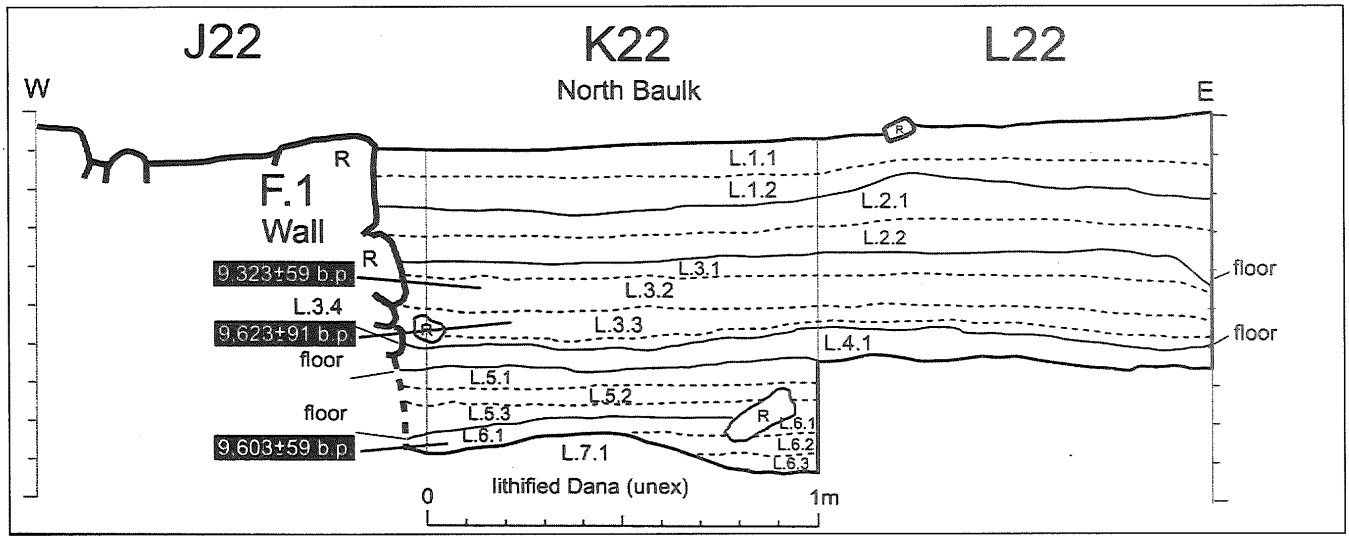
8. View of infant skull burial in Locus 25, Square E28 of Structure 1, ZAD 2.

drop'-shaped structure which opens to the east, with its major axes measuring some 7m in length (**Fig. 12**). A further surprise is that the eastern wall of Structure 2 appears to swing round to the southeast to continue as Structure 3, though this awaits clarification by further excavation.

The Communal Burial in Squares I-J-K25

A second wall (F.2) abutted F.1 in Square J22 and curved away in the opposite direction (to the southwest). In 1999, a small cairn of stones (F.3) was discovered, positioned in the interstices between the two walls near the south baulk of Square J24, and this overlay some large fragments of a human cranium. Further excavation showed that F.3 marked the northern end of a complete human skull that emerged in the baulk. This burial (F.5) was excavated in 2001 (**Fig. 11**). Traces of at least three humans were excavated in the burial. The one which belonged to the skull (see Westaway, below) was by far the most complete of them.

No burial pit was visible at any stage of the excavations. The bones were embedded in dark and friable ashy deposits throughout, and deposited in fill on or near to the uppermost floor between the two structures. Several large rocks based around the skull form a continuation of the small cairn (F.3) first discovered in Square J24. The burial



9. North baulk sections of Squares J/K/L22 in Structure 2, ZAD 2.



10. View southward to Floor 4.1 in Squares K22-L23 of Structure 2, ZAD 2.

continued west of Square I25, in the direction of a clandestine excavation pit. Many artefacts were recovered from the shallow deposits, the most notable being a small stone phallic figurine (**Fig. 13**).

Structure 3 (U-V22)

In the first season, two squares (U-V22) were positioned at the summit of the site in order to investigate the deepest deposits of the site. In Locus 2.1, about 40cm below the surface, a hearth (F.3) rich in charcoal was found associated with a floor. This capped the underlying Structure 3 which consisted of a curvilinear wall stepped down to the north, curving east to west from Square V22 to U22, with the interior floored surface some 25cm below the exterior one. Excavations in the second season were designed to determine whether Structure 3 overlay an earlier structure or not, and in any case to excavate to natural sediments.

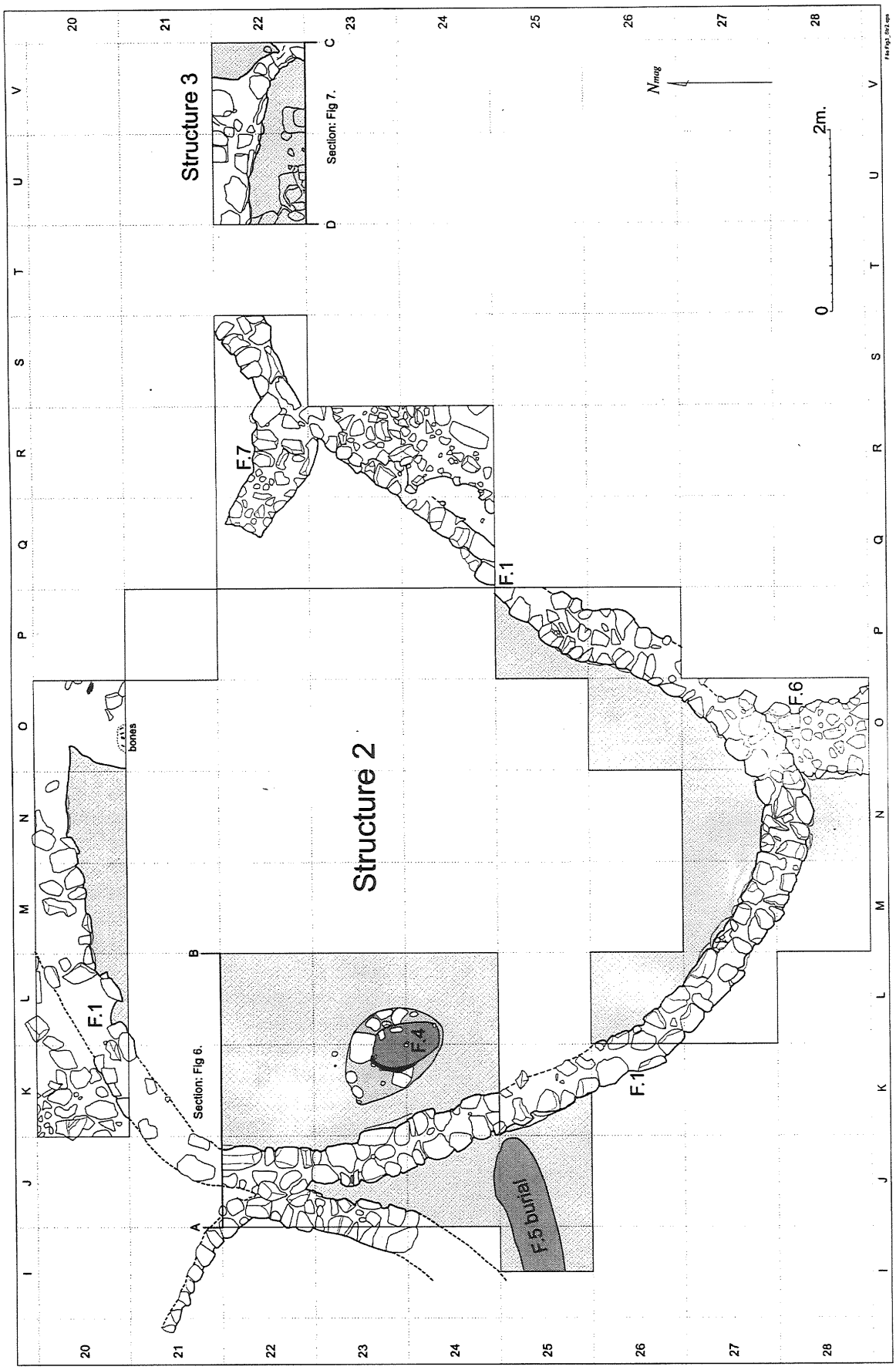
Only two thin layers (Loci 7.3 and 7.4), including the basal floor of Structure 3 (Locus 7.4), had to be removed before the season's goal was achieved (**Fig. 14**). Below these layers the sterile Dana sediment (Locus 7.5) was encountered and dug down 45cm without further architectural finds appearing. Like Structure 2, the base of the main wall (F.1) was not set into a foundation trench, but was laid on a mortar base. The Structure 3 wall was dismantled in Square V22, showing that the stones were set into copious, hard mortar layers. This left a patch of exterior surfaces to be excavated from the small, triangular area in the northeast corner of V22. Two sharply defined and superimposed white plaster floors were encountered here, one associated with the external base of F.1.

Structure 4 (Squares K11 – Q10)

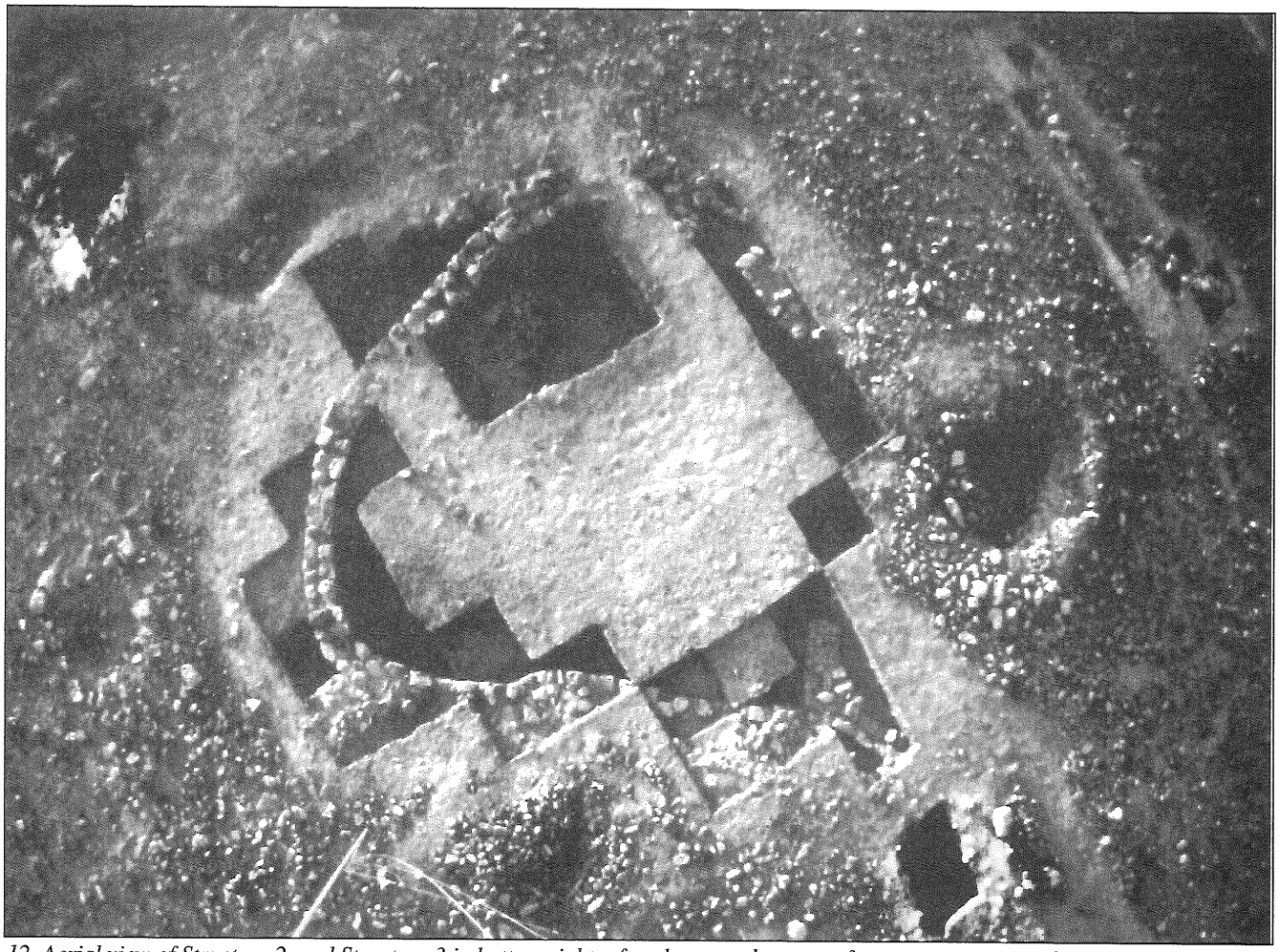
Clearance of Structure 4, located in the northern part of ZAD 2, was initiated in the second season. Excavation in thirteen squares tracked a large curvilinear wall segment (F.1) running in a northwest to southeast direction (**Figs. 15, 16**). Excavations in Squares P10-11 and Q10 indicated the wall to be but one course thick, with a maximum height of 0.25m and width ranging from 0.55–0.68m, sitting on a thin layer of small pebbles and rocks. Hence, subsequent excavation was directed laterally wherever this horizon was encountered. Numerous stones were missing from the wall in Squares O11 and O12, and a large amount of tumble was scattered on its southern, exterior side. In Squares L-O11 on the interior of Structure 4, the single wall course was associated with a cobblestone floor composed of pebbles and small stones set into a coarse, grayish plaster. All of these strands of evidence support the conclusion that Structure 4 is much less well preserved than its more southerly counterparts, and this is attributable to its position near the edge of the mound where deposits are thinner.

Summary of ZAD 2 Architecture

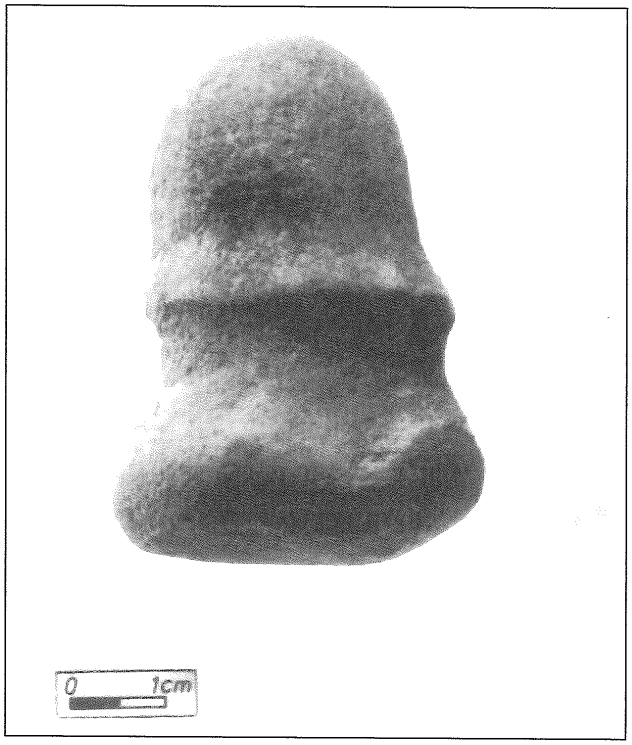
The 2001 excavations confirmed and extended the evidence previously obtained in 1999, and demonstrated that ZAD 2 was a short-lived settlement of round and teardrop-shaped stone huts, containing only one major constructional phase. Where we have excavated, the structures appear to be curvilinear ones whose external walls adjoin other structures. Despite the tightly clustered series of radiocarbon dates, it is not necessarily the case that all of the structures were planned and built at



11. Structures 2 and 3 in the southern part of ZAD 2.



12. Aerial view of Structure 2, and Structure 3 in bottom right, after the second season of excavations at ZAD 2.



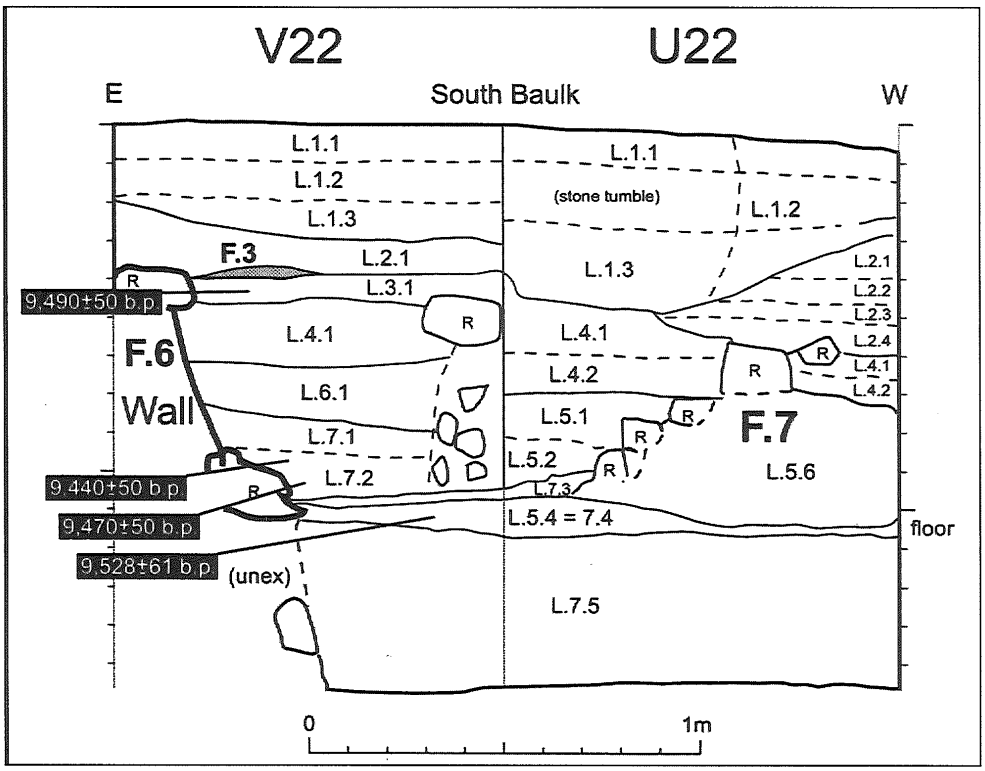
13. Small stone figurine (RN 010036) found in the J25 burial west of Structure 2, ZAD 2.

one time. Rather, there is some evidence in the way that Structure 2 seems to 'onlap' Structure 3, and the later exterior walls abutting Structure 2 (e.g. F.6) to suggest that the huts were added to laterally over time. Within individual structures there are multiple floor phases — up to four in the case of Structure 2. Structures 1, 2 and 3 were dug through to sterile deposits at about 1m below the surface, showing that the low rise of the mound (ca. 1-2m) is partially natural.

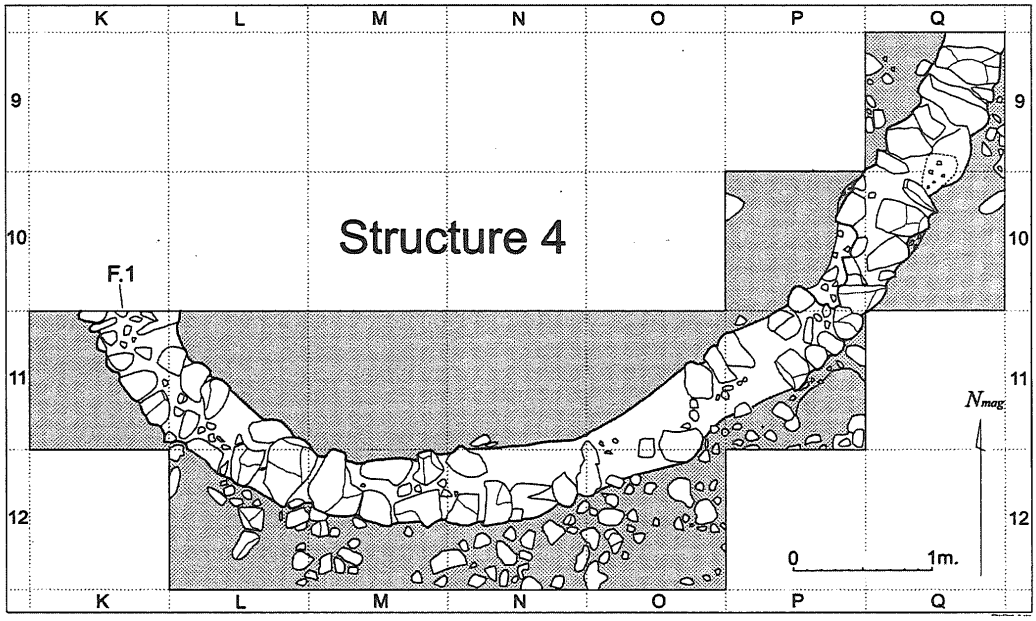
The architecture is notable for its regularity and high standard of construction, and can currently be counted among the more substantial architectural arrays for the PPNA period in Jordan. It is difficult to find exact parallels to ZAD 2's array of adjoining round, oval and teardrop-shaped stone huts, but it does recall another late PPNA architectural complex at Jurf al-Aḥmar in northern Syria (in Phase I on the eastern mound; Stordeur 1999: 140).

Various Artefacts and Materials from ZAD 2 in 2001

The most unusual find from the 2001 excavations was a small figurine made of an undeter-



14. South baulk sections of Squares U/V22 in Structure 3, ZAD 2.



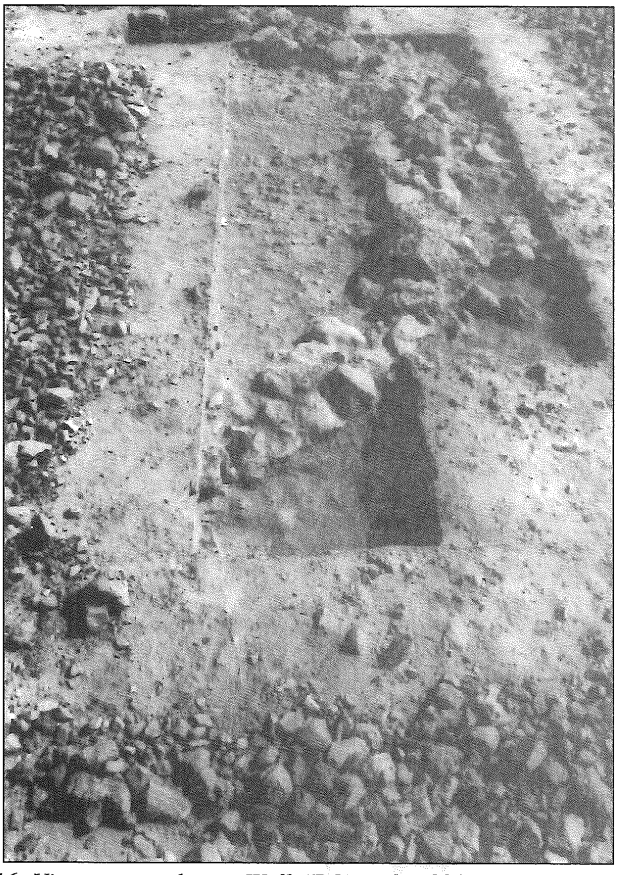
15. Structure 4 in the northern part of ZAD 2.

mined stone (**Fig. 13**), found in the J25 burial (RN 010036). More malachite fragments, some facetted, a red (coral?) bead, Dentalium shells and retouched lithics, a complete basalt pestle (RN 010065) and a cuphole mortar (010069) numbered among other prominent finds.

Stratigraphy and Chronology of Ẓahrat adh-Dhrā' 2

Six additional AMS radiocarbon dates from ZAD 2 have been acquired after the second season, augmenting the three obtained from the first season (**Table 2**). All samples were run on small and chunky wood charcoal fragments, which are abundant in almost every excavation context throughout the site. The few specimens that have as yet been identified (pers. comm. Patricia Fall) derive from the branches and twigs of pistachio (cf. *Pistacia* sp.) trees. Notably, pistachio and fig are virtually ubiquitous in all loci at ZAD 2 in the floated archaeobotanical material (see Meadows, below).

In Structure 1, the date of 9,552 ± 59 BP (Wk-9455) comes from the lowermost occupation layer



16. *View eastward over Wall (F.1) and cobblestone floor of Structure 4, ZAD 2.*

of Square E28 (Locus 22.3),and overlies the infant skull remains dug into the Dana Conglomerat (**Fig. 7**). A date of 9,635 ± 59 BP (Wk-9633) comes from Locus 20.1, some 15-20cm higher than Locus 22.3. According to the method of Gillespie (1982), which is based on that of Ward and Wilson (1978), the two dates are statistically indistinguishable. The calculated value of the Test statistic T is 0.520, which is less than the tabled value of Chi-Squared (3.841) for one degree of freedom at the 0.05 level, indicating a 95% probability that the two ages share the same true mean age.

Structure 2 yielded three superimposed AMS dates. The first is 9,323 ± 59 BP (Wk-9444) that comes from a deposit (Square L23, Locus 3.2) underlying the uppermost floor (**Fig. 9**). The next date of 9,623 ± 91 BP (Wk-9568) comes from the layer (Square K22, Locus 3.3) immediately underlying Wk–9444. The final date of 9,603 ± 59 BP (Wk-9447) is from the earliest and lowest of Structure 2's four floors (Square K22, Locus 6.1). The statistic T for the three means is 3.783, less than the Chi-Squared Value (5.991) for two degrees of freedom at the 0.05 level, indicating a 95% probability that the three dates are statistically indistinguishable.

For Structure 3, a fourth date of 9,528 ± 61 BP (Wk-9570) can now be added to the trio obtained

Table 2: *Radiocarbon age determinations from ZAD 2.*

Provenance	Date (uncal. BP)	Laboratory Code	Calibrated date (95.4% probability) OxCal. version 3.4
Structure 1 Sq. E 28, Loc. 20.1	9,635 ± 59	Wk-9633	9,230 – 8,790 BC
Structure 1 Sq. E 28, Loc. 22.3	9,552 ± 59	Wk-9445	9,250 – 8,650 BC
Structure 2, Sq. K 22, Loc. 6.1	9,603 ± 59	Wk-9447	9,220 – 8,790 BC
Structure 2, Sq. K 22, Loc. 3.3	9,623 ± 91	Wk-9568	9,240 – 8,740 BC
Structure 2, Sq. L 23, Loc. 3.2	9,323 ± 59	Wk-9444	8,750 – 8,330 BC
Structure 3, Sq. U 22, Loc.5.4	9,528 ± 61	Wk-9570	9,200 – 8,600 BC
Structure 3, Sq. V 22, Loc. 3.1	9,490 ± 50	OZE 605	9,150 – 8,650 BC
Structure 3, Sq. V 22, Loc. 7.2	9,440 ± 50	OZE 606	9,150 – 8,550 BC
Structure 3, Sq. V 22, Loc. 7.2	9,470 ± 50	OZE 607	9,150 – 8,600 BC

from the first season (**Fig. 14**). Wk-9570 is from the lowermost floor of Structure 3 (Square U22, Locus 5.4). Only a thin layer (Locus 7.3) separates this date from the overlying ones of 9,440 ± 50 BP (OZE-606) and 9,470 ± 50 BP (OZE-607), both on Floor 7.2 of Square V22,whicharein turn overlaid by the date of 9.490 ± 50 BP (OZE-605) underlying the uppermost floor (Square V22, Locus 3.1). 'T' for the four means is 1.358, less than the Chi-Squared (7.815) for three degrees of freedom at the 0.05 level, indicating a 95% probability that the four dates are statistically indistinguishable.

Together, the suite of radiocarbon dates shows a strong degree of concordance. Indeed, T calculated for eight of the nine dates (minus the most recent one of Wk-9444, 9,323 ± 59 BP) is 11.605, less than the tabled value of Chi-Squared (14.067) for seven degrees of freedom at the 0.05 level, indicating a 95% probability that the eight ages share the same true mean age. Only when Wk-9444 is added in does this concordance break down, giving a T-value of 21.942, which exceeds the tabled value of Chi-Squared (15.507) for eight degrees of freedom at the 0.05 level.

ZAD 2 is now a well-dated Pre-Pottery Neolithic A site. The single constructional phase across the site and the suite of concordant dates point to a short-lived settlement. Just a single date (9,323 ± 59 BP) suggests that the settlement persisted for more than about a century, and, at the outside, ZAD 2 spans the period from 9,600 to 9,300 BP.

The Implications of ZAD 2 for the Transition between the PPNA and the PPNB

In view of recent uncertainties about the nature of the passage from the PPNA to the PPNB in Jordan (Kuijt 1997; Rollefson 2001), the dating of PPNA ZAD 2 to 9,600 – 9,300 BP is a most extraordinary outcome, because the site slots neatly into the time frame of 9,600 – 9,200 BP proposed for the 'Early PPNB' (EPPNB) period (Rollefson 1989; 2001). The EPPNB in Jordan was advanced on the basis of such a phase in Syria, as attested at Tall Aswad (De Contenson 1989). However, the putative EPPNB in Jordan has hitherto entirely lacked any dated or excavated archaeological sites to fill it. Moreover, the PPNA at Jericho and Netiv Hagdud persists until 9,300 BP, and because of these considerations and the fact that socio-cultural, architectural and economic shifts towards sedentism and farming in Syria are known to precede the same transitions in the southern Levant, Kuijt (1997) has argued strongly against the EPPNB's existence in Jordan and for an extension of the PPNA in Jordan until ca. 9,300 BP.

On the uncalibrated radiocarbon scale, ZAD 2 now provides conclusive evidence for an extension of the PPNA in the southern Levant till 9,300 BP, and conversely, the site militates against the existence of the EPPNB in Jordan. Nonetheless, the employment of uncalibrated radiocarbon dates *per sé* is problematic in this regard, because uncalibrated dates do not represent true sidereal time. In particular they are ambiguous in the period from 9,600 to 9,400 BP which coincides with a marked 'flat spot' on the dendrochronological calibration curve (Edwards and Higham 2001). For example, calibration of the ZAD 2 dates (ranging ca. 300 years) leads to a greatly expanded calibrated time slice, from 9,250 BC to 8,330 BC, or nearly a thousand years.

In so far as the uncalibrated chronology is accepted, the extension of the Jordanian PPNA down to 9,300 BP is not just a matter of changing the chronological borders a little. It also highlights the transition in Jordan between the late PPNA of 9,300 BP and the large MPPNB settlements after 9,200 BP as a more acute scalar shift than we have previously realized. For the Dead Sea region, the contrast is best exemplified by the gulf between tiny ZAD 2 and the massive architectural elaboration of MPPNB (from ca. 9,000 BP) Wadi Ghuwair I (Najjar 2001). In view of the prior PPNB developments in the north, it now becomes increasingly difficult to derive the MPPNB village solely from the small late-PPNA hamlet of ZAD 2-type, and increasingly likely that strong influences from the northern Levant were introduced around 9,200 BP, just as economic changes such as the introduction of livestock herding (Martin 2000) later were.

(PCE)

The Lithic Technology and Typology of ZAD 2: results from the second season

The results of the second season of excavations show that ZAD 2 has an abundant flaked stone assemblage in flint, supplemented by a few pieces of quartz and obsidian, and a diverse groundstone assemblage made from basalt, limestone and sandstone. Geo-archaeological fieldwork in the ZAD Triangle indicates that all sources of raw material, besides the obsidian, are local (pers. comm. C. Day 2001). The Dana Conglomerate Formation which surrounds ZAD 2 contains massive veins of flint cobbles, used through time as flint quarries (Edwards *et al.* 1998), and this inexhaustible supply of ready flint lies only a 10-minute walk from the site. Furthermore, flint pebbles originating in the Dana Conglomerate veins wash down through Wādī adh-

Table 3: Lithic artefacts in Structures 1-4, ZAD 2.

Structure 1		Structure 2		Structure 3		Structure 4	
Debris	2,622	Debris	56,870	Debris	5,224	Debris	21,856
Debitage	102	Debitage	4,924	Debitage	205	Debitage	1,345
Tools	4	Tools	359	Tools	24	Tools	130
Sub-totals (Total= 93,665)	**2,728**		**62,153**		**5,453**		**23,331**

Dhrā' and are widely scattered over ZAD 2 and in its vicinity.

When relatively equal excavation volumes are considered, the majority of lithics came from the uppermost layers of ZAD 2, with lithic density decreasing noticeably with depth. This pattern probably relates to natural deflation, whereby the surface lithics have been concentrated in the upper layers over time, due to the steady winnowing of fine surface sediment. Beside the 52,959 pieces found during the first season of excavation (Edwards *et al.* 2001), the second season yielded a total of 93,665 specimens, recovered from Structures 1-4 (**Table 3**). Structure 1 provided 2,728 specimens of debitage, debris and retouched tools. Structure 2, which is the largest excavated area, supplied 62,153 pieces whereas Structure 3 had 5,453 and finally Structure 4 yielded 23,331 specimens.

Flaked Stone Technology

The second season produced a few burnt lithics, probably due to incidental burning of lithics associated with hearths, as was observed during the first season (Edwards *et al.* 2001). Macroscopic evidence for flint heat treatment during manufacturing is very limited, and shows that heat treatment was not a preferred technique (Sayej 2001).

The 'Debris' (or angular shatter) class at ZAD 2 consists of 92.4% of the total amount of recovered lithics and this category is divided between chips (84.2%) and chunks (15.8%, **Table 4**). This large amount of debris in comparison to other sites such as Netiv Hagdud 70.3% (Nadel 1997: table 4.1) and Wādī Faynān وادي فينان (WF16) 60.3% (Mithen *et al.* 2000: tables 2-3) reflects the easy availability of raw materials and indicate that the flint knappers of ZAD 2 produced most of their tools on site. The 'Debitage' class comprises 7% of the total recovered lithics at ZAD 2 and are divided as: cores (3.5%), flakes (71.8%), bladelets (23.3%), blades (0.9%) and core trimming elements (0.5%, **Table 4**). This percentage is much less than what is recorded from both Netiv Hagdud: 27.2% (Nadel 1997: table 4.1) and from Wādī Faynān: 37.6% (Mithen *et al.* 2000: table 2-3). It is quite intriguing to note that these proportions for the various sites differ so much. For example, Dhrā' is as equally close as ZAD 2 to the Ẓahrat adh-Dhrā' flint quarries.

Core analyses demonstrate three different sizes: small (<30mm), medium (30-70mm) and large (>70mm), made from flint (brown 80.8%, grey 15.7% and black 3.5%). The great majority of them (199) belong to the 'medium' size class, with 17 in the 'large' and 13 in the 'small' size categories. The smaller sizes might result from a deliberate strategy to produce small size tool-blanks, or exhaustion of the larger cores. The majority are pyramidal or conical single platform cores (107), while 25 have two platforms, 23 have multiple platforms and for 74 of them, the platforms are missing. The average scars on these cores are 5 scars for each core and the majority have scars of flakes (131) whereas (98) cores are predominantly blade/bladelet scars. Remains of both burnt and heat-treated cores are very limited, with only 11 cores burnt and 4 showing signs of heat treatment. Additional to the small scars resulting from platform trimming, 78 cores were further retouched and used as tools.

The existence of cortex on both cores and many flaked elements supports the idea that the local cobbles provided the main source for flaking flint elements. With regard to the cores, 43 have 30-100% coverage, 114 cores <30% coverage, and 72 cores do not have any. These high percentages tally with the proportions noted on the local flint sources by Edwards *et al.* (1998). The predominantly brown flint colour of the cores is also reflected in the Ẓahrat adh-Dhrā' quarries, with other colours present in lower frequencies.

Typology

As a contrast to the PPNB assemblages where bladelet blanks generally dominate retouched tool components (cf. Bar-Yosef 1981; Rollefson 1989), ZAD 2 has retouched tools almost equally manufactured from flakes (53%) and from blades and bladelets (47%), which is a typical PPNA pattern (Belfer-Cohen 1994). The second season, like the first (Edwards *et al.* 2001) produced many typical PPNA tool types (**Table 4**) such as Beit Ta'amir

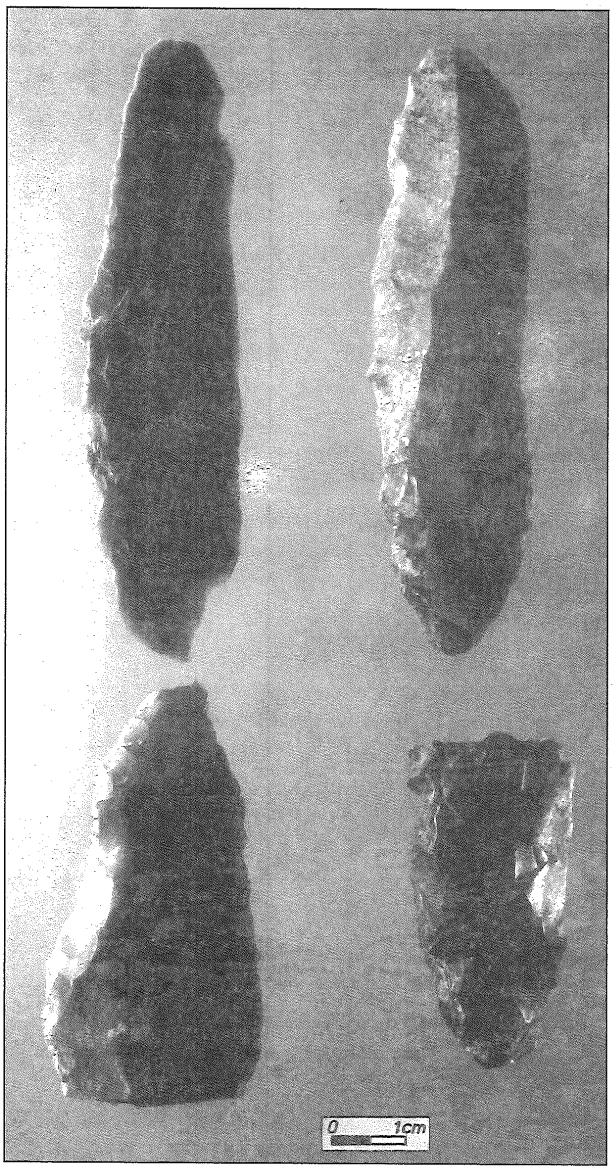
Table 4: Debris, debitage and retouched tool totals for Structures 1–4, ZAD 2.

	Types	N	%	Total	%
Debris					
	Chips	72,882	84.2		
	Chunk	13,690	15.8		
	Subtotal			86,572	92.4
Debitage					
	Cores	229	3.5		
	Flakes	4,724	71.8		
	Blades	61	0.9		
	Bladelets	1,531	23.3		
	Core trimming elements	31	0.5		
	Subtotal			6,576	7.0
Tools					
	Scrapers	38	7.4		
	Burins	5	1.0		
	Retouched blades	26	5.0		
	Beit Ta'amir blades	2	0.4		
	Retouched bladelets	123	23.8		
	Backed tools	7	1.3		
	Projectile points	3	0.6		
	Hagdud truncations	36	7.0		
	Notches	42	8.1		
	Retouched flakes	142	27.5		
	Borers	42	8.1		
	Picks	22	4.2		
	Axes	14	2.6		
	Hand axes	1	0.2		
	Intermediate	1	0.2		
	Multiple tools	4	0.8		
	Ouchtata	1	0.2		
	Truncations	5	1.0		
	Varia	3	0.6		
	Sub-totals			**517**	**0.6**
	Totals			**93,665**	**100**

sickles (**Fig. 17**), Hagdud truncations (**Fig. 18**), bifacially flaked adzes, borers (**Fig. 19**), scrapers, notches, burins — but only a few broken El-Khiam points and other atypical projectile points (**Fig. 20**).

In contrast to other contemporaneous sites, ZAD 2 has a very low proportion of projectile points, and this raises many questions concerning the nature of its economy (Sayej n.d.). At ZAD 2 they constitute only 0.6% of the retouched tools, and most of them are broken, whereas at Dhrā' they make up 53.5% (Kuijt 2001; Kuijt and Mahasneh 1998: table 3), 24.3% at WF 16 (Mithen *et al.* 2000: table 2), and finally 3% at Netiv Hagdud (Nadel 1997: table 4.12). These results suggest that hunting was not a major preoccupation for the inhabitants of ZAD 2, whereas the quantities of ground stone equipment and botanical remains imply an emphasis on plant food processing. However, if projectile points had only symbolic or ritual status, then such purely functional conclusions may be inaccurate. Furthermore, some perishable materials may also have been used for hunting.

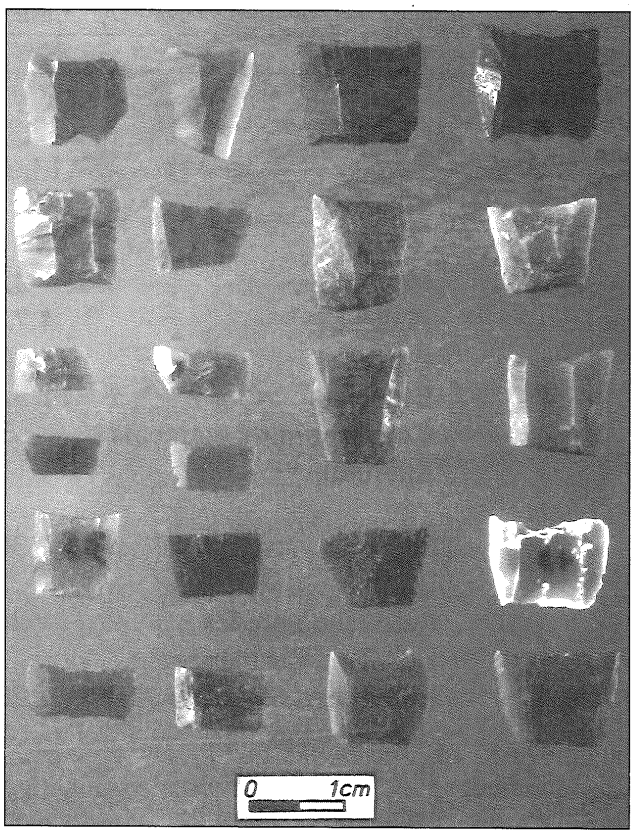
Both ZAD 2 and Dhrā' completely lack microliths (specifically lunates), while WF 16 has 25.4% (of retouched tools) and Netiv Hagdud has 13%. Because microliths were part of the continuity in



17. Beit Ta'amir sickles from Structures 2 and 4, ZAD 2.

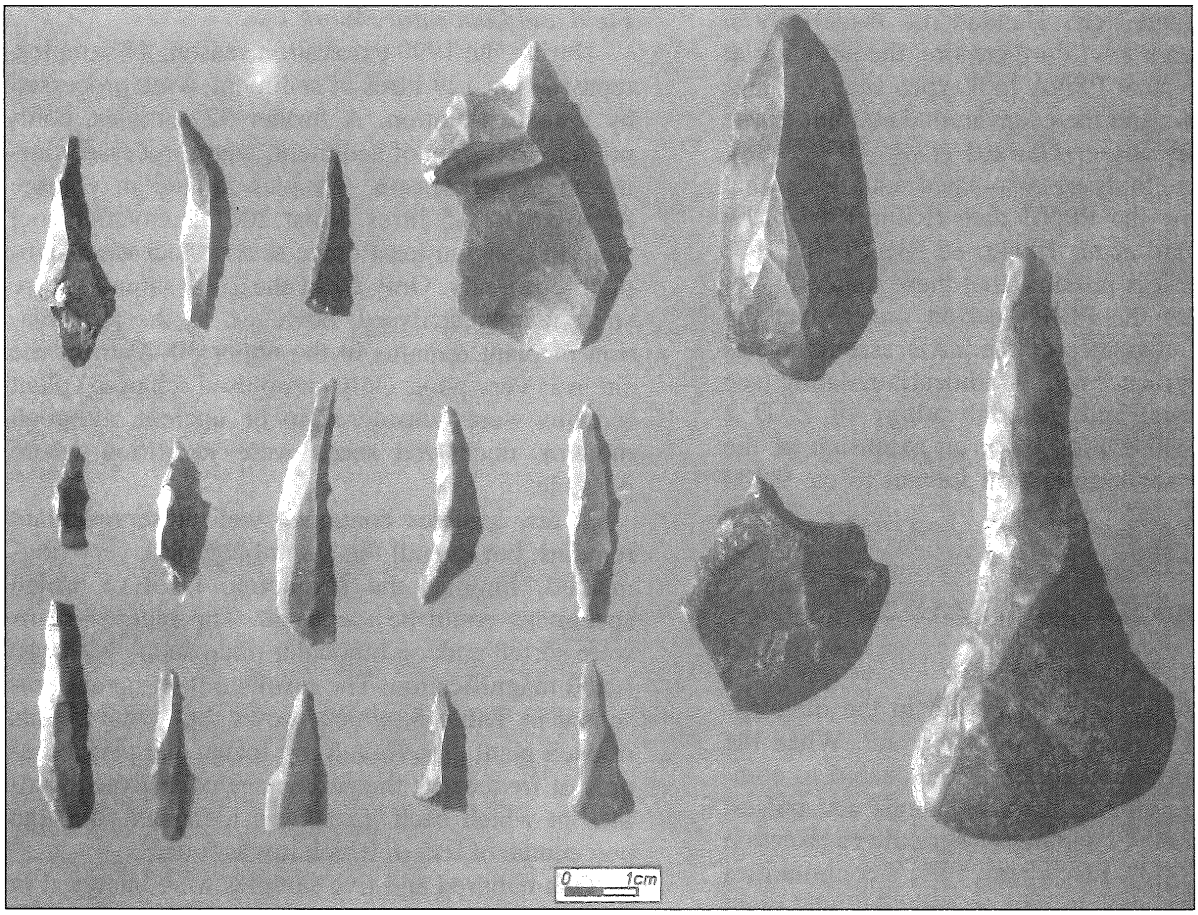
flint knapping technologies between the late Natufian and the early Neolithic periods (Nadel 1998: 8), the question arises as to whether Netiv Hagdud and WF 16 date to an earlier phase within the PPNA than Dhrā' and ZAD 2. Subject to the limitations discussed above on the interpretive potential of calibrated radiocarbon dates (see Edwards, above), the published dates give some support to this hypothesis. On the other hand, Dhrā' has 53.5% of its retouched tools identified as projectile points, which indicates an emphasis on hunting, and so functional explanations may also complicate the picture. Therefore, several explanations can be suggested:

1) If the two sites are contemporary, then Dhrā' may have supplied ZAD 2 with meat and the gathered products from the highlands such as pistachio nuts and figs, whereas ZAD 2 supplied the cultivated products to the inhabitants of Dhrā', such as barley and lentils.
2) If ZAD 2 is a little bit younger than Dhrā', as the dates so far suggest, then ZAD 2 with its extensive tracts of irrigable flat land, might represent a successor site to Dhrā'.
3) If there was no connection between the two sites whatsoever, then it is possible that ZAD 2 was a seasonal site, with an emphasis on crop growing (see Meadows, below), and that its inhabitants moved to the highlands during the hot dry season to practice foraging (Edwards and Higham 2001; Sayej n. d.; Sayej 2001).

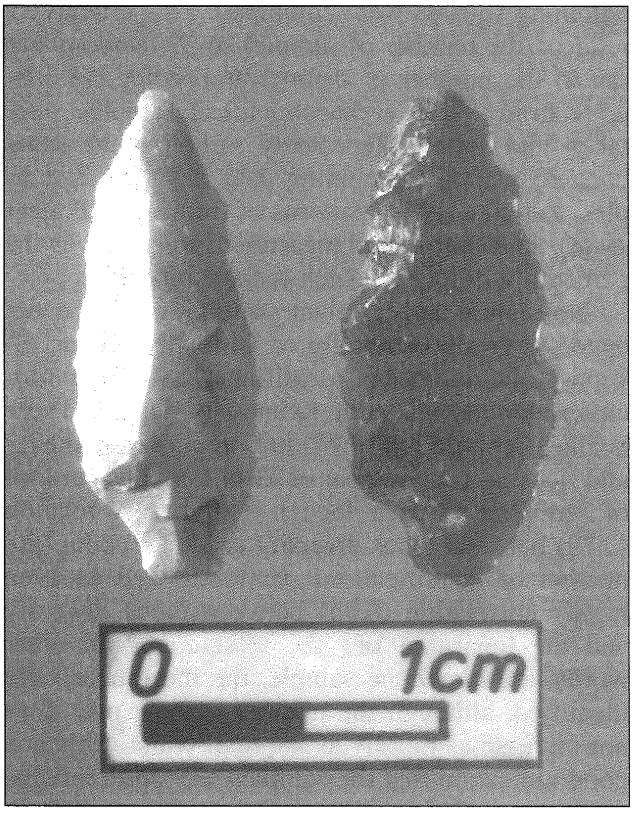


18. Hagdud truncations from Structures 2 and 4, ZAD 2.

The second season of excavation also yielded 36 Hagdud truncations, which form 7% of the recovered retouched tools (**Fig. 18**). These tools have steep retouch on distal and proximal ends and none of them show any sign of being either burnt or heat-treated. Three specimens are partially broken, from either misuse or incidental breakage. Flint was the only raw material exploited for this type of tool and 78% of these were brown flint (28 specimens), followed by grey (6 specimens or 17%) and black (2 specimens or 5%). The combination between both seasons of excavations have yielded a total of 61 Hagdud truncations, which is to date, the second largest amount recovered in the Southern-central Levant after Netiv Hagdud (63 specimens; Nadel 1997: 111).



19. Borers from Structures 1, 2, 3 and 4, ZAD 2.



20. Projectile points from Structures 2 and 4, ZAD 2.

Groundstone Artefacts

The remains of 6 pestles, including a complete one, were found during the second season of excavation, made from sandstone (3), basalt (2) and limestone (1). A hammer stone made from limestone and one cuphole mortar made from sandstone were also recovered. No querns were found in deposits during this season, contrary to their abundance on the surface of the site. In contrast to the surface collection of 35 groundstone specimens (Edwards *et al.* 2001), those recovered during the second season of the excavations were much fewer in quantity and poorer in quality.

Concluding Remarks

While the chronological status of the Khiamian and Sultanian phases of the PPNA are currently the subject of some debate, it is clear already that the techno-typological features of the ZAD 2 assemblage lack any of the PPNB characteristics such as bipolar naviform cores, regular heat treatment, Jericho points, Byblos points and Amuq points (cf. Bar Yosef 1981), and do show strong connections to many dated PPNA sites such as Dhrā' (Kuijt 2001; Kuijt and Mahasneh 1998), WF 16 (Finlayson and Mithen 2001; Mithen and Finlayson 2000; Mithen

et al. 2000), and Netiv Hagdud (cf. Nadel 1997), just to mention a few. Furthermore, the site of Jilat 7 has some typical PPNA tool types such as Hagdud truncations and the excavators dated this phase to the EPPNB phase (Garrard *et al.* 1994a: 88). However, these tools are associated with layers that are well below the PPNB date (Kuijt 1997: 199; see also Garrard *et al.* 1994a: 85-91; 1994b: 193) and therefore, it is possible that these materials belong indeed to the PPNA period rather than the EPPNB. The character of the ZAD assemblage is PPNA. The evidence of the radiocarbon dating (see Edwards, above) and material culture of ZAD 2 provide decisive evidence for an extension of the PPNA in the southern-central Levant to ca. 9,300 BP.

(GS)

Archaeobotanical Report for ZAD 2

Background

The PPNA is a critical period in the development of food production in the Levant. When the PPNA was defined at Jericho, it appeared to coincide with the domestication of cereals and pulses, and thus with the beginning of agriculture (Kenyon 1979; Hopf 1983). Elsewhere, PPNA communities apparently continued to rely on gathered wild plant foods for their subsistence (Garrard 1999: table 3). Experimental work (Hillman and Davies 1990) has shown that the mutations that define the domestic varieties of cereals, while occurring naturally, could only become dominant under certain methods of cultivation, and would be selected against by the harvesting of naturally occurring wild stands. In order for the plant domesticates to become established, therefore, there must have been a period of 'pre-domestication cultivation', in which the wild ancestors of the domestic crops were intentionally cultivated. For certain species, that period may have coincided with the PPNA. The research questions that informed the archaeobotanical investigation of ZAD 2 therefore included:

1) Did the site depend entirely on foraging, or were certain species cultivated?
2) Were any cultivars wild or domestic forms?
3) Could 'pre-domestication cultivation' be identified from the plant remains, and distinguished from foraging and agriculture?
4) How would the plant economy of a 'pre-domestication' site differ from that of a true farming village?

Preliminary results of the first season were recently published (Edwards *et al.* 2001). This report combines those data with the results of the second season of excavation.

Field and Laboratory Work

During the 1999 excavation season, 41 samples, representing 129 litres of sediment, were processed by manual flotation. A further 92 samples, comprising 264 litres of sediment, were processed during the 2001 season. Samples ranged in volume from 0.5 to 6.5 litres. Most 2001 excavation loci were sampled at least once; several loci were sampled repeatedly. Only 64 of the 2001 samples were subsequently analysed, however, as the preservation of plant remains in the upper 30-40cm of the site was very poor. Only carbonised (charred) plant remains were considered to be ancient, although modern, uncharred seeds were identified where possible.

A few samples contained well-preserved plant remains, but overall the assemblage was very fragmented, limiting the taxonomic level to which specimens could be identified. The plant remains were sorted under a binocular microscope with x10 – x50 magnification. The results of sorting are presented in **Table 5**, which shows the actual counts of each plant type (taxon) by locus, and two measures of frequency: the percentage of analysed samples in which each taxon was identified, and the percentage of loci in which it was found.

One hundred and five samples were analysed in the two seasons. For the purpose of this report, data from all samples with the same locus number in adjoining squares were combined. This effectively reduced the number of samples to 39, corresponding to the number of distinct archaeological contexts from which archaeobotanical samples were taken and sorted. Repeatedly sampling the same context, without combining data from those samples, can create false patterns of frequency (Popper 1988). The least biased measure of frequency is the percentage of loci in which each taxon occurs.

No significantly variant patterning can be detected, either horizontally or vertically. Locus diversity (the number of identifiable taxa in each locus) is directly related to richness of deposit. There is a high correlation (0.77) between locus diversity and richness (the number of identifications per litre of sediment in each locus), a higher correlation (0.79) between locus diversity and total count (the number of identifications per locus) and an even higher correlation (0.85) between locus diversity and the logarithm of the total count. In other words, the larger the sample, the more taxa were identified, although the number of new taxa does not increase as rapidly as the total count. This is a good indication that the samples are representative of the taxa that might potentially be recovered, since every increase in sample size results in fewer

Table 5: Archaeobotanical remains from ZAD 2 by locus, for the 1999 and 2001 seasons.

Structure	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Locus	02	05	06	08	10	11	12	13	14	15	16	17	18	20	21	22	24	25
samples	5	1	4	1	2	1	2	1	3	2	1	1	2	1	1	3	1	1
volume (L)	20	4	16	4	8	4	8	4	8.5	8	4	4	8	1.5	4	6.5	0.5	0.5
wheat (*Triticum* sp.) grain	1	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
wheat spikelet fork	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
wheat glume base	.	.	.	.	.	.	2	.	1	1	.	.	.	.	.	.	.	.
'wild' barley (*Hordeum* sp.) grain	.	.	.	.	.	2	3	.	1	2	.	1	1	.	.	.	.	.
'domestic' barley grain	.	.	.	.	.	.	3	.	.	.	.	.	.	1	.	1	.	.
barley grain indet.	1	.	.	.	.	.	1	2	2	2	1	.	.	.	.	2	.	.
barley lateral floret base	.	.	1	.	1	7	84	25	33	18	8	6	6	1	.	9	3	.
'wild' barley rachis internode	1	.	.	.	.	.	2	.	1	2	.	1	1	.	.	1	.	.
'domestic' barley rachis	.	.	.	.	1	.	1	.	1	1	.	.	.	.	.	.	.	.
indet. barley rachis	.	.	.	.	.	3	11	1	1	3	.	2	2	.	.	5	1	.
cereal grain fragments	34	3	20	15	18	50	180	40	31	87	9	19	20	6	1	11	2	.
cereal culm node	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
cereal culm base	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
lentil (*Lens* sp.)	1	.	2	.	.	.	2	2	2	1	1	1	.	.	.	1	.	.
pea/vetch (Vicieae) type	1	.	2	.	1	1	1	2	2	4	1	5	1	.	.	5	.	.
grass pea (*Lathyrus*) type	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
indet. pulse fragments	56	4	54	6	20	24	50	75	69	96	35	50	27	1	1	9	6	.
Pistacia sp. fragments	1	.	1	1	1	20	21	3	15	44	12	15	13	.	4	24	5	.
cf. *Pistacia* fragments	34	4	16	50	23	210	260	60	299	780	270	225	365	.	62	199	44	2
fig (*Ficus* sp.) seeds	13	1	3	.	1	12	17	12	40	191	28	58	21	2	1	32	12	2
Aizoon hispanicum	m	m	m	m	m	m	m	m	m	m	m	2	1	.	m	1	.	.
Carthamus/Centaurea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asteraceae indet.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cerastium sp.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Silene sp.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Heliotropium sp.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Arnebia/Lithospermum	.	.	.	.	.	.	.	.	m	.	.	.	.	.	m	1	.	.
Salsola sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chenopodiaceae	1	.	.	m	1	1	1	1	1	.	4	.	1	.	.	.	.	.
Carex type	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Cyperaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
small-seeded legumes indet.	1	.	2	.	.	.	3	1	2	.	.	.	1	.	1	.	.	.
Onobrychis sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Onobrychis pod fragments?	.	.	.	.	.	.	.	.	.	5	1	2	1	.	.	12	.	.
Geraniaceae 'twist'	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bupleurum sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ornithogalum-type	.	.	.	.	.	.	1	.	.	.	.	1	.	1	.	1	.	.
Liliaceae indet.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Malva sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plantago sp.	.	1	.	.	.	m	.	.	6	3	4	3	1	.	.	2	1	.
Bromus sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stipa sp.	.	.	.	.	.	1	3	.	1	2	.	.	.	.	.	.	.	.
Avena sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Avena/Stipa awn fragment	.	.	.	.	.	.	1	.	4	4	3	2	3	.	1	2	.	.
Setaria type	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
grass bulbil - cf. *Poa* sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
small grass - sharp apex	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
small grass - blunt apex	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
grass seeds indet.	m	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.
grass seed fragments	.	.	.	.	.	3	8	5	6	11	.	.	1	.	.	4	.	.
Solanaceae indet.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Verbena sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Thymelaea?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
unknown - Cyperaceae?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
indeterminate seeds	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	10	2	.
total identifiable	20	2	11	2	5	29	139	47	102	249	57	88	46	7	4	88	19	2
identifiables/L	1.0	0.5	0.7	0.4	0.7	7.3	17.4	11.7	12.0	31.2	14.2	22.1	5.7	4.7	0.9	13.6	39.0	4.0

Table 5: (continued).

Structure	2NW	2NW	2NW	2NW	2NW	2SE	2SE	2SE	J25	N28	N28
Locus	02	03	04	05	06	02	03	04	03	03	04
samples	3	10	5	4	4	2	4	5	3	2	2
volume (L)	11	21.5	13.5	9	9.5	6.5	12	15.5	7	3	2
wheat (*Triticum* sp.) grain	.	.	.	.	.	.	.	2	1	.	.
wheat spikelet fork	.	.	.	.	.	1	1	.	.	.	.
wheat glume base	.	3	.	.	.	3	9	4	2	.	.
'wild' barley (*Hordeum* sp.)	.	1	.	.	.	2	1	9	.	.	.
'domestic' barley grain	.	.	2	.	.	1	.	5	.	.	.
barley grain indet.	1	1	1	.	.	.	1	13	.	.	.
barley lateral floret base	.	40	24	12	4	14	60	81	5	2	1
'wild' barley rachis internode	.	3	2	1	.	1	6	4	.	1	.
'domestic' barley rachis	.	2	.	.	.	.	.	5	.	.	.
indet. barley rachis	1	9	6	2	.	7	20	14	.	1	.
cereal grain fragments	54	18	5	3	2	113	284	403	1	.	.
cereal culm node	1	.	.	.	.	.	.	.	.	.	.
cereal culm base	.	.	.	.	.	.	.	.	.	.	.
lentil (*Lens* sp.)	.	.	.	.	.	4	9	5	1	.	.
pea/vetch (Vicieae) type	1	6	.	.	1	5	20	20	2	.	.
grass pea (*Lathyrus*) type	.	.	.	.	.	.	2	.	.	.	.
indet. pulse fragments	32	52	13	1	.	90	200	182	62	1	.
Pistacia sp. fragments	5	37	35	9	1	41	224	276	15	5	3
cf. *Pistacia* fragments	163	1060	670	434	17	2257	8976	10300	918	73	114
fig (*Ficus* sp.) seeds	1	25	21	7	2	13	150	76	2	.	2
Aizoon hispanicum	m	13	1	m	m	1	25	64	m	m	m
Carthamus/Centaurea	.	.	.	.	.	.	.	7	.	.	.
Asteraceae indet.	.	.	.	.	.	2	12	.	.	.	.
Cerastium sp.	.	.	.	.	.	.	.	.	.	.	.
Silene sp.	m	.	.	.	.	.	.	.	.	.	.
Heliotropium sp.	m	.	.	.	.	.	.	.	.	.	.
Arnebia/Lithospermum	.	.	.	.	.	.	.	.	.	.	.
Salsola sp.	.	.	.	.	.	.	.	1	.	.	.
Chenopodiaceae	.	m	m	.	.	4	3	3	.	.	.
Carex type	.	.	.	.	.	.	.	.	.	.	.
Cyperaceae	.	.	.	.	.	.	1	.	.	.	.
small-seeded legumes indet.	1	.	1	.	.	.	3	5	.	.	.
Onobrychis sp.	.	.	1	.	.	.	.	.	.	.	.
Onobrychis pod fragments?	.	.	.	.	.	.	.	3	.	.	.
Geraniaceae 'twist'	.	.	.	.	.	.	1	.	.	.	.
Bupleurum sp.	.	.	.	.	.	1	1	.	.	.	.
Ornithogalum-type	.	.	.	.	.	2	2	2	.	1	.
Liliaceae indet.	.	1	.	1	.	.	.	.	.	.	.
Malva sp.	.	.	.	.	.	1	.	.	1	.	.
Plantago sp.	.	.	.	.	.	.	.	.	.	.	.
Bromus sp.	.	1	1	.	.	.	.	.	.	.	.
Stipa sp.	.	1	1	.	.	.	12	8	.	.	.
Avena sp.	.	3	.	.	.	.	1	1	.	.	.
Avena/Stipa awn fragment	.	3	3	1	.	2	9	20	6	.	1
Setaria type	.	1	.	.	.	1	24	24	.	.	.
grass bulbil - cf. *Poa* sp.	.	.	.	.	.	.	8	59	.	.	.
small grass - sharp apex	.	.	.	.	.	5	14	5	.	.	.
small grass - blunt apex	.	1	.	.	.	.	.	.	.	.	.
grass seeds indet.	.	1	1	.	.	3	3	21	.	.	.
grass seed fragments	.	21	2	2	.	20	37	55	5	.	.
Solanaceae indet.	.	.	.	.	.	.	.	1	.	.	.
Verbena sp.	.	.	.	.	.	.	1	.	.	.	.
Thymelaea?	.	.	.	.	.	.	2	.	.	.	.
unknown - Cyperaceae?	.	.	.	.	.	.	212	344	.	.	.
indeterminate seeds	.	36	13	4	.	56	200	117	7	7	.
total identifiable	8	164	85	32	7	152	905	1029	36	13	5
identifiables/L	0.7	7.6	6.3	3.6	0.8	23.4	75.4	66.4	5.2	4.3	2.6

Table 5: (continued).

Structure	3	3	3	3	3	3	3	3	3	3	total	frequency	frequency
Locus	02	03	04	05	06	07	08	09	10	11	(ancient)	%samples	%loci
samples	2	1	3	9	1	6	3	1	1	1		N=105	N=39
volume (L)	2	1.5	4.5	13.3	0.75	7.5	5	3	3	3.5	256		
wheat (*Triticum* sp.) grain	.	.	1	.	.	.	.	.	.	.	6	7	10
wheat spikelet fork	.	.	.	.	.	.	2	.	.	.	4	3	8
wheat glume base	.	.	.	.	.	2	1	.	.	.	26	21	26
'wild' barley (*Hordeum* sp.)	.	.	.	.	.	2	.	1	.	.	26	17	31
'domestic' barley grain	.	.	.	3	.	.	.	.	.	2	18	14	21
barley grain indet.	.	.	1	.	.	.	.	.	.	.	29	15	31
barley lateral floret base	.	.	2	25	.	10	23	30	7	10	544	72	77
'wild' barley rachis internode	.	.	.	5	.	.	2	.	.	.	33	23	41
'domestic' barley rachis	.	.	.	.	.	.	.	.	2	.	13	10	18
indet. barley rachis	1	.	.	8	.	2	6	12	1	2	120	47	59
cereal grain fragments	6	1	11	34	1	32	25	6	9	15	1568	76	90
cereal culm node	.	.	.	1	.	.	.	1	.	.	4	4	10
cereal culm base	.	.	.	.	.	.	.	.	.	.	1	1	3
lentil (*Lens* sp.)	.	.	1	.	.	.	1	.	.	.	33	20	33
pea/vetch (Vicieae) type	.	.	1	.	.	.	.	.	.	.	80	30	41
grass pea (*Lathyrus*) type	.	.	.	.	.	.	.	.	.	1	3	3	5
indet. pulse fragments	.	.	4	7	.	3	1	3	1	1	1173	67	82
Pistacia sp. fragments	.	1	.	16	1	.	5	7	2	5	845	67	85
cf. *Pistacia* fragments	7	4	23	339	7	47	138	144	38	27	27554	96	97
fig (*Ficus* sp.) seeds	.	.	2	12	.	4	5	1	1	1	767	77	79
Aizoon hispanicum	m	m	m	m	m	m	1+m	.	m	m	108	18	23
Carthamus/Centaurea	.	.	.	.	.	.	.	.	.	.	7	2	3
Asteraceae indet.	.	.	.	.	.	.	.	.	.	.	14	4	5
Cerastium sp.	.	.	.	.	.	.	.	.	.	.	1	1	3
Silene sp.	.	.	.	.	.	.	.	.	.	.	1	1	3
Heliotropium sp.	.	.	.	.	.	.	.	.	.	.	1	1	3
Arnebia/Lithospermum	.	.	.	m	.	m	m	m	.	m	1	1	3
Salsola sp.	.	.	.	.	.	.	.	.	.	.	1	1	3
Chenopodiaceae	.	.	.	.	.	.	.	.	.	.	21	13	21
Carex type	.	.	.	.	.	.	.	.	.	.	1	1	3
Cyperaceae	.	.	.	.	.	.	.	.	.	.	1	1	3
small-seeded legumes indet.	.	.	.	1	.	.	1	1	.	.	24	17	33
Onobrychis sp.	.	.	.	.	.	.	.	.	.	.	1	1	3
Onobrychis pod fragments?	.	.	.	.	.	.	.	1	1	.	26	10	15
Geraniaceae 'twist'	.	.	.	.	.	.	1	.	.	.	2	2	5
Bupleurum sp.	.	.	.	.	.	.	.	.	.	.	2	2	5
Ornithogalum-type	.	.	.	.	.	.	.	.	.	.	10	10	21
Liliaceae indet.	.	.	.	.	.	.	.	.	.	.	2	2	5
Malva sp.	.	.	1	m	.	.	.	.	.	.	2	3	8
Plantago sp.	.	.	.	.	.	.	1	.	.	.	22	10	21
Bromus sp.	.	.	.	.	.	.	.	.	.	.	2	2	5
Stipa sp.	.	.	1	4	.	.	.	4	1	2	41	22	33
Avena sp.	.	.	.	1	.	.	.	.	.	.	6	5	10
Avena/Stipa awn fragment	.	.	.	5	.	.	1	1	2	1	68	32	54
Setaria type	1	.	.	.	.	.	.	.	.	.	52	12	15
grass bulbil - cf. *Poa* sp.	.	.	.	1	.	.	.	.	.	.	68	7	8
small grass - sharp apex	.	.	.	.	.	.	.	.	.	.	25	8	10
small grass - blunt apex	.	.	.	1	.	.	.	.	.	.	2	2	5
grass seeds indet.	.	.	1	2	.	.	.	.	.	.	34	11	21
grass seed fragments	.	.	.	6	.	2	3	4	2	3	195	37	51
Solanaceae indet.	.	.	.	.	.	.	.	.	.	.	1	1	3
Verbena sp.	.	.	.	.	.	.	.	.	.	.	1	1	3
Thymelaea?	.	.	.	.	.	.	.	.	.	.	2	1	3
unknown - Cyperaceae?	.	.	.	.	.	.	.	.	.	.	556	7	5
indeterminate seeds	.	.	.	8	.	.	1	5	1	1	455	38	41
total identifiable	3	0	12	81	0	20	46	59	17	20	3613		
identifiables/L	1.5	0.03	2.7	6.1	0.1	2.7	9.3	19.5	5.8	5.8	14.1		

Table 5 : (continued).

Notes:

1. all identifications are somewhat uncertain, due to fragmentary nature of remains; counts and frequencies include probable and doubtful identifications.
2. unless specified, plant part identified was a seed (broadly defined).
3. m = modern (not included in count or frequency results).
4. 'total identifiable' includes all taxa except: cereal grain fragments, pluse fragments, grass seed fragments and modern remains; total includes *Pistacia* fragments divided by 100 (estimated number of fragments per whole nut).
5. 'frequency % sample' is the percentage of samples analysed containing that taxon.
6. 'frequency % loci' is the percentage of loci containing that taxon.
7. Structure 2 (north-west) includes Squares J 22, J 23, K 22, K 23, L 22 and L 23; Structure 2 (south-west) includes Squares M 27, N 27, and O 27
8. J 25 samples came from a burial feature against the outside wall of Structure 2 (north-west).
9. N 28 samples were from deposits against the outside wall of Structure 2 (south-east).

additional taxa. The richest and most diverse loci are floor deposits on the south-eastern side of Structure 2. Some loci in Structure 1 are also relatively rich and diverse.

The most frequently identified food plant was pistachio (*Pistacia* sp.), with nutshell fragments in almost every locus with identifiable plant remains. Nutlets (seeds) of wild fig (*Ficus* sp.) were almost as widespread. Barley (*Hordeum* sp.) was also ubiquitous, but wheat (*Triticum* sp.) was identified in only a third of loci. Cereal grain fragments that were too broken to identify further were found in most loci. Three types of pulses — lentil (*Lens* sp.), a pea/ vetch type (Fabaceae Sect. Vicieae) and a grass pea type (cf. *Lathyrus* sp.) — were identified. There were pulse fragments in most loci. Most of the indeterminate pulse fragments probably belong to either the pea/ vetch or grass pea types, as fragments of lentil are more readily identifiable in cross-section. Lentils were found in only a third of loci.

Grasses other than wheat and barley (*Avena* sp., *Bromus* sp., *Poa* sp., *Stipa* sp., *Setaria* sp. and others) were common, with seeds, seed fragments or awn fragments in two-thirds of all loci. At least one grass taxon was identified in every locus with over 20 identifications. It is surprising that plants with little known food value were found so frequently, in the absence of domestic animals (whose dung, when burnt for fuel, can contribute fodder and pasture species to archaeobotanical assemblages). Nevertheless, even the broad category of non-cereal grass remains was represented in only about half the samples, compared to the 94% of samples with some cereal remains. The difference may reflect usage; it is possible that cereals were stored for year-round use, while other grasses were not.

All other plant taxa are less frequent. A third of loci include very small numbers of small-seeded legumes, while between a fifth and a quarter of loci include charred seeds of *Aizoon hispanicum*, *Ornithogalum*-type, *Plantago* sp. and Chenopodiaceae. No other taxon occurs in more than three loci. Two adjoining loci in Structure 2 contained over 500 seeds of an unknown type, possibly a species of Cyperaceae.

In summary, every locus sampled with a dozen or more identifications produced evidence of four categories of plant foods: cereals (barley and/ or wheat), pulses (lentil, pea/ vetch and/ or grass pea), pistachio and fig. Pistachio nutshell, which was probably used for fuel, may be over-represented. Likewise, the fig seeds recovered could, conceivably, have come from a single fruit. It is the regularity with which fig and pistachio remains were found that suggests they were staple foods, together with cereals and pulses.

Environment at Ẓahrat adh-Dhrā' during the PPNA Period

The ongoing analyses of pollen and charred macrobotanical remains from the project's core data (see Fall and Swoveland, above) will provide the best evidence of past regional vegetation for the Ẓahrat adh-Dhrā' region. Plant macrofossils gathered from our archaeological sites may also contribute to the study of the wider region's vegetation history; though they are highly selective in nature.

Wood charcoal is the preferred indicator of local vegetation, as the least-effort principle militates against long-distance transport of firewood. With relatively few tree species in Jordan, wood identification can also be more taxonomically specific than seed identification. Known food plants, such

as fig and pistachio, are less indicative of local vegetation than are wild plants without food value, because it is assumed that foragers would travel further to collect highly valued species. At ZAD 2, three taxa were found both in the modern seed bank and as charred macrofossils: *Aizoon hispanicum*, Chenopodiaceae (e.g., *Suaeda* sp.) and *Arnebia/ Lithospermum* sp. The last was rare in the charred assemblage and occasional in the modern seed bank. The chenopod family is often treated as an indicator of arid, saline conditions, as many of its members thrive in such environments; chenopods were uncommon in both the modern and ancient flora. On the other hand, *Aizoon*, also an indicator of arid or saline conditions, was ubiquitous in the modern seed bank, and relatively common (108 seeds, in 23% of loci) in the archaeobotanical remains. Single (and questionable) examples of *Silene* sp. and *Heliotropium* sp. were also found in both the modern and ancient flora.

These taxa suggest an early Holocene environment similar to today's. The non-cereal grasses, however, tell another story. While none can be identified to species level, their abundance and diversity, and the near-absence of grass seeds in the modern seed bank (one uncharred grass seed was noted) suggest that the early Holocene vegetation of the Dhrā' Plain was significantly different.

The larger grass seeds (*Stipa* sp., *Avena* sp. and/ or *Bromus* sp.) may represent steppe vegetation, rather than desert. Awn and grass seed fragments were found in a small majority of loci. Awn fragments of *Avena* and *Stipa* are indistinguishable. Sections of caryopses lacking features that might have identified them as *Stipa, Avena* or *Bromus* were classed as grass seed fragments. Based on the relative frequency of the three genera, most of the indeterminate fragments are probably from *Stipa*. A second grass category consists of bulbils, rather than seeds, which match those identified by Kislev (1997) as *Poa* cf. *bulbosa*. These were found in only three loci. A third group includes the smaller grass seeds, some of which could be identified as *Setaria* sp. Most of the 79 small grass seeds were from the same loci as the bulbils. The bulbils and small grass seeds are weak indicators of past vegetation, due to their relative scarcity and inexact identification.

A number of other taxa were identified, including some that might be considered weeds at later sites, such as Asteraceae indet., *Silene* sp., small-seeded legumes, *Ornithogalum*-type, *Malva* sp., *Plantago* sp. and *Verbena* sp. Whatever their role at ZAD 2, these taxa are poor environmental indicators. Two seeds, tentatively identified as *Thymelaea* sp., may reflect steppe conditions.

In summary, the limited palaeoenvironmental evidence in the assemblage suggests less arid conditions in the PPNA than prevail at present. Kislev (1997) reached a similar conclusion, based on the range of species found at Netiv Hagdud. Steppe vegetation requires annual rainfall of at least 150mm. The modern vegetation around ZAD 2, however degraded by overgrazing, receives only 50-100 millimetres per annum (Al-Eisawi 1985).

Wild Food Resources

Nutshell fragments are ubiquitous at ZAD 2, occurring in almost every locus with identifiable plant remains. All were assigned to *Pistacia* sp. A single, whole nut recovered during the 1999 season appears to be of *Pistacia atlantica*. Fragments deemed to be diagnostic included a section of the rim around the hilum. The vast majority of fragments lacked diagnostic features, but were consistent with *Pistacia*. The only tree fruit identified was *Ficus* sp. Both trees may have grown in sandstone gorges a few kilometres east of the site, at more than 600 metres above sea level (Kürschner 1986: 55). Both are widely reported from prehistoric sites in Jordan (Neef 1997).

Pre-Domestication Cultivation

Barley, wheat and the pulses were probably cultivated at ZAD 2. The evidence is ambiguous, due to the poor preservation of most of the remains, but it has been argued that morphologically wild barley was cultivated (Meadows n.d.). This may, strictly speaking, be referred to as "non-domestication cultivation" (Hillman and Davies 1990: 168), as there is no evidence that the cultivation methods employed at ZAD 2 favoured the evolution of the domestic form of barley.

The defining characteristic of domestic cereals is that their ears, or spikes, do not spontaneously disarticulate at maturity (a highly disadvantageous mutation in the wild, but one which is selected for under certain methods of cultivation). In wild cereals, individual spikelets break off as soon as the grains within them ripen, leaving smooth abscission scars at the point of attachment between the rachis internodes. In domestic forms, the rachis internodes do not separate cleanly at the point of attachment. In theory, then, rachis internodes may be identified as domestic or wild, provided that the abscission scar is preserved. In reality, a minority of rachis internodes of wild cereals will have rough abscission scars if the grain is not allowed to ripen completely before harvesting (Kislev 1989). Moreover, wild cereals often grow as weeds of domestic crops. Early farming sites, therefore, tend to pro-

duce both wild- and domestic-type internodes.

At ZAD 2, wild-type barley rachis internodes outnumber the domestic type (32 definite and 2 probable wild types, versus 4 definite, 7 probable and 2 dubious domestic types). Most (121) barley rachis internodes could not be assigned to one type or the other, because the abscission scar was not preserved. Most of these, however, are narrow and have sturdy lateral floret bases, characteristics of wild barley (van Zeist and Bakker-Heeres 1982: 204). Over 500 fragments of lateral floret bases were also found. After allowing for the poorer preservation of the ZAD 2 remains, these proportions are similar to those obtained at Netiv Hagdud (Kislev 1997: table 8.1), where Kislev attributed all the chaff to wild barley. The barley chaff, therefore, is probably all of the wild variety.

No intact cereal grains were recovered. Of the 73 cereal grain fragments that could be identified as barley, 40 were complete enough for the thickness and breadth of the grain to be measured. When plotted, these measurements fall into two groups, the dimensions of which correspond to those of wild and domestic barley grains identified at other Neolithic sites in Jordan (Colledge 1994: fig. 4.6). Of the 40 grains, 15 had been identified as wild barley on morphological grounds, 16 had been identified as 'domestic' and 9 could not be classified as wild or domestic grains. All 16 'domestic' grains fell into the size group corresponding to domestic barley, while 14 of the 15 'wild' grains fell into the 'wild' size group; the indeterminates fell mainly into the lower end of the 'domestic' size group. On the basis of grain size and morphology, therefore, both wild and domestic barley appear to be present at ZAD 2.

The combination of wild barley chaff and 'domestic' grains at ZAD 2 invites two explanations: either 'domestic' chaff is missing from the assemblage, or the large domestic-size grains grew on plants with wild-type rachis. As both grains and chaff were derived from all areas of the site, the former explanation is highly implausible. Instead, it appears that one type of chaff is associated with two size groups of grain. The likely explanation is pre-domestication cultivation, perhaps supplemented by gathering of wild barley from natural stands. In this case, it is assumed that conscious selection of seed had already led to a cultivated variety of barley with larger, rounder grains, before domestic-type chaff had become established.

The remains of wheat are too few and too poorly preserved for comparable measurements to be obtained. The location of ZAD 2 suggests that the wheat was cultivated, as wild emmer is not found in southern Jordan, but its relative scarcity may imply that it was a 'weed' of the barley crop, rather than a crop in its own right.

Two aspects of the pulses suggest that they were also cultivated. Firstly, pulse fragments are roughly as abundant as cereal fragments, and occur in almost as many loci. This implies a similar pattern of storage and usage. Secondly, the pulse taxa at ZAD 2 are indistinguishable from those that were later domesticated — lentil, pea *(Pisum sativum)*, bitter vetch *(Vicia ervilia)* and grass pea. These are the same pulse taxa found at Netiv Hagdud. The mutations that characterise domestic pulse crops (loss of seed dormancy and pod indehiscence) are not observable in carbonised seeds (Kislev and Bar-Yosef 1988; Ladizinsky 1989). Nevertheless, the evidence is inconclusive. Pulse cultivation (and indeed domestication) at ZAD 2 is possible, but unproven.

It is assumed that the cereals and pulses were grown close to the site, taking advantage of the availability of flat land and the perennial flow of the Wādī adh-Dhrā'. Indeed, the establishment of ZAD 2, 2km west of a pre-existing PPNA site at the spring of Dhrā' (Kuijt and Mahasneh 1998), may reflect the adoption of food production, as the new site was further away from the natural habitat of the principal food plants (cf. comments in Sayej, above).

Comparison to Other Sites

The ZAD 2 assemblage is, to a good approximation, a sub-set of the better preserved assemblage analysed by Kislev (1997) at Netiv Hagdud. This is evident in both the food and non-food plants common at the two sites. Taxa that were rare at Netiv Hagdud, such as almond (*Amygdalus* sp.), acorn (*Quercus* cf. *ithaburensis*) and grape (*Vitis* sp.), are absent at ZAD 2. At both sites, barley remains greatly outnumber those of wheat, and lentils are outnumbered by vetch types (Vicieae). Barley chaff at both sites is predominantly of the wild type. Barley grain measurements from Netiv Hagdud were not published, but wheat grains were identified as wild emmer *(Triticum dicoccoides)*. At both sites, fig and pistachio were the main fruit and nut taxa. Common non-food species at both sites include *Aizoon, Avena, Stipa, Poa* and *Plantago*; others (e.g., *Malva*) are rare at ZAD 2 but more common at Netiv Hagdud.

The PPNA archaeobotanical assemblage from 'Irāq ad-Dubb (عـراق الدبّ) (Colledge 1994), which may be earlier than ZAD 2, presents some similarities and differences. Again, fig and pistachio are the main fruit and nut taxa, although almond was

also found consistently. Two or three pulse types include lentil, vetch/ grass pea and broad bean. Wheat and barley occur in most samples. Grains and chaff of both wild and domestic barley were identified. The wheat may be wild einkorn *(Triticum boeticum)*, which would be considered a cultivar on biogeographical grounds. 'Irāq ad-Dubb is probably a 'pre-domestication cultivation' site, although the evidence is ambiguous.

Cereal domesticates have also been identified in the PPNA at Jericho (Hopf 1983) and Tall Aswad, near Damascus (van Zeist and Bakker-Heeres 1982). Jericho is difficult to compare to the other sites, as plant remains were collected by hand, rather than by flotation. The resulting assemblage is small and unrepresentative. At Aswad, by contrast, a large and diverse assemblage was obtained, and it apparently includes domestic emmer wheat *(Triticum dicoccum)*, but not wild einkorn. In contrast to ZAD 2 and Netiv Hagdud, glume wheat chaff is abundant in the PPNA at Aswad (Phase I). On the other hand, Aswad has 'domestic' barley grains with 'wild' barley chaff, just as ZAD 2 does, indicating "an intermediate stage between the wild and fully domesticated forms" (van Zeist and Bakker-Heeres 1982: 204). Aswad also relied on the collection of figs and pistachios.

Pre-domestication cultivation may impose limits on community size that do not apply once domestic varieties are grown (Meadows n.d.). This is because the time available to harvest wild cereals is short; the ears of wheat or barley shatter as they ripen. Foragers can extend the harvest season by exploiting wild stands of cereals at different altitudes, because these would not ripen simultaneously. More sedentary cultivators of wild-type cereals, however, risk having their entire crop ripen at the same time, and being unable to harvest it all before the ears shatter, if their labour-force is too small. With domestic cereals, the harvest is the most labour-intensive time of the year (Russell 1988). Without domestic varieties, it seems unlikely that a sedentary community could grow enough cereals to feed itself. This is reflected in the continued reliance on gathered foods, as well as barley, at ZAD 2 (0.2ha) and Netiv Hagdud (1.5ha). PPNA Jericho and Aswad are larger (ca. 4ha), but apparently had domestic wheat.

(JM)

The Human Remains (Homo 1) in the Communal Burial (Squares I-J-K/ 25)

This report concerns the cranium of the first encountered individual in Square J25 *(Homo 1)*. It is limited to a discussion of some of the cranial material, as other cranial and post-cranial material is still in the process of being cleaned and reconstructed. *Homo 1* was buried on a slight angle, with the anterior portion (the face) buried straight down facing into the ground. The mandible and atlas were articulated with the cranium at the time of burial, indicating that there was at least some level of articulation of the individual when it was buried.

The fragile nature of the cranium meant that its removal from the matrix saw it break into numerous fragments. Very little was preserved of the maxio-facial region other than some small fragments of alveolar bone around the remaining teeth. The outline of the mandible, however, could clearly be made out *in situ*. Before removal the cranium was carefully cleaned and documented so as to identify any significant morphological or pathological features. No obvious pathologies were noted in the remains.

While *in situ*, it was noted that the individual had a pronounced supraorbital ridge and reasonably well developed mastoid processes. Morphologically these are considered male characters, although it is difficult to provide a definitive statement of sex from skeletal remains in the absence of the innominate bone. However, a number of additional characters were observed in the laboratory that indicate the remains might be those of a male. In the occipital bone, a reasonably well developed inferior nuchal line and external occipital protuberance suggested considerable muscle attachments. The masseteric tuberosity was, on the other hand, not well developed which suggests that the stresses of mastication were not particularly heavy.

Establishing the age of cranial material in such a fragmentary state is problematic. The cranial sutures were not obliterated suggesting that the individual was not an old man. It was noted that the different bones of the cranium had come apart at the coronal, sagittal and lambdoidal sutures. Considerable wear on the occlusal surfaces of the teeth was recorded, however, the cusps were not worn flat on all teeth and features such as regular fissures were still apparent in at least one tooth (the left maxillary second premolar). The condition of the sutures and degree of occlusal wear would indicate that the individual was an adult.

An unusual pattern of wear was identified in the first left maxillary molar. It consisted of a very severe pattern of wear on the lingual portion of the tooth which climbed steeply to the regular height of the occlusal surface on the buccal side. It may be associated with some kind of task or activity; however, in the absence of adjacent teeth and the alveolar structure it is difficult to say.

In the posterior mandibular dentition there is considerable alveolar resorption, which suggests that the last two molars on each side may have been lost due to some activity-related mechanism. There is no evidence of infection of the alveolar region, and therefore pathology is unlikely to be the cause of tooth loss, unless all evidence has healed. The unusual occlusal wear pattern on the left side maxillary M1 most likely has some relationship with this, however, the absence of evidence for the supporting tooth structure makes it difficult to explain this unusual pattern of wear.

(MW)

Mapping Survey at Ẓahrat adh-Dhrā' 1, 2001

Field operations at Ẓahrat adh-Dhrā' 1 (ZAD 1) between January 2 and 14, 2001 involved intensive remapping of all visible archaeological features on the ridge between Wādī al-Wa'īda (وادي الوعيدة) (which forms the northern bank of ZAD 1) and Wādī adh-Dhrā', and along the south bank of the Wādī adh-Dhrā'. This work was guided by the original site map drawn in 1994 by George Findlater and updated in 1999 by Rudy Frank (Edwards *et al.*1998; 2001: fig. 11), as well as the architecture revealed by the 1999/ 2000 excavations at ZAD 1.

A theodolite survey gathered data from over 1200 points to create a stone-by-stone map of 45 architectural features, including single- and multiple-room rectilinear structures, linear stone alignments, and curvilinear stone enclosures (**Fig. 21**). During the 1999/ 2000 season, 21 excavation units of various sizes sampled 9 structures (Structures 36-44) and 6 potential midden localities (see discussion in Edwards *et al.* 2001). Among the architectural features at ZAD 1 are several alignments and structures on the south bank of the Wādī adh-Dhrā' with associated Middle Bronze Age potsherds, demonstrating that the settlement originally extended south of the modern wadi. Our mapping also incorporated the boulder fields cross-cutting the southeastern and northwestern ends of ZAD 1, with elements of the northwestern boulder field on both the north and south sides of Wādī adh-Dhrā'. Topography was mapped over the main site area between Wādī al-Wa'īda and Wādī adh-Dhrā', as well on three low alluvial terraces along the north bank of Wādī adh-Dhrā'. Terrace 2, below Structure 37, was the setting for Units Y and Z, excavated during the 1999/ 2000 season, while Terrace 3, below the southeast end of ZAD 1, was the site of stratigraphic investigation in 2001 (see Day, above).

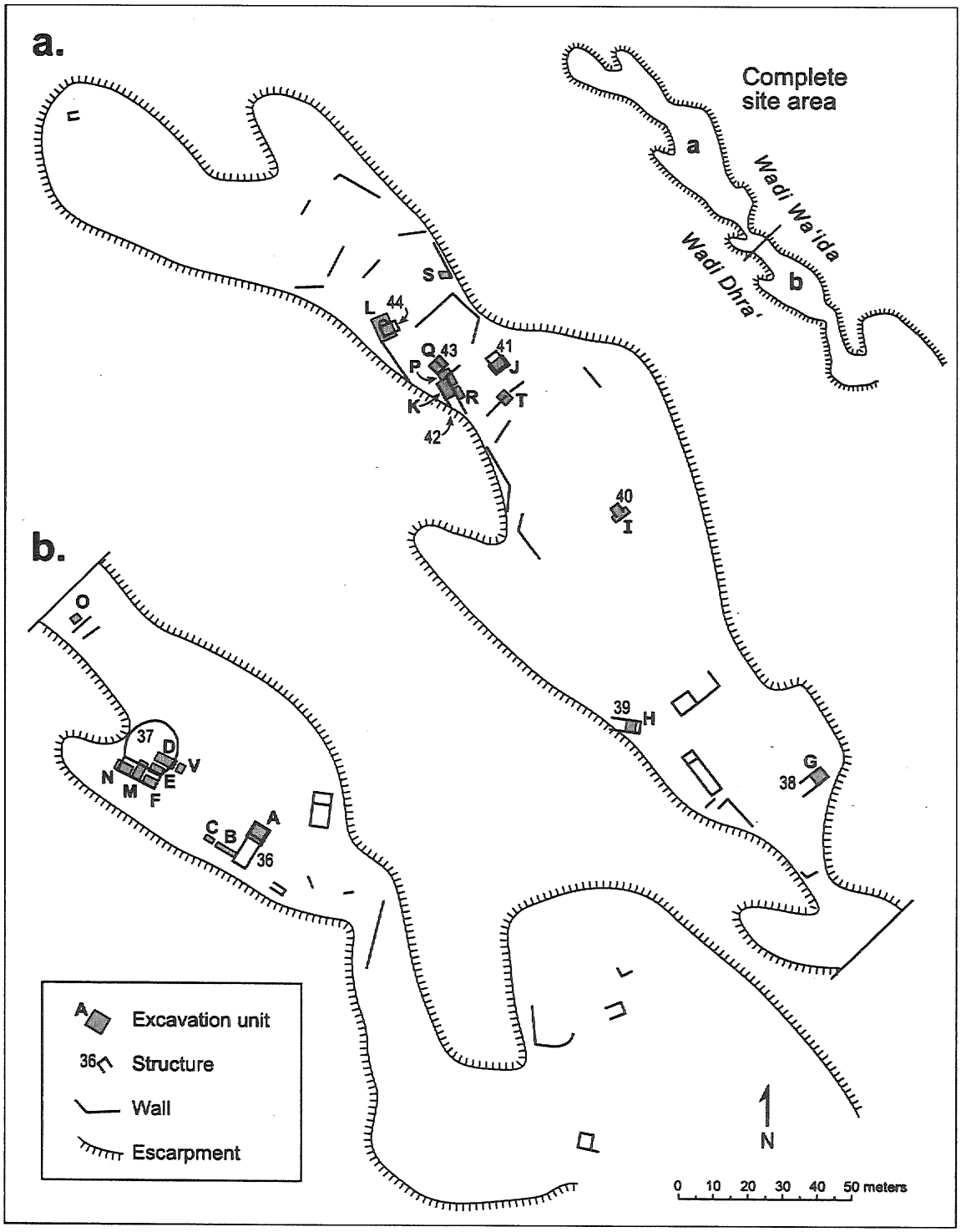
Pedestrian reconnaissance for our mapping also revealed a large rectangular hilltop enclosure (Structure 33) overlooking ZAD 1 from the southern edge of Wādī adh-Dhrā'. The outer walls of this structure measure roughly 50 x 40m, surrounding a central open area, with a series of square rooms along the south wall. A gap in the centre of the south wall suggests apossible entry or gateway. All surface pottery associated with this complex appears to be Middle Bronze Age, but shows intriguing contrasts to the pottery from the ZAD 1 excavations (see Falconer and Berelov, below). Approximately 100 metres farther east along the south edge of Wādī adh-Dhrā', a 20m-long wall associated with Roman/ Byzantine pottery provides our only example of a post-Middle Bronze Age archaeological feature in the immediate vicinity of ZAD 1.

(SF and JC)

Ceramic Sampling along the South Bank of Wādī adh-Dhrā'

Reconnaissance along the south bank of Wādī adh-Dhrā' included selective surface collection of ceramics, as well as a general mapping of the Structure 33 architectural complex. The pottery along the south bank, including Structure 33, like that at ZAD 1, dates uniformly to the Middle Bronze Age. Roman/ Byzantine pottery found approximately 100 metres east along the south bank of the Wādī adh-Dhrā', including corrugated jar body sherds and an example of terra sigillata ware, provide the only evidence of post-Middle Bronze Age occupation in the area.

The Structure 33 ceramics feature many types recovered in the 1999/ 2000 excavations, supplemented by several forms previously absent from ZAD 1. As we found during our previous work, serving vessels are extremely rare, but include an example of a concave, disk-based bowl (cf. Cole 1984: plate 20k, l, n). Cooking pots again include hand-built, straight-sided, coarse ware vessels with appended rope molding (cf. Cole 1984: plate 23; Falconer 1995: fig. 10a), but these are accompanied by globular cooking pot sherds with plain everted rims (cf. Cole 1984: plate 26; Falconer 1995: fig. 10b). Most notably, the Structure 33 surface pottery shows a striking predominance of jar sherds, whereas the ZAD 1 excavated assemblage had an unusual abundance of cooking pots. The jar forms feature a variety of simple to moderately elaborated everted rims (cf. Cole 1984: plates 32, 33) and characteristic flat bases (cf. Cole 1984: plate 37a-d). Another striking contrast is seen in the relative abundance of jar loop handles (Cole 1984: plate 38a, b; plate 44), which are absent altogether in the previously excavated assemblage. Among the Structure 33 samples is one example of



21. Results of the 2001 mapping survey of ZAD 1.

a double loop jar or jug handle (cf. Cole 1984: plate 29a).

Pottery from the south bank of Wādī adh-Dhrā', including Structure 33, seems generally contemporaneous with the assemblage excavated at ZAD 1. The straight-sided cooking pots and simple jar rims can be accommodated easily within Middle Bronze IIA assemblages from a variety of sites (e.g., Tall al-Ḥayyāt تل الحيّات Phases 5-4), while the globular cooking pots, disk-based bowl, and double-handled jar suggest occupation into Middle Bronze IIB (e.g., comparable to Tall al-Ḥayyāt Phase 3). No jar or bowl forms are sufficiently elaborated to suggest manufacture in Middle Bronze IIC. The distinctions between the pottery excavated at ZAD 1 and that collected from Structure 33 may also point to functional differences between these two major, and apparently contemporaneous, components of ZAD 1. A possible ethnographic parallel may be seen in the hilltop compounds of modern land own-

ers that overlook agricultural villages and seasonal encampments on the Plain of Dhrā'.

In contrast to the evidence from Structure 33, the ceramics collected farther west along the south bank of Wādī adh-Dhrā' fit the general characteristics of the assemblage excavated on the main site of ZAD 1 in 1999/ 2000. Once again, cooking pot sherds are more frequent and jar handles are absent. This pattern again suggests that the domestic settlement of ZAD 1 originally extended over a larger expanse now dissected by the Wādī adh-Dhrā' and that the distinct nature of Structure 33 merits its own functional interpretation.

(SF and IB)

The ZAD 1 Middle Bronze II Ceramic Assemblage

Isolated from other MB II sites of the same period, and situated in an inhospitable environment, ZAD 1 is an unusual, single-phase MB site with a distinctive ceramic assemblage. A description of ongoing work on the excavated ceramic assemblage is given below, with emphasis on progress in reconstructing whole vessel numbers from fragmentary sherd evidence. Additionally, some evidence suggests that ZAD 1 was seasonally occupied, and so it is important to focus on data relating to the use and abandonment cycles of the site. Ongoing analysis of the ZAD 1 ceramic material has revealed a number of patterns that contribute to our understanding of these aspects.

Assemblage Composition

The ceramic assemblage is restricted to a few vessel types only (Berelov 2001a; Edwards *et al.* 2001). Cooking vessels are most abundant (63%), augmented by a smaller number of jars (36.5%), bowls and juglets (<1%). There are no vessels with handles found in the ZAD 1 excavation areas, which is very unusual for MB sites, although some have been found at Structure 33 which overlooks the main site from the south bank of Wādī adh-Dhrā' (see Falconer and Berelov, above).

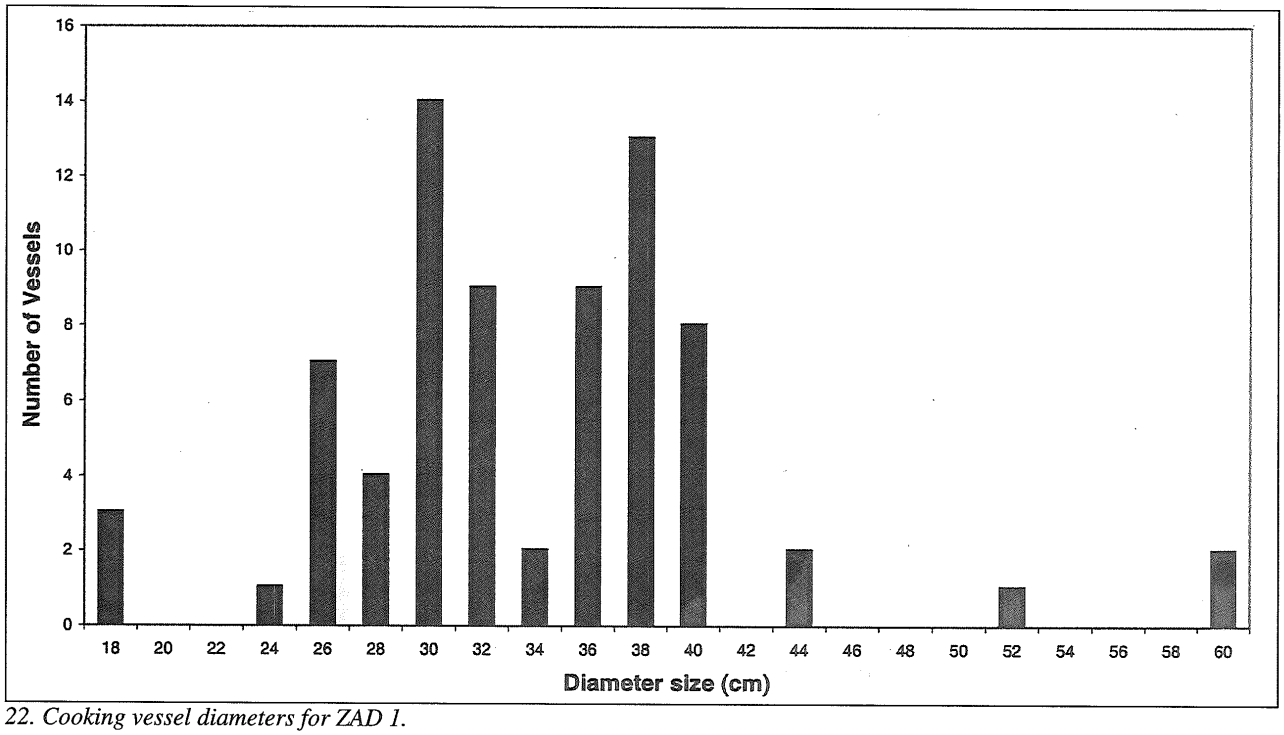
Raw sherd counts reveal that the ZAD 1 ceramic assemblage is made up predominantly of cooking vessels. Analysis has shown that the ZAD 1 cooking vessels break into smaller fragments than any other class of vessel, thus inflating their number in sherd counts. However, because cooking pots have smaller surface areas than jars, calculations show that cooking pots were more abundant than jars at ZAD 1 (**Table 6**). Ethnographic evidence (Longacre 1985), as well as technological considerations (Rye 1981), suggest that cooking pots, in general, are highly visible because of their high breakage rates, and hence their frequency of replacement is often high. Hand-built MB II cooking vessels were poorly made, and their angular design made them susceptible to frequent breakage (Edwards 1993). In addition, and contrary to initial estimations (Edwards *et al.* 2001), cooking vessels at ZAD 1 do vary substantially in size (**Fig. 22**). Cooking pot sherds show a bimodal distribution of rim diameters, suggesting small (<34cm in diameter) and large (>34cm in diameter) size classes.

A range of sizes is found throughout the structures. Five vessels provided complete profiles, enabling the reconstruction of their dimensions, which in turn assisted recalculation of vessel class proportions, using Orton and colleagues' (1997) *Estimated Vessel Equivalent* (EVE) measure. The total surface areas of the five vessels were calculated and averaged, giving an EVE figure. Following this, the surface area of all cooking vessel sherds was summed, and divided by the EVE. The aim was to estimate relative frequencies of vessel classes with greater accuracy than those calculated from raw sherd counts. The EVE method was applied to all classes (**Table 6**), since vessel profiles were reconstructed for all classes of vessels. Jars showed some range in diameter size (**Fig. 23**), particularly in Structure 33, which shows a bimodal distribution of small (<17cm in diameter) and large (>17cm in diameter) jars. The rest of the site shows a unimodal distribution of jar rim diameters.

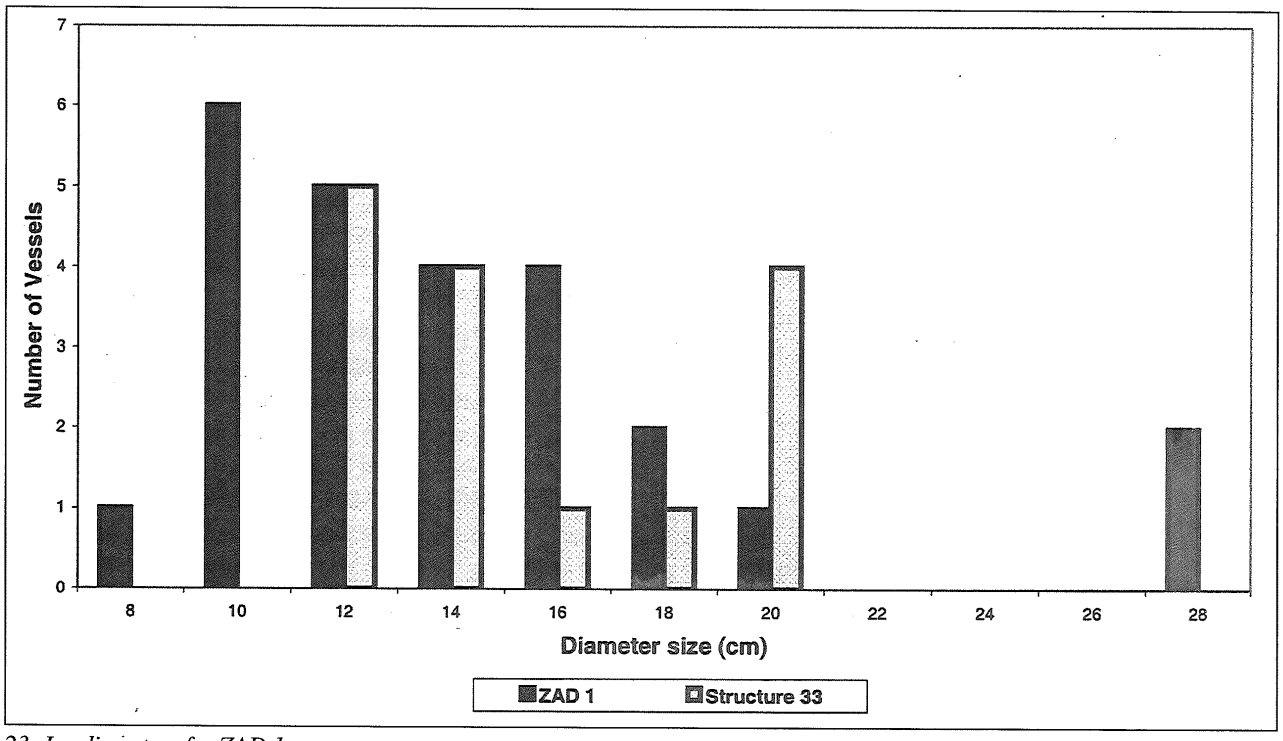
Jar surface areas and volumes show patterns different from those based on rim diameters. Two complete jar profiles and three partial profiles were reconstructed. Current data suggest that jars with diameters of about 10cm could be attributed to a smaller size category distinct from jars with diameters of between 12cm and 15cm. The latter catego-

Table 6: Relative proportion of ZAD 1 vessel classes calculated from Estimated Vessel Equivalent (EVE) measure.

Vessel type	Total Surface Area (cm^2)	EVE (cm^2)	Minimum No. of Vessels	Assemblage Proportion (%)
Cooking pots	38,585	3,520	11	60
Jar	34,523	5,360	6.5	35
bowl	229	420	0.6	3
juglet	159	420	0.4	2



22. Cooking vessel diameters for ZAD 1.

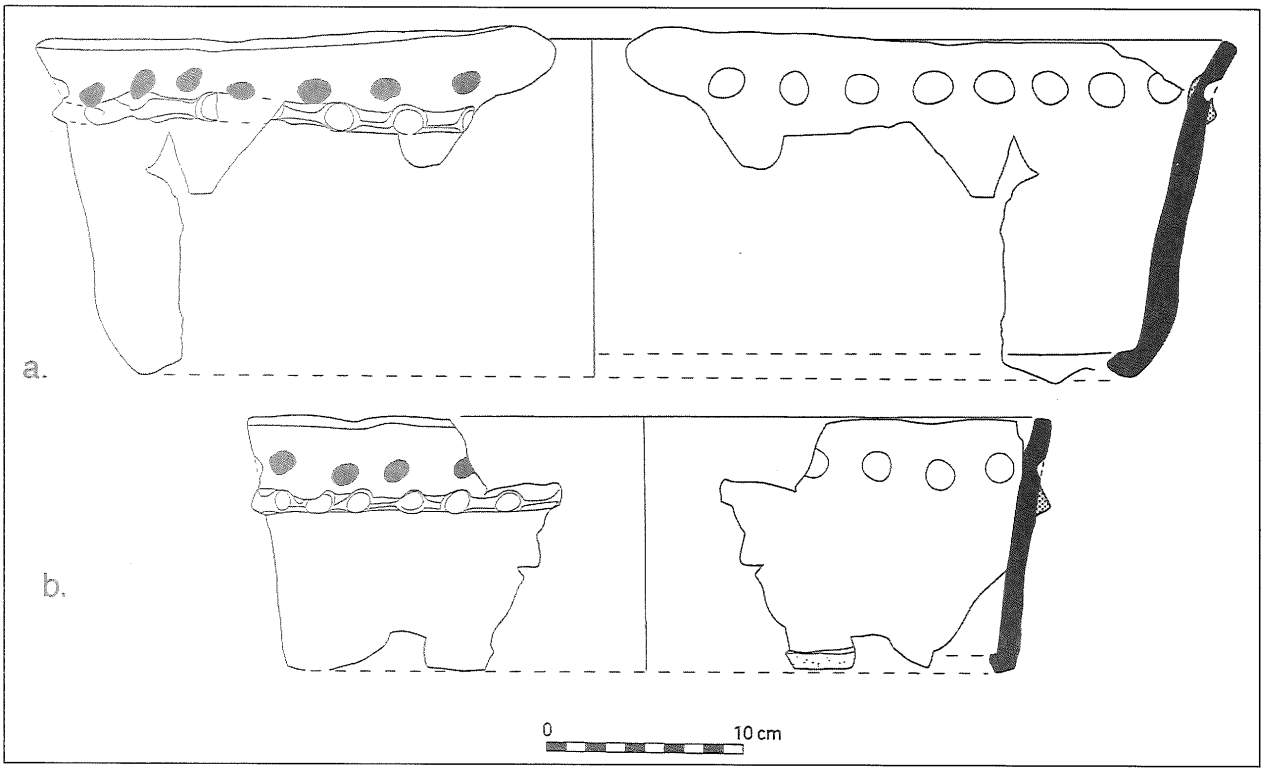


23. Jar diameters for ZAD 1.

ry is defined by medium sized jars of approximately 45cm in height and may belong to a class of larger jars or a distinct functional type of vessel. Jars with diameters of 18cm and more were not recovered in restorable condition. Finally, jars at ZAD 1 have a high number of mend holes, reflecting a strategy of curation. Small vessels such as bowls and juglets make up only 5% of the assemblage based on EVE calculations, and are restricted to the large Structures 37 and 42 (**Fig. 21**).

Typology

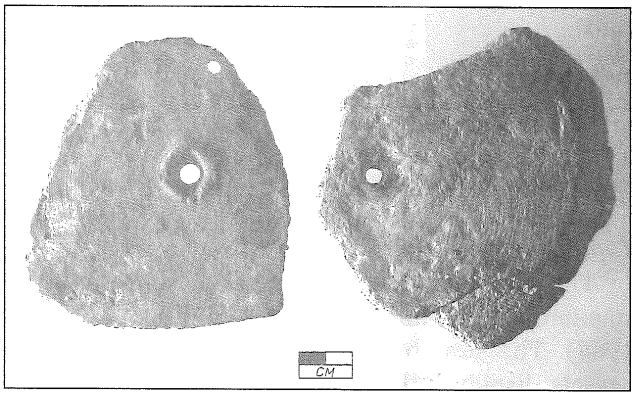
The cooking vessels at ZAD 1 conform to a standard type common in the MB IIA/ IIB (Cole 1984). The straight sided, hand-built, coarse-ware vessels display little variation at ZAD 1, generally maintaining a slight eversion, with the rope molding decoration substantially lower than the rim



24. Cooking vessels from ZAD 1.

(**Fig. 24**). Thumb impression decoration is always present and positioned above the rope molding and below the rim. The ZAD 1 cookers are generally larger than similar vessels found elsewhere (see for instance Fritz and Kempinski 1983).

Jars are generally squat and bulbous, without handles. Similar vessels are found at MB IIA/ IIB sites further to the north and have been linked to the opening phase of the MB II (Beck 2000; Cole 1984). Rim profile elaboration is minimal, the most common type constructed by the execution of one fold for thickening. There is no evidence at ZAD 1 to suggest that the lower half of the vessel was completed on a fast wheel. Current data supports the use of the fast wheel for the rim and upper dimensions of the body only. Two jar bases with perforations made before firing were excavated at ZAD 1 (**Fig. 25**) from Structures 37 (Locus N001) and 42 (Locus K019). Jars of this sort are known from the tombs of Dayr 'Ayn 'Abāṭa دير عين عباطة (Politis 1997), as well as sites in Syria (Curvers and Schwartz 1997).

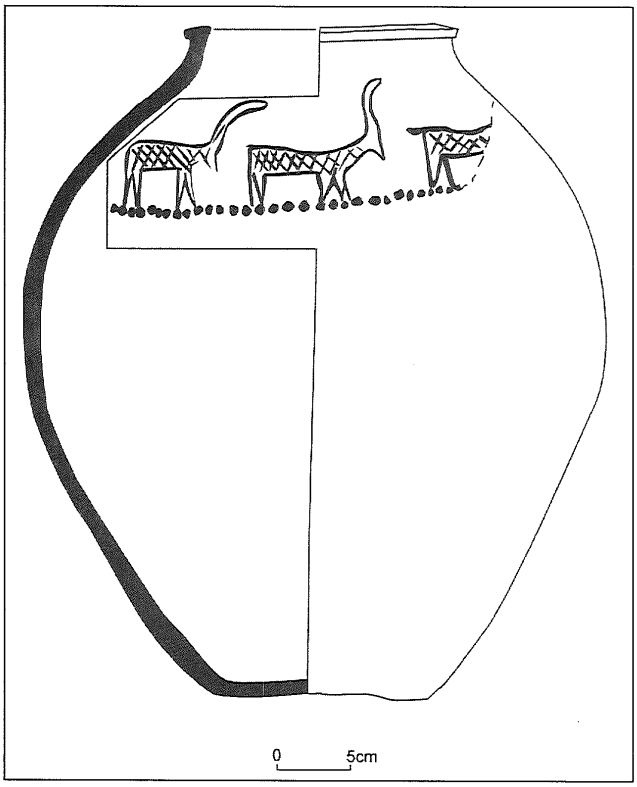


25. Perforated bases from ZAD 1.

A unique jar, bearing a series of incised antelope motifs on the shoulder of the vessel, was found in Structure 42 (Locus K019) during the first season of excavations (Edwards *et al.* 2001) and can now be presented after its recent reconstruction[3] (**Figs. 26, 27**). Morphologically, this type of jar is commonly attested in the Middle Bronze Age (Gerstenblith 1983). The jar measures 47cm in height and has a maximum diameter of 40cm. The lower half of the vessel has been formed on a cone, whilst the upper portion was thrown on a wheel. A light cream slip was applied to the vessel over its variably coloured fabric; the latter ranging from Very Pale Brown (Munsell 10YR 8/2) to Light Greenish Gray (Gley 2 8/5GY). The rim is thickened and hammerhead-shaped in section, measuring 15cm in diameter.

The decoration of the pot is idiosyncratic, bearing a motif of nine antelope incised on the shoulder on the vessel. The animals follow one another, in procession, from left to right. The position of the head varies in each of the nine animals, with some

3. Many thanks go to Jo Atkinson of the Nicholson Museum at the University of Sydney for conserving the 'Antelope Jar'.



26. The 'Antelope Jar', ZAD 1.



27. Detail of the 'Antelope Jar', ZAD 1.

inclined further towards the ground, others looking ahead and up. Hoof prints are represented by punctate impressions below the animals in a continuous fashion. It was first suggested that the animals in the motif represented oryx. This however seems unlikely given the forward orientation of the horns. It is therefore more appropriate to describe the animals as antelope. The nearest known parallel to the 'Antelope Jar' is a small jar recovered out of context at the nearby EBA site of Bāb adh-Dhrā', which has a single ibex incised on the shoulder (Saller 1965: 153).

Implications for the Middle Bronze Period

The nearest Middle Bronze II settlements to ZAD 1 are Tall Msās (تل مساس) (Fritz and Kempinski 1983) and Tall al-Milḥ (تل الملح) (Kochavi 1967), 50-55km to the west, and Tall Nimrīn (تل نمرين) (Flanagan and McCreery 1990), 60km to the north. The typology of cooking vessels from these sites suggests that they are later than ZAD 1. They feature hand-built, straight-sided cooking vessels that are smaller than those found at ZAD 1, and display a pronounced inversion which the ZAD 1 vessels lack. In addition, vessels from the later sites are distinguished by the position of the rope molding decoration, which sits flush on the rim. Although a combination of thumb impressions, perforation, and rope decoration is found at Tall al-Ḥayyāt (Falconer 1995), inverted rims combined with a high rope molding placement seems to occur in MB IIB and MB IIC (Cole 1984: 64, fig. 16) only. The latter features belong to a later typological development, which suggests that ZAD 1 is indeed earlier, and should be placed in MB IIA-MB IIB. There are no vessels at ZAD 1 that should be attributed to MB IIC.

If these MB settlements are later than ZAD 1, it implies that the latter is chronologically as well as geographically isolated from other sites of the same period. This possibility increases the importance of any connection between ZAD 1 and the MB II cemetery of Dayr 'Ayn 'Abāṭa (Politis 1997), located 25km to the south of Ẓahrat adh-Dhrā'. The two sites are connected by the presence of jars with perforated bases. Since such jars have been linked to beer production (Curvers and Schwartz 1997), their presence at ZAD 1 together with large quantities of barley (see Fall and Meegan, below) attest to the pre-requisites for the production and consumption of beer at the site. Further, the presence of these jars in the Dayr 'Ayn 'Abāṭa tombs is significant as it indicates that a ritual significance was ascribed to them, and also suggests a possible cultural connection between the cemetery and ZAD 1 (Berelov 2001b).

Further evidence for the cultural distinctiveness of the Ẓahrat adh-Dhrā' region is suggested by ZAD 1's 'antelope jar' and its only known parallel, the generically similar 'ibex jar' from Bāb adh-Dhrā'. The two jars imply some cultural continuity on the Dead Sea Plain from the EBA to the MBA, since this decorative scheme in not known elsewhere in the southern Levant.

Refuse and Site Function

Structures 37, 41, 42, and 44 yielded floors with clusters of broken cooking vessels associated with cooking fires, which represent examples of 'primary refuse' (Schiffer 1972). Eight partially restorable cooking vessels were excavated from the structures, though their friable fabrics precluded the possibility of total restoration.

All size categories of cooking vessel occur in the western room of Structure 37. The other structures contain a narrower size range of rim diameters (between 30cm and 40cm). In four cases in Structure 37 (Loci N001/ N012), Structure 41 (Locus J023), Structure 42 (Locus K019), and Structure 44 (Locus L023), cooking vessel sherds were recovered in clusters associated with floors and ashy soil. These cooking vessels ranged greatly in size from diameters of 28-60cm in the case of Structure 37, and 32-36cm in the cases of Structures 41, 42, and 44. Their largely intact condition and great quantity suggests that they were not highly valued, and were cached from season to season.

One juglet, resting against the lower part of Wall E001 in Structure 37, was recovered intact but for a small fragment detached from the rim. The eastern room of Structure 37 also produced two incomplete jars, their lower halves unrestorable. The western room produced one complete jar and a smaller jar, which retained less than 50 per cent of its original form.

The ceramic evidence reveals distinguishable patterns relating to architecture, generally linked to the size and complexity of structures. Three types of structure are represented at ZAD 1: Horseshoe-shaped Room, 1-Room, and 2-Room. Three Horseshoe-shaped Rooms (Structures 38, 39, and 40) were excavated, but these contained no restorable items. Structure 5, in particular, contained a high Maximum Number of Vessels of between 65 and 94 vessels, often represented by single sherds. Two 1-Room structures were excavated at ZAD 1: Structures 43 and 44. Only Structure 44 contained restorable pottery in the form of two cooking vessels. The 2-Room Structures 36, 37, 41, and 42 contained most of the restorable vessels (particularly jars), and produced high densities of refuse on floors at 137.7 sherds/m^3 in Structure 37, 115.3 sherds/m^3 in Structure 41, and 63.2 sherds/m^3 in Structure 42 (**Table 7**).

Only Structure 37 produced more than one clear floor (Loci F010, F013, F015, and F020), and more than one phase of architecture (Walls F001, F018 and F019). In all but two structures (Structure 38 and the western room of Structure 37, Loci N001/ N012) occupational debris associated with floors produced much higher sherd densities than any other context type (**Table 7**).

Discussion

The ceramic material and its depositional context suggest a number of factors relating to site use and function. There is reason to believe that the ZAD 1 jars served a variety of functions, if one is to judge from the variety of rim types and sizes, perforated bases, and curious lack of handles. Furthermore, there are no intact jars, implying that jars were highly curated because of their value (for a comparative example, note Frankel and Webb n.d.). High rates of recycling (and by extension, of curation) are demonstrated by the large number of mending holes on jar sherds. The practice of drilling holes in broken jar sherds for mending is widely attested in the ethnographic literature (Deal 1998).

Variability in cooking vessel size across the site may likewise reflect a variety of functions for the vessels. On the other hand, the difference in vessel size may equally reflect differences in household unit size. This is suggested by the fact that Structure 37, which is the largest at ZAD 1, also contains the greatest variation in cooking vessel size, including the largest vessel which measures 60cm in diameter.

Seasonal exploitation of ZAD 1 is in part supported by the archaeobotanical evidence (see Fall and Meegan, below). This notion is also advanced by Falconer (in Edwards *et al.* 2001) on the basis of stratigraphic evidence in the form of a series of surfaces segregated by windblown sediments in Structure 42, Unit K. If ZAD 1 was a seasonal site, then cooking vessels were left as site furniture (cf. Binford 1981) while usable items such as jars, bowls, and juglets were removed. This proposition is likely given the high numbers of restorable cooking vessels and the absence of primary or *de facto* refuse for every other ceramic class (with the exception of one almost complete juglet). Longacre (1985) has argued ethnographically for a short life expectancy of cooking vessels. However in practice they are often under-represented (Frankel and Webb, in press; Edwards 1993), in contrast with the jar material. Interestingly, sites like Marki-*Alonia* in Cyprus and Pella/Ṭabaqat Faḥl (طبقة فحل) in Jordan which show a lower than expected volume of cooking vessel material, are not seasonal. Sedentary sites like these, as well as Tall al-Ḥayyāt in the north Jordan Valley, are generally associated with more frequent removal of household refuse to secondary contexts (Falconer 1995).

At ZAD 1, differences in sherd densities across depositional contexts are instructive. Occupational

Table 7: Sherd density for various excavation contexts, ZAD 1.

Structure	Late Fill	Surface	Exterior	Bin	Court-yard	N = Exc. (m3)	area
1	23.2	137.7	28.8		21.9	53.9	
2	7.6	11.9	4.		-		24.3
3	7.5	-	13.8		-		6.9
4	5.7	52.5	-.		-		7.3
5	22.3	125.7	3.5		-		9.6
6	1.7	115.3	0.9		-		22.3
7	2.6	63.2	10		-		28.6
8	2.0	102.6	39.7	33.3	-		13.8
9	1.7	56.6	11.5		-		6.1
Site Mean	8.3	83.2	14.0	33.3	21.9		172.7

debris associated with floors shows very high densities of sherd deposition, whereas later room fill and exterior contexts have the lowest sherd densities (**Table 7**). No middens were identified during the excavations at ZAD 1. These differences suggest that the site was intensively used during short seasonal visits. Ethnographically, several cases show that non-sedentary people generally do not practice removal of refuse from residential areas as regularly as sedentary populations (Graham 1993; Joyce and Johannessen 1993).

(IB)

Macrobotanical Remains from Ẓahrat adh-Dhrā' 1

Macrobotanical remains were recovered using a non-random sampling strategy during the winter 1999/ 2000 excavations of the Middle Bronze Age village of Ẓahrat adh-Dhrā' 1. Sediment samples were collected from all areas exhibiting evidence of burning or carbonised seeds, especially hearths, pits, and surfaces. Approximately 353 litres of sediment from 123 samples were processed using water flotation. Seventy-five samples (averaging 3.8 litres each, totalling 240 litres) contained carbonized seeds and are reported below.

The plant macrofossils were sorted and identified with a binocular microscope at ASU. Seed identifications are based on external morphology and comparison with seed identification manuals (e.g. Martin and Barkley 1961), reports from prior excavations (Lines 1995; van Zeist and Bakker-Heeres 1982; 1984), and reference material at ASU's Laboratory of Paleoecology. The seeds were sorted and identified by Cathryn Meegan and form the basis for her Master's Thesis (Meegan n.d.).

The plant remains identified from ZAD 1 (**Table 8**) have been divided into six major categories: cultivated cereals, orchard crops, cultivated legumes, field weeds, wild taxa, and unidentified (unknown weed and wild seed taxa). The main cultivated taxa at ZAD 1 are hulled 2-row barley *(Hordeum distichum)*, fig *(Ficus carica)*, and grape *(Vitis vinifera)*. Other cereal types include naked barley *(Hordeum vulgare* var. *nudum)*, emmer wheat *(Triticum dicoccum)*, and bread wheat *(T. aestivum)*. Field weeds comprise the largest category of plant taxa recovered from ZAD 1. The field weed taxa, totalling 41.7% of the total number of seeds, include *Aizoon, Chenopodium, Malva, Rumex,* and several types of Papillionaceae. Wild taxa comprise 4.16% of the total seed assemblage; unknown seeds (most likely non-cultigens) make up 29.01%. Wild or weed plants account for about 75% of the assemblage.

The majority of the identified cereal grains are hulled barley (75.8% of the identified cereal grains), with naked barley (6.8% of cereal grains), emmer wheat (9.1%), and bread wheat (8.3%) present in relatively small amounts (Meegan n.d.). This suite of cereal grains is indicative of irrigation agriculture. The ratio of barley to wheat at an archaeological site can provide an estimate of the relative use of these cereals and provide environmental information. The barley to wheat seed ratio for

Table 8: Macrobotanical Remains from ZAD 1 (data from Meegan n.d.).

				Seed Count	Density Ratio *	Relative Frequency
Cultigens				447	2489	25.1 %
	Cereals			222	1236	12.5 %
		Barley		132	735	7.4 %
			Hulled 2-row Barley	100	557	5.6 %
			Naked Barley	9	50	0.5 %
			Undiff. Barley	23	128	1.3 %
		Wheat		28	156	1.6 %
			Emmer Wheat	12	67	0.7 %
			Bread Wheat	11	61	0.6 %
			Undiff. Wheat	5	28	0.3 %
		Und. Cereal		62	345	3.5 %
	Orchard Crops			189	1053	10.6 %
			Fig	130	724	7.3 %
			Grape	59	329	3.3 %
	Legumes			36	200	2.0 %
			Garden Pea	28	156	1.6 %
			Horsebean	7	39	0.4 %
			Bitter Vetch	1	6	0.1 %
Non-Cultigens				1332	7417	74.9 %
	Field Weeds			742	4132	41.7 %
	Wild Taxa			74	411	4.2 %
	Unknown			516	2874	29.0 %
	TOTAL			**1779**	**9906**	**100.0 %**

ZAD 1 is 4.71, similar to ratios found at the Early Bronze IV sites of Bāb adh-Dhrā‘ (6.2:1; see McCreery 1980), and Tall Abū an-Ni‘āj تل ابو النعاج (3.3:1; Fall *et al.* in review). Interestingly, the ratio for ZAD 1 is quite different from the ratio of 0.9:1 found at the Middle Bronze Age village of Tall al-Ḥayyāt in the northern Jordan Valley (Lines 1995; Fall *et al.* in review). Hulled varieties of barley are generally used as animal fodder, while naked forms may be used for food (Zohary and Hopf 1988). The predominance of hulled barley suggests that pastoralism played a significant role in the economy of ZAD 1. Barley also requires less water than wheat, is more tolerant of saline soils, and is less susceptible to insect infestation due to its shorter growing season (Zohary and Hopf 1988). Indeed, McCreery (1980) found high concentrations of boron in wheat and barley grains from Early Bronze Age Bāb adh-Dhrā‘, suggesting high salinity in the soils of the Dhrā‘ Plain.

Fig and grape are relatively common at ZAD 1; olive seeds are notably absent. Fig seeds are abundant in Bronze Age sites along the Jordan Rift Valley. A pattern of abundant grape and barley seeds is found in Bronze Age sites throughout the driest portions of the Southern Levant (Fall *et al.* in re-

view). In contrast, substantial amounts of olive seeds suggest linkage to the development of urban markets (Fall *et al.* 1998). The lack of olive seeds suggests that ZAD 1 was not linked to the Middle Bronze Age regional markets.

(PLF and CM)

P.C. Edwards
I. Berelov
J. Meadows
G. Sayej
Archaeology Program
La Trobe University
Victoria 3086
Australia

S.E. Falconer
P.L. Fall
J. Czarzasty
C. Meegan
T.K. Swoveland
Department of Anthropology
Arizona State University
Box 872402, Tempe
AZ 85287-2402
USA

C. Day
Yung shue Wan
Lamma Island
Hong Kong

M. Westaway
National Museum of Australia
GPO Box 1901
Canberra
A.C.T. 2601
Australia

References

Abed, A. M. and Yaghan, R.
2000 On the Paleoclimate of Jordan during the Last Glacial Maximum. *Palaeogeography, Palaeoclimatology, Palaeoecology* 160: 23-33.

Al-Eisawi, D.
1985 Vegetation in Jordan. Pp. 45-57 in *SHAJ* 2. Amman: Department of Antiquities of Jordan, and London: Routledge and Kegan Paul.

Baruch, U. and Bottema, S.
1999 A New Pollen Diagram from Lake Hula. Pp. 75-86 in H. Kawagoe, G.W. Coulter, and A.C. Roosevelt (eds.), *Ancient Lakes: Their Cultural and Biological Diversity*. Belgium: Kenobi Productions.

Bar-Yosef, O.
1981 The Pre-Pottery Neolithic Period in the Southern Levant. Pp. 555-569 in J. Cauvin and P. Sanlaville (eds.), *Préhistoire du Levant*. Lyon: Maison de l'Orient Mediterraneen, and Paris: C.N.R.S.

Beck, P.
2000 The Middle Bronze Age Pottery. In M. Kochavi, P. Beck and E. Yadin (eds.), *Aphek-Antipatris. Excavation of Areas A and B. The 1972-1976 Seasons*. Tel Aviv: The Emery And Claire Yass Publications in Archaeology, Monograph Series of the Institute of Archaeology, Tel Aviv University.

Belfer-Cohen, A
1994 The Lithic Continuity in the Jordan Valley: Natufian into the PPNA. Pp.91-100 in H.G. Gebel and S. Kozlowski (eds.), *Neolithic Chipped Stone Industries of the Fertile Crescent*. Studies in early Near Eastern production, subsistence and environment 1. Berlin: ex oriente.

Berelov, I.
2001a Zahrat adh-Dhra' 1: Stranded on the Dead Sea Plain in the Middle Bronze Age. Pp.165-172 in A. Walmsley (ed.), *Australians Uncovering Jordan; Fifty Years of Middle Eastern Archaeology*. Sydney: The Research Institute for Humanities and Social Sciences, University of Sydney and Department of Antiquities of Jordan.
2001b Problems of Identifying Social Regimes in the Dead Sea Basin – when sites become 'visible'. *Bulletin of the Anglo-Israel Archaeological Society* 18 (in press).

Binford, L.
1981 Behavioral Archaeology and the Pompeii Premise. *Journal of Anthropological Research* 37: 195-208.

Cole, D.P.
1984 *Shechem I: The Middle Bronze IIB Pottery*. Winona Lake, IN: American Schools of Oriental Research.

Colledge, S.
1994 *Plant Exploitation on Epipalaeolithic and Early Neolithic Sites in the Levant*. Unpublished Ph.D. thesis, University of Sheffield.

Curvers, H.H. and Schwartz, G.M.
1997 Umm el-Marra, a Bronze Age Urban Center in the Jabbul Plain, Western Syria. *AJA* 101: 201-239.

Deal, M.
1998 *Pottery Ethnoarchaeology in the Central Maya Highlands*. Foundations of Archaeological Inquiry. Salt Lake City: University of Utah Press.

De Contenson, H.
1989 L'Aswadien: un nouveau faciès du Néolithique Syrien. *Paléorient* 15/1: 259-262.

Donahue, J.
1985 Hydrologic and Topographic Change during and after Early Bronze Occupation at Bab adh-Dhra' and Numeira. Pp. 131-140 in *SHAJ* 2. Amman: Department of Antiquities of Jordan, and London: Routledge and Kegan Paul.

Edwards, I.
1993 *A Potter's View of Bronze Age Pella (Jordan); A Study of Ceramic Technology*. Unpublished Doctoral Dissertation. Melbourne: La Trobe University.

Edwards, P.C.
2001 By the Shores of Lake Lisan: the Epipalaeolithic in the East Jordan Valley between 20,000 and 11,000 years ago. Pp. 85-93 in *SHAJ* 7. Amman: Department of Antiquities of Jordan.

Edwards, P.C. and Higham, T.
2001 Zahrat adh-Dhra' 2 and the Dead Sea Plain at the Dawn of the Holocene. Pp.139-152 in A. Walmsley (ed.), *Australians Uncovering Ancient Jordan: Fifty Years of Middle Eastern Archaeology*. Sydney: The Research Institute for Humanities and Social Sciences, University of Sydney and Department of Antiquities of Jordan.

Edwards, P.C., Falconer, S.E., Fall, P.L., Berelov, I., Davies, C., Meadows, J., Meegan, C., Metzger, M.C. and Sayej, G.J.
2001 Archaeology and Environment of the Dead Sea Plain: preliminary results of the first season of investigations by the joint La Trobe University/ Arizona State University Project. *ADAJ* 45: 135-157.

Edwards, P.C., Macumber, P.G. and Green, M.K.
1998 Investigations into the Early Prehistory of the East Jordan Valley: results of the 1993/ 1994 La Trobe University survey and excavation season. *ADAJ* 42: 15-40.

Falconer, S.E.
1995 Rural Responses to Early Urbanism: Bronze Age household and village economy at Tell el-Hayyat, Jordan. *JFA* 22/ 4: 399-419.

Fall, P.L., Lines, L. and Falconer, S.E.
1998 Seeds of Civilization: Bronze Age rural economy and ecology in the Southern Levant. *Annals of the Association of American Geographers* 88/1: 107-125.

Fall, P.L., Falconer, S.E. and Lines, L.
n.d. Agricultural Intensification and the Secondary Products Revolution along the Jordan Rift. *Human Ecology* (in review).

Finlayson, B. and Mithen, S.
2001 The Dana-Faynan Ghuwayr Early Prehistory Project. *Newsletter of the Council for British Research in the Levant (CBRL 2001)*: 17.

Flanagan. J.W. and McCreery, D.W.
1990 First Preliminary Report of the 1989 Tell Nimrin Project. *ADAJ* 34: 131-152.

Frankel, D. and Webb, J.
n.d. Population, Households, and Ceramic Consumption in a Prehistoric Cypriot Village. *JFA* (in press).

Fritz, V. and Kempinski, A.
1983 Ergebnisse der Ausgrabungen auf der Hirbet el-Msas (Tel Masos) 1972-1975. Wiesbaden: *Abhandlungen des Deutschen Palastinavereins* 1-3.

Frumkin, A., Carmi, I., Zak, I. and Margaritz, M.
1994 Middle Holocene Environmental Change Determined from the Salt Caves of Mount Sedom, Israel. Pp. 315-332 in O. Bar-Yosef and R.S. Kra (eds.), *Late Quaternary Chronology and Paleoclimates of the Eastern Mediterranean*. RADIOCARBON. Tucson: University of Arizona.

Garrard, A.
1999 Charting the Emergence of Cereal and Pulse Domestication in South-West Asia. *Environmental Archaeology* 4: 67-86.

Garrard, A., Baird, D., Colledge, S., Martin, L. and Wright, K.
1994a Prehistoric Environment and Settlement in the Azraq Basin: an interim report on the 1987 and 1988 excavation seasons. *Levant* 26: 73-109.

Garrard, A., Baird, D. and Byrd, B.
1994b The Chronological Basis and Significance of the Late Palaeolithic and Neolithic Sequence in the Azraq Basin, Jordan. Pp. 177-199 in O. Bar-Yosef and R.S. Kra (eds.), *Late Quaternary Chronology and Paleoclimates of the Eastern Mediterranean*. RADIOCARBON. Tucson: University of Arizona.

Gerstenblith, P.
1983 *The Levant at the Beginning of the Middle Bronze Age*. American Schools of Oriental Research Dissertation Series, no. 5. Winona Lake, Indiana: American Schools of Oriental Research.

Graham, M.
1993 Settlement Organization and Residential Variability among the Rarámuri. Pp. 25-42 in C.M. Cameron and S.A. Tomka (eds.), *Abandonment of Settlements and Regions: Ethnoarchaeological and Archaeological Approaches*. Cambridge: Cambridge University Press.

Hillman, G.C. and Davies, M.S.
1990 Measured Domestication Rates in Wild Wheats and Barley under Primitive Cultivation, and their Archaeological Implications. *Journal of World Prehistory* 4/2: 157-178.

Hopf, M.
1983 Jericho Plant Remains. Pp. 576-621 in K.M. Kenyon and T.A. Holland (eds.), *Excavations at Jericho Volume V: The Pottery Phases of the Tell and Other Finds*. Oxford: Oxford University Press.

Joyce, A.A. and Johannessen, S.
1993 Abandonment and the Production of Archaeological Variability at Domestic Sites. Pp.138-153 in C.M. Cameron and S.A. Tomka (eds.), *Abandonment of Settlements and Regions: Ethnoarchaeological and Archaeological Approaches*. Cambridge: Cambridge University Press.

Katz, A., Kolodny, Y. and Nissenbaum, A.
1977 The Geochemical Evolution of the Pleistocene Lake Lisan-Dead Sea System. *Geochimica et Cosmochimica Acta* 41: 1609-1626.

Kenyon, K.M.
1979 *Archaeology in the Holy Land*. 4th edition. New York: W W Norton.

Khalil, B.
1992 *The Geology of the ar-Rabba Area. Map Sheet no. 3152 IV.* Bulletin 22, Geology Mapping Division, Geology Directorate. Amman: Ministry of Energy and Mineral Resources / Natural Resources Authority, Hashemite Kingdom of Jordan.

Kislev, M.E.
1988 Nahal Hemar Cave Desiccated Plant Remains: an interim report. *Atiqot* (English Series) 18: 76-81.
1989 Pre-Domesticated Cereals in the Pre-Pottery Neolithic A Period. Pp. 147-151 in I. Hershkovitz (ed.), *People and Culture in Change: Proceedings of the Second Symposium on Upper Palaeolithic, Mesolithic and Neolithic Populations of Europe and the Mediterranean Basin.* BAR International Series 508(i). Oxford: BAR.
1997 Early Agriculture and Paleoecology of Netiv Hagdud. Pp. 209-236 in O. Bar-Yosef and A. Gopher (eds.), *An Early Neolithic Village in the Jordan Valley Part I: The Archaeology of Netiv Hagdud.* School of Prehistoric Research Bulletin 43, Peabody Museum of Archaeology and Ethnology. Cambridge. MA: Harvard University.

Kislev, M.E. and Bar-Yosef, O.
1988 The Legumes: the earliest domesticated plants in the Near East? *Current Anthropology* 29/ 1: 175-179.

Kochavi, M.
1967 Tel Malhata. *IEJ* 17: 272-273.

Kuijt, I.
1997 Trying to Fit Round Houses into Square Holes: re-examining the timing of the South-Central Levantine Pre-Pottery Neolithic A and Pre-Pottery Neolithic B cultural transition. Pp.193-202 in H.G.K. Gebel, Z. Kafafi and G.O. Rollefson (eds.), *The Prehistory of Jordan, II. Perspectives from 1997.* Berlin: ex oriente.
2001 Lithic Inter-Assemblage Variability and Cultural-Historical Sequences: a consideration of the Pre-Pottery Neolithic occupation of Dhra', Jordan. *Paléorient* (in press).

Kuijt, I. and Mahasneh, H.
1998 Dhra: an early Neolithic village in the southern Jordan Valley. *JFA* 25: 153-161.

Kürschner, H.
1986 A Physiognomical-Ecological Classification of the Vegetation of Southern Jordan. Pp. 45-80 in H. Kürschner (ed.), *Contributions to the Vegetation of Southwest Asia.* Beihefte zum Tübinger Atlas des Vorderen Orients, Reihe A, Nr.24. Wiesbaden: Dr Ludwig Reichert Verlag.

Ladizinsky, G.
1989 Origin and Domestication of the Southwest Asian Grain Legumes. Pp. 374-389 in D.R. Harris and G.C. Hillman (eds.), *Foraging and Farming: the Evolution of Plant Exploitation.* London: Unwyn Hyman.

Lines, L.
1995 *Bronze Age Orchard Cultivation and Urbanization in the Jordan River Valley.* Ph.D. Dissertation. Tempe: Arizona State University.

Longacre, W.A.
1985 Pottery Use-Life among the Kalinga, Northern Luzon, the Phillipines. Pp. 334-345 in B.A. Nelson (ed.), *Decoding Prehistoric Ceramics.* Carbondale: Southern Illinois University Press.

Martin, L.A.
2000 Mammal Remains from the Eastern Jordanian Neolithic, and the Nature of Caprine Herding in the Steppe. *Paléorient* 25/2: 87-104.

Martin, A.C. and Barkley, W.D.
1961 *Seed Identification Manual.* Berkeley: University of California Press.

McConaughy, M.A.
1981 A Preliminary Report on the Bab edh-Dhra Site Survey. Pp.187-190 in W.E. Rast and R.T. Schaub (eds.), *The Southeastern Dead Sea Plain Expedition: an interim report of the 1977 season.* Cambridge, MA: American Schools of Oriental Research.

McCreery, D.
1980 *The Nature and Cultural Implications of Early Bronze Age Agriculture in the Southern Ghor of Jordan: an Archaeological Reconstruction.* Ph.D. dissertation, University of Pittsburgh. Ann Arbor: University Microfilms.

Meadows, J.
n.d. The Earliest Farmers? Archaeobotanical research at PPNA sites in Jordan. Paper presented at the Eighth International Conference on the History and Archaeology of Jordan. University of Sydney, July 2001.

Meegan, C.
n.d. *Rural Agrarian Ecology in the Middle Bronze Age of the Southern Levant: a palaeoethnobotanical study of Zahrat adh-Dhra'* 1. MA thesis. Tempe: Arizona State University.

Mithen, S. and Finlayson, B.
2000 WF 16, A New PPNA Site in Southern Jordan. *Antiquity* 74: 11-12.

Mithen, S., Finlayson, B., Pirie, A., Carruthers, D. and Kennedy, A.
2000 New Evidence for Economic and Technological Diversity in the Pre-Pottery Neolithic A: Wadi Faynan 16. *Current Anthropology* 41/ 4: 655-663.

Nadel, D.
1997 The Chipped Stone Industry of Netiv Hagdud. Pp. 71-149 in O. Bar-Yosef and A. Gopher (eds.), *An Early Neolithic Village in the Jordan Valley, Part I. The archaeology of Netiv Hagdud.* School of Prehistoric Research Bulletin 43, Peabody Museum of Archaeology and Ethnology. Cambridge MA: Harvard University.
1998 A Note on PPNA Intra-Site Tool Variability. *Neo-Lithics* 1/98: 8-10.

Najjar, M.
2001 Towards a Commonly Accepted Chronological Framework of the Pre-Pottery Neolithic B Period in Jordan. Pp. 101-105 in *SHAJ* 7. Amman:

Department of Antiquities of Jordan.

Neef, R.
1995 Vegetation and Plant Husbandry. Pp. 55-71 in H.J. Nissen, M. Muheisen and H.G. Gebel (eds.), *Basta I, The Human Ecology.* Institute of Archaeology and Anthropology Monograph Series Vol. 3. Irbid: Yarmouk University Publications.
1997 Status and Perspectives of Archaeobotanical Research in Jordan. Pp. 601-609 in H.G. Gebel, Z. Kafafi and G.O. Rollefson (eds.), *The Prehistory of Jordan II. Perspectives from 1997.* Studies in Early Near Eastern Production, Subsistence and Environment 4. Berlin: ex Oriente.

Neev, D. and Emery, K.O.
1995 *The Destruction of Sodom, Gomorrah, and Jericho: Geological, Climatological, and Archaeological Background.* Oxford: Oxford University Press.

Orton, C., Tyers, P. and Vince, A.
1997 *Pottery in Archaeology.* Cambridge: Cambridge University Press.

Politis, K.D.
1997 Excavations and Restorations at Dayr 'Ayn 'Abata 1995. *ADAJ* 41: 341-350.

Popper, V.S.
1988 Quantitative Methods in Paleoethnobotany. Pp. 53-71 in C.A. Hastorf and V.S. Popper (eds.), *Current Paleoethnobotany: Analytical Methods and Cultural Interpretations of Archaeological Plant Remains.* London: University of Chicago Press.

Rast, W.E. and Schaub, R.T.
1981 The 1977 Expedition to the Southern Dead Sea Plain, Jordan. Pp. 1-6 in W.E. Rast and R.T. Schaub (eds.), *The Southeastern Dead Sea Plain Expedition: an interim report of the 1977 season.* Cambridge, MA: American Schools of Oriental Research.

Rollefson, G.
1989 The late Aceramic Neolithic of the Levant: a synthesis. *Paléorient* 15/1: 168-173.
1992 Neolithic Settlement Patterns in Northern Jordan and Palestine. Pp. 123-127 in *SHAJ* 4. Amman: Department of Antiquities of Jordan.
2001 Jordan in the Sixth and Seventh Millennia BC. Pp. 95-100 in *SHAJ* 7. Amman: Department of Antiquities of Jordan.

Russell, K.W.
1988 *After Eden: the behavioural ecology of early food production in the Near East and North Africa.* BAR International Series 391. Oxford: BAR.

Rye, O.S.
1981 *Pottery Technology; Principles and Reconstruction.* Washington: Taraxacum.

Saller, S.
1965 Bab edh-Dhra'. *LA* 15: 137-219.

Sayej, G.
2001 A New Pre-Pottery Neolithic A cultural Region in Jordan: the Dead Sea basin. Pp. 225-232 in A. Walmsley (ed.), *Australians uncovering ancient Jordan: fifty years of Middle Eastern archaeology.* Sydney: The Research Institute for Humanities and Social Sciences, University of Sydney and Department of Antiquities of Jordan.
n.d. Lithic Production at the PPNA Site of Zahrat adh-Dhra' 2 and its Context. Paper presented at the Eighth International Conference on the History and Archaeology of Jordan. University of Sydney, July 2001.

Schiffer, M B.
1972 Archaeological Context and Systemic Context. *American Antiquity* 38: 344-350.

Stiller, M. and Margaritz, M.
1974 Carbon-13 Enriched Carbonate in Interstitial Waters of Lake Kinneret Sediments. *Limnology and Oceanography* 19/ 5: 849-853.

Stordeur, D.
1999 Organisation de l'espace construit et organisation sociale dans le Néolithique de Jerf el Ahmar (Syrie, Xe – IXe millénaire av. J.-C.). Pp. 131-149 in F. Braemer, S. Cleuziou and A. Coudart (eds.), *Habitat et société.* XIXe Rencontres Internationales d'Archéologie et d'Histoire d'Antibes. Antibes: Editions APDCA.

Swoveland, T.K.
2001 *The Paleoclimate of the Dead Sea Basin from the Last Glacial Maximum to the Holocene.* M.A. Thesis. Tempe: Arizona State University.

van Zeist, W. and Bakker-Heeres, J.A.H.
1982 Archaeobotanical Studies in the Levant 1. Neolithic Sites in the Damascus Basin: Aswad, Ghoraifé, Ramad. *Palaeohistoria* 24: 165-256.
1984 Archaeobotanical Studies in the Levant 2. Neolithic and Halaf Levels at Ras Shamra. *Palaeohistoria* 26: 151-170.

Ward, G.K. and Watson, S.R.
1978 Procedures for Comparing and Combining Radiocarbon Age Determinations: a critique. *Archaeometry* 20: 19-31.

Worschech, U.F.C.
1985 *Northwest Ard al-Kerak 1983 and 1984: a preliminary report.* Beihefte 2. München: Biblische Notizen.

Yasuda, Y., Kitagawa, H. and Nakagawa, T.
2001 The Earliest Record of Major Anthropogenic Deforestation in the Ghab Valley, Northwest Syria: a palynological study. *Quaternary International* 73/74: 127-136.

Zohary, D. and Hopf, M.
1988 *Domestication of Plants in the Old World.* Oxford: Clarendon Press.

ADDITIONAL INFORMATION AND OBSERVATIONS OF NEOLITHIC AL-BASĪṬ, WĀDĪ MŪSĀ, SOUTHERN JORDAN

Gary O. Rollefson,
With a contribution by Khairieh 'Amr

Introduction

In 1996 survey work associated with civic improvements in the Petra-Wādī Mūsā-aṭ-Ṭayyiba (الطيبة – وادي موسى – البتراء) area of southern Jordan recorded a number of Neolithic occurrences ('Amr *et al.* 1998). The most important of the Neolithic sites is al-Basīṭ (البسيط), a large settlement across the deep wadi from the Wādī Mūsā town centre (Site W8 in 'Amr *et al.* 1998: fig. 8; 'Amr and al-Momani 2001: fig. 6). The site covers approximately 7.5 hectares ('Amr, in press) and dates principally to the Late PPNB (LPPNB), placing it in the "megasite" phenomenon that characterized the Jordanian highlands in the late seventh millennium bc.

Excavations in two parts of the settlement produced evidence of domestic architecture and a rich chipped and ground stone assemblage (Fino 1998: 107); in the northern, uphill part of the site a probe into a house revealed at least two major depositional phases in just under two meters of depth (Fino 1998: fig. 3; Fino 1997). Farther south and downhill, monitoring of the excavation of trenches for laying water pipes and for the construction of foundations for a school noted at least three major PPNB architectural phases through some 6m of depth ('Amr, in press; 'Amr and al-Momani 2001: 262-264), and in the upper reaches and surface there is evidence for Pottery Neolithic and Early Bronze Age lithics and ceramics.

The waterline trenches showed that architecture was densely distributed, consisting of buildings with narrow spaces between them and small rooms constructed on trimmed, thin limestone blocks. Floors and walls were plastered, some painted red, and subfloor channels added to the similarities of the structures with nearby Basṭa (بسطة) ('Amr, in press: figs 2-5; 'Amr and al-Momani 2001: 263; cf. Nissen *et al.* 1987: figs. 4-4). A striking feature in one small room exposed in one trench was a standing stone more than a meter long with a ring of smaller stones circles the base ('Amr, in press: fig. 6; 'Amr and al-Momani 2001: fig. 12).

The survey and monitoring operations between 1996 and 2000 resulted in a corpus of artifacts that required analysis, and in 2001 the survey director Dr. Khairieh 'Amr offered the Neolithic material to me. In addition, permission was granted by Dr. Fawwaz al-Khraysheh to conduct a more intensive surface collection on the remnants of the site (which had been severely damaged by recent construction), as well as to dig through and sift a small volume (ca. 0.5 m^3) of a backdirt pile from the excavations of the foundation of a new house near one of Fino's probes in the northern part of al-Basīṭ. This is a report on the combined results of the analysis of these collections.

The Chipped Stone Assemblage

Altogether more than 1500 chipped stone artifacts were collected since the beginning of the survey.[1] It was noted in the sorting process that raw material color and quality, edge freshness, technological features (platform types, amount of cortex, etc.), and other aspects indicated that more than one archaeological period was represented among the lithics. This suspicion was supported by the presence of pottery (probably EB, perhaps MB, and Iron Age; cf. 'Amr *et al.* 1998: 519) on the surface as well as some pottery of probably Late Neolithic period from one of the trenches (see 'Amr, below). Lithics were sorted into three groups: LPPNB, Chalco/EB, and "Unknown", which may have been principally Iron Age, although any period might be represented in this small cluster.

The Chalcolithic/EB and "Unknown" Groups

Table 1 presents the results of the sorting into post-Neolithic debitage classes, although admittedly it is possible that Pottery Neolithic chipped stone material might be included in both the Chalco/EB and "Unknown" counts. On the other hand, the extreme rarity of PN potsherds suggests that the contribution of PN lithics was probably minimal in either case.

1. This total does not include 1,442 pieces of debris and lithic shatter that were included in the earlier surface collections. In **Table 1**, only the debris from the excavated backdirt pile (all LPPNB) is included in the totals.

Of note in **Table 1** is the presence of Canaanean blades, which are generally taken to be representative of the Chalco/EB technological repertoire. The "Naviform" blade in the "unknown" column is an insecure identification and might be a blade struck from a non-Naviform opposed platform blade core. The "ordinary blade" category is represented by blades with relatively large, plain platforms and with no evidence of bidirectional removals from blade cores.[2]

Table 2 provides information on striking platforms on the debitage described in **Table 1.** Although between one fourth to one half of the platforms are missing, plain platforms obviously dominate, and only dihedral platforms occur in a relatively popular fashion. This circumstance once again mirrors conditions for post-PPNB lithic technologies, whether Chalco/EB (e.g. Savage and Rollefson 2001) or Pottery Neolithic (Rollefson 1990). One additional comment should be made concerning the plain platform category: although platform dimensions were not measured in this analysis, it was striking how much broader and thicker the plain platforms in the Chalco/EB group (and to a lesser extent, in the "unknown" artifacts). Once again, broad, thick, and steep platforms are typical of post-PPNB periods (cf. Quintero *et al.* n.d.).

Cores were not numerous in the "post-Neolithic" group of artifacts (**Table 3**). The assignment of three cores to the Chalco/EB period was based on raw material type and freshness of edges and ridges. But the fact that 13 of the remaining 14 cores were non-descript flake or unclassifiable-cores suggests that some of them at least, might in fact be PPNB in age.

Tools in the collection are enumerated in **Table 4,** assigned to the Chalco/EB or "unknown" sub-assemblages on the basis of technological features of the blanks or the nature of the raw material. The limited counts do not provide for much interpretive

Table 1: Debitage classes in the al-Basīṭ post-Neolithic assemblages.

	Chalco/EB		Unknown	
Blank	**n**	**%**	**n**	**%**
Ordinary blade	27	36.49	27	15.79
Naviform blade	0	0.00	1	0.58
Canaanean blade	5	6.76	0	0.00
Unknown blade	0	0.00	22	12.87
Bladelet	0	0.00	1	0.58
Flake	38	51.35	101	59.06
C.T.E.	0	0.00	3	1.75
Burin spall	0	0.00	2	1.17
Core	4	5.41	14	8.19
(Tools)	(19)	(25.33)	(23)	(13.45)
Subtotal	74	100.00	171	100.00
Unclassifiable	1	1.33	0	0.00
Total	75		171	

Table 2: Platform, types in the post-Neolithic assemblages from al-Basīṭ.

	Chalco/EB		"Unknown"	
Type	**n**	**%**	**n**	**%**
Plain	50	92.59	59	76.62
Dihedral	3	5.56	10	12.99
Multiple facet	1	1.85	5	6.49
Punctiform	0	0.00	3	3.90
Subtotal	54	100.00	77	100.00
Missing	17	(23.94)	80	(50.96)
Total	71		157	

Table 3: Core types in the post-Neolithic assemblages at al-Basīṭ.

	Chalco/EB		"Unknown"	
Type	**n**	**%**	**n**	**%**
Prismatic blade	0	0.00	1	7.69
Flake	2	100.00	12	92.31
Subtotal	2	100.00	13	100.00
Unclassifiable	1	(33.3)	1	(7.14)
Total	3		14	

Table 4: Chipped stone tools (by type/class) in the post-Neolithic al-Basīṭ.

	Chalco/EB		Unknown	
Type	**n**	**%**	**n**	**%**
Burin	0	0.00	2	13.33
Truncation	0	0.00	1	6.67
Endscraper	1	8.33	4	26.67
Sidescraper	5	41.67	0	0.00
Denticulate	3	25.00	3	20.00
Borer	0	0.00	1	6.67
Chopper	1	8.33	0	0.00
Wedge	0	0.00	3	20.00
Backed blade	1	8.33	0	0.00
Other	1	8.33	1	6.67
Subtotal	12	100.0	15	100.00
Retouched flake	1	(5.26)	1	(4.35)
Retouched blade	5	(26.32)	5	(21.74)
Utilized piece	1	(5.26)	2	(8.70)
Total	19		23	

2. In all discussions about blade production, blades are defined on a technological basis and has no dependence on a metric relationship between length and width.

potential beyond noting that there is a relatively broad range represented and that no specialization is apparent.

The Late PPNB Collections

More than 1300 chipped stone artifacts were classified as LPPNB in age. **Table 5** provides a breakdown of the LPPNB sample into debitage classes. The second and third columns (n and %) represent absolute and relative frequencies of the combined sample of the surface collection and the artifacts recovered from the sifted backdirt mentioned earlier; the last two columns (n' and %') refer only to the surface collection (information on the backdirt sample can be found in Rollefson and Parker 2002). Blades and bladelets dominate both samples, with flakes accounting for only 10-30%.

Of particular interest here are the high values for bladelets, which in LPPNB samples at 'Ayn Ghazāl ranged from 1.5-4.4% (Rollefson and Kafafi 1996: table 1; Rollefson *et al.* 1992: table 2). It was clear for the backdirt sample that bladelets were a special focus (ca. 30%) of lithic production due to the specialized activity associated with large number of drills that dominated the tool kit there. But even with the removal of the backdirt sample, the %' figure indicates that there is still an elevated level of bladelets, suggesting that the activity focus was not limited to the particular region around the source of the backdirt.

One final comment on **Table 5:** "limestone flakes" of considerable size were somewhat numerous (the quantity in **Table 5** is not representative of the abundance of limestone flakes on the surface). These are clearly associated with the dressing of wall stones used in the construction of houses at al-Basīṭ.

Platform types are presented in **Table 6,** and these figures are typical of an LPPNB assemblage. Although plain platforms are still relatively numerous, they are less than half as popular as in the post-Neolithic groups **(Table 2).** Furthermore, although the dimensions of platforms were not measured, there is a perceptible reduction in size of plain platforms in the LPPNB sample. The diminished numbers of plain platforms were replaced by a manifest swing towards a larger representation of punctiform platforms on naviform blades.

Cores in the LPPNB sample were not only more numerous, they were much more varied (**Table 7**, which includes cores from the backdirt sample as well). Blade cores of all kinds make up 80% of the collection, and naviform cores were particularly important (**Figs. 1a, 2a**). Among the other blade cores were some that had opposed platforms (**Fig. 1b**), but they did not have the kind of preparation, dimensions, and maintenance typical of naviform blade cores (cf. Wilke and Quintero 1994; also see Gebel in Gebel and Bienert 1997: 242). The three prismatic blade cores were carefully made, although the "other" blade cores were more *ad hoc* in manufacture. Finally, in view of the high importance of bladelets in the debitage, it is not surprising to see three bladelet cores (e.g. **Fig. 2d**), al-

Table 5: *Debitage Classes in the LPPNB assemblages from al-Basīṭ.*

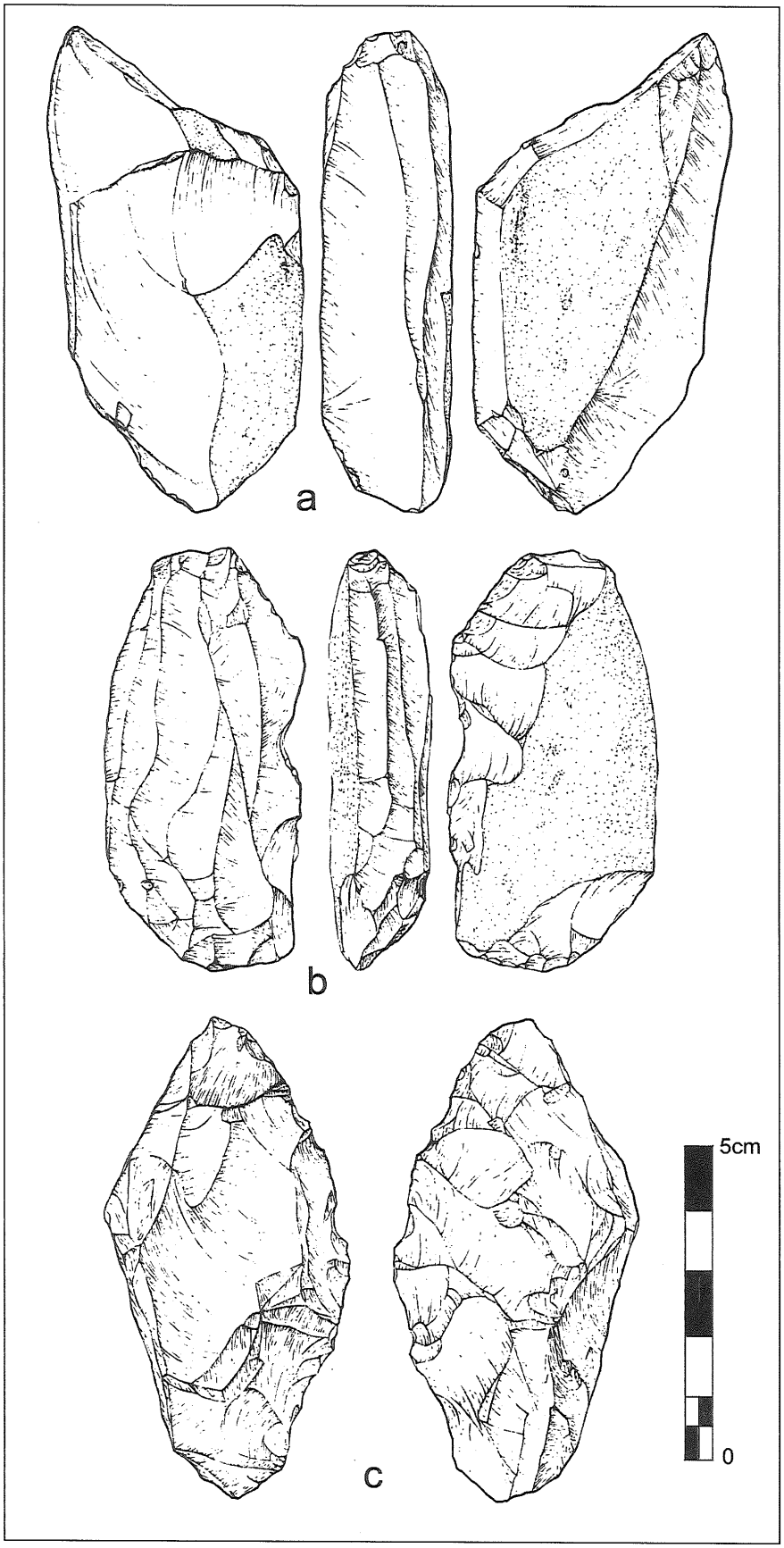
	LPPNB		LPPNB'	
Blank	**n**	**%**	**n'**	**%'**
Ordinary blade	79	6.33	20	5.63
Naviform blade	304	24.34	152	42.82
Unknown blade	64	5.12	21	5.92
Bladelet	354	28.34	79	22.25
Flake	360	28.82	34	9.58
C.T.E.	36	2.88	8	2.25
Burin spall	9	0.72	2	0.56
Core	43	3.44	39	10.99
(Tools)	(362)	(28.55)	(166)	(46.76)
Subtotal	1249	100.00	355	100.00
Microflake	6	0.46	6	1.52
Debris	13	0.99	13	3.28
Unclassifiable	21	1.60	2	0.56
Limestone flake	20	1.53	20	5.63
Total	1309		396	

Table 6: *Platform types in the LPPNB assemblage at al-Basīṭ.*

Type	**n**	**%**
Plain	199	32.52
Dihedral	41	6.70
Multiple facet	39	6.37
Punctiform	333	54.41
Subtotal	612	100.00
Missing	639	(51.08)
Total	1251	

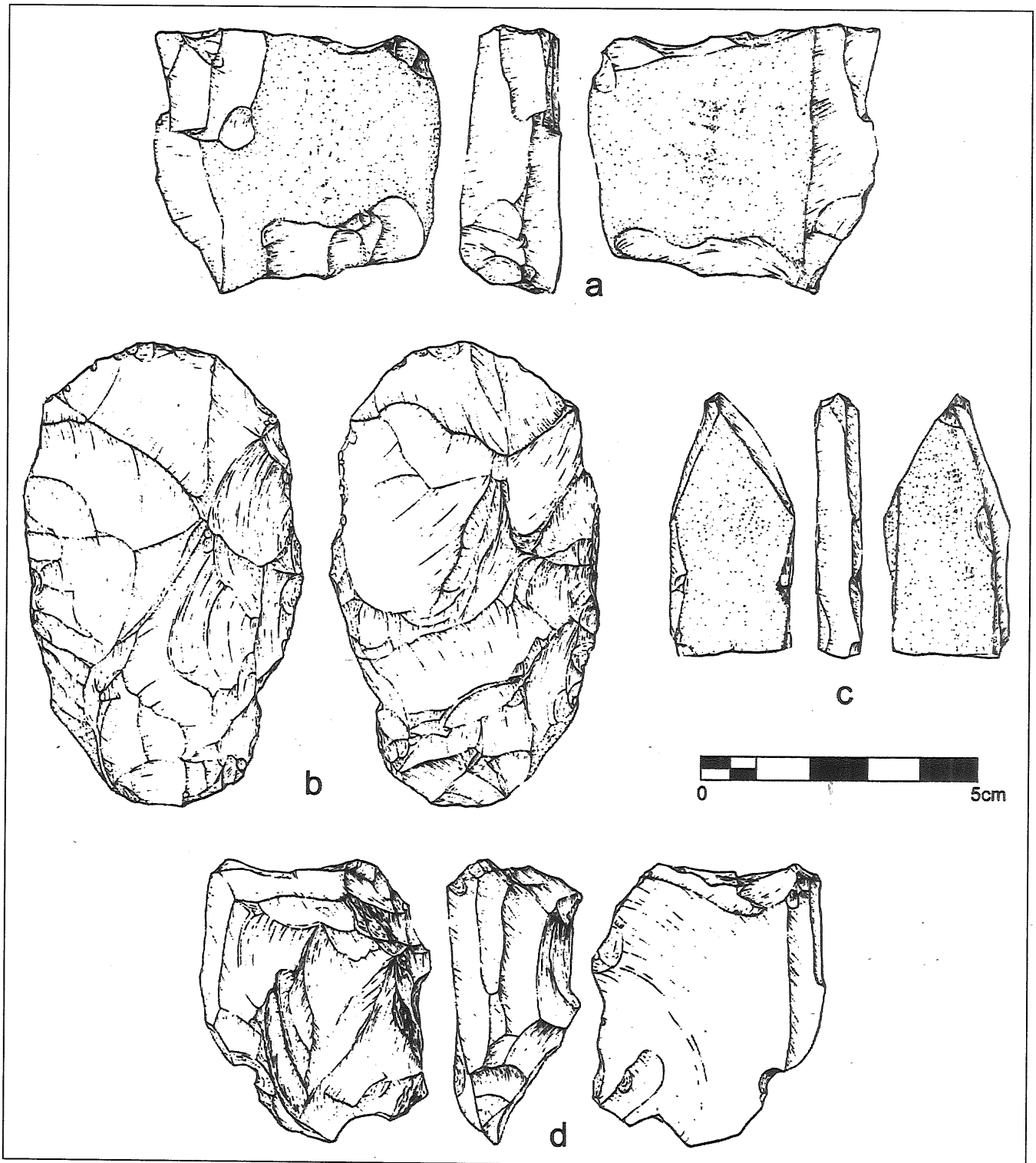
Table 7: *Core types in the LPPNB assemblage at al-Basīṭ.*

Type	**n**	**%**
Naviform bladelet	2	7.70
Naviform blade	11	42.31
Bidirectional, non-Naviform blade	4	15.38
Prismatic blade	3	11.54
Other bladelet	1	3.85
Flake	5	19.23
Subtotal	26	100.00
Tested piece	3	(8.82)
Unclassifiable	1	(2.94)
Hammerstone	4	(11.76)
Total	34	



1. a. Naviform blade core; b. bidirectional, non-Naviform blade core; c. pick (drawings: Qais Tweissi).

though two of these thin tabular pieces are typical miniature versions of naviform techniques (**Fig. 2c**) that seem to be restricted to southern Jordan (cf. Baird 2001: 645).



2. a. Naviform blade core; b. tranchet axe; c. "micronaviform" bladelet core (8mm thick); d. bladelet core on a flake (drawings: Qais Tweissi).

The LPPNB chipped stone tools both are abundant and represent a broad array of types/functions (**Table 8**). Projectile points (**Fig. 3a-e**) are generally rare and sometimes fragmentary, but they are in keeping with retouch styles common to the period. Burins were alsorelatively scarce, even when the backdirt sample is not considered (the %' column). Heavy duty tools, including tranchet axes (**Fig. 2b**) and picks (**Fig. 1c**) were by no means scarce. Knives (**Fig. 4b-e**) were more common; as has been commented before (Rollefson and Kafafi 1997: 44-45), some of these "knives" might in fact be unglossed sickles (e.g. **Fig. 4f-g**), as described by Quintero *et al.* (1997). The overwhelming plurality of tools consists of the drill/borer class (cf. Rollefson and Parker 2002). Even when the drills

from the restricted backdirt sample are removed from consideration, drills (**Fig. 5**) still account for more than two-fifths of the formal tools, adding additional support to the debitage data that al-Basīṭ was deeply involved in a specialized occupation.

Of the classifiable blanks (n=193), 80 % of the drills were made on bladelets (**Fig. 5d-h, o**), although some larger examples were made on blades (**Fig. 5a-c, i-n**), all of which is similar to MPPNB and LPPNB drills at 'Ayn Ghazāl (cf. Rollefson 1984: fig. 2a; see Baird 2001: 645). Drills in the northeastern desert area of Jordan occurred predominantly on burin spalls (Rollefson *et al.* 1999; cf. Baird 2001).

The Groundstone Assemblage

Surface groundstone artifacts were by no means uncommon (**Table 9**), although it is very difficult to assign groundstone artifacts to any particular time period. Several of the handstones were found in association with a few potsherds in the upper reaches of the trenches excavated for water and wastewater lines ('Amr, unpublished data), and a couple were also found in the LPPNB backdirt sifted in 2001. For the moment, these items are lumpedtogether with the undated surface materialin **Table 9.**

Although the groundstone/milling stone artifacts were typed according to Wright's system (Wright 1992; cf. Wright in Gebel and Bienert 1997), detailed distinctions were not considered important in the present discussion and are therefore not included in **Table 9.** Of interest are the items associated with red ochre, including two stone vessels and two handstones; four of the highly glossed polishing pebbles (small flint cobbles whose cortex had been eroded away through rubbing) were heavily coated with red ochre, emphasizing the value of this mineral for polishing purposes. What was being polished with the pebbles remains unknown, but red floors at 'Ayn Ghazāl were often polished to a high shine, and similar polishing pebbles were found at that site as well (e.g. Rollefson and Simmons 1985: table 5).

Some comment on the "pounders" is also called for here. In all cases the pounders were spherical or subspherical in shape, and often they bore heavily battered angular facets around the entire surface. In their replication experiments, Wilke and Quintero have noted that faceted and beveled hammerstones were efficient tools for the shaping of milling stones (metate-like grinding slabs, mortars, and pestles), and this observation appears to apply here (Wilke and Quintero 1996: 254-255). The mace head (**Fig. 6b**) is made of limestone and measures 4.3cm in height and 4.5cm in diameter.

Most of the stone vessels are made of soft limestone (one was made of sandstone) and reflect a broad variety of shape and size, ranging from deep bowls to shallow platter-like pieces (**Fig. 7a-d**). One of the vessels, made of a hard limestone, was a broad (ca. 60cm diameter) and shallow basin of unknown use (**Fig. 8**). A basin of similar size and shape was recovered from the excavations at LPPNB Wadi Fidan 1 in 1999 (personal observation).

Table 8: Chipped stone tool classes in the LPPNB assemblages from al-Basīṭ.

	LPPNB		LPPNB'	
Type	n	%	n'	%'
Projectile point	11	3.57	6	5.31
Sickle	3	0.97	2	1.77
Burin	13	4.22	7	6.20
Truncation	3	0.97	1	0.89
Endscraper	5	1.62	3	2.65
Sidescraper	9	2.92	5	4.42
Notch	5	1.62	3	2.65
Denticulate	4	1.30	3	2.65
Drill/borer	182	59.09	49	43.36
Axe/adze	4	1.30	4	3.54
Pick	6	1.95	6	5.31
Chopper	4	1.30	4	3.54
Wedge	1	0.32	1	0.89
Unifacial knife	25	8.12	14	12.39
Backed blade	1	0.32	1	0.89
Backed bladelet	2	0.65	0	0.00
Tanged blade	1	0.32	1	0.89
Other	4	1.30	3	2.65
Subtotal	308	100.00	113	100.00
Retouched flake/blade	32	(1.93)	15	(10.56)
Retouched bladelet	1	(0.28)	0	(0.00)
Utilized piece	18	(4.97)	13	(9.15)
Unclassifiable	3	(0.83)	1	(0.70)
Total	362		142	

*Table 9: Groundstone and milling stone artifacts from the al-Basīṭ collection. ** refers to number with red ochre stains.*

Type	n	%	o**
Quern/slabs	2	2.44	-
Handstones (hs)	25	30.49	1
Pestles(ps)	2	2.44	-
Pounders(pd)	33	40.23	-
Combination hd/ps/pd	5	6.10	1
Polishing pebbles	6	7.32	4
Loomweight	1	1.22	-
Macehead	1	1.22	-
Stone vessels	6	7.32	2
Other*	1	1.22	-
Total	82	100.00	

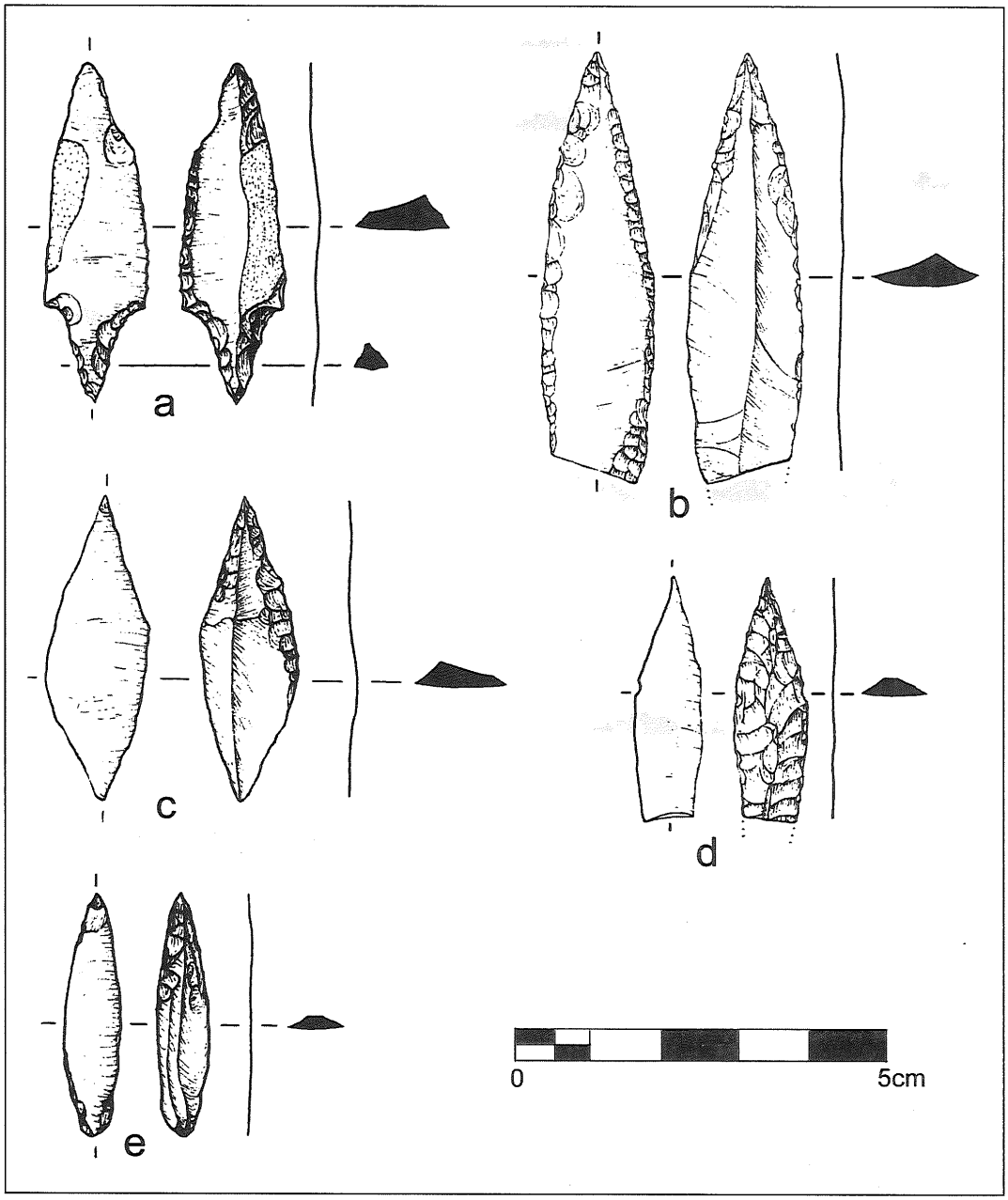
* Flint cobble fragment with red ochre stains

Ornaments and Small Finds

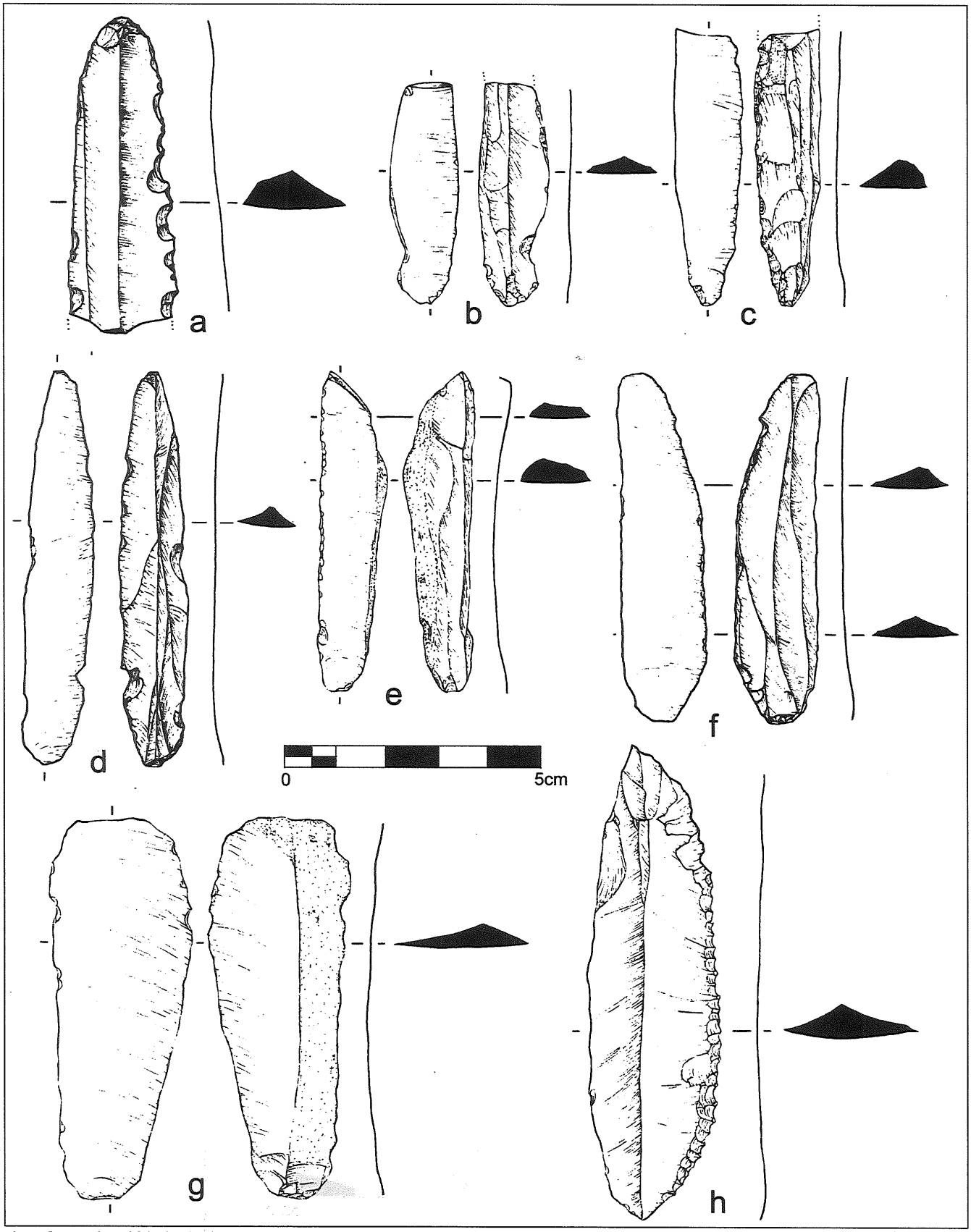
Table 10 presents a list of the artifacts that do not conveniently fit into the other categories of the first nine tables. A broken bone tool was found, a spatula fragment. Among the remaining pieces are artifacts presumably of personal adornment, including sandstone "bracelets" **(Fig. 6c-d)** common in the LPPB (Gebel and Bienert 1997: 252-257; Rollefson *et al.* 1990: 103 and table 10), as well as beads, pendants, and a possible finger ring of bone, mother-of-pearl, and shells. The three land snail beads are identical in style and production technique to LPPNB examples at 'Ayn Ghazāl (Rollefson *et al.* 1993: 123 and fig. 13). The perforated sandstone cylinder (4.7cm x 2.5cm, **Fig. 6a**) and the ovate sandstone object (7.7cm x 3.0cm) have no immediately apparent utilitarian functions, but they also have no other obvious meaning either. The small (ca. 1-2cm diameter) quartz crystals are not apparently modified, but they are still striking in terms of their clarity and possible attraction to the residents of al-Basīṭ, and the microfossil is also an item of possible intrigue to the people of the settlement.

A Neolithic Pottery Vessel from al-Basīṭ
(Khairieh 'Amr)

The only Neolithic pottery vessel from al-Basīṭ **(Fig. 6e)** was retrieved from inside a shallow pit in

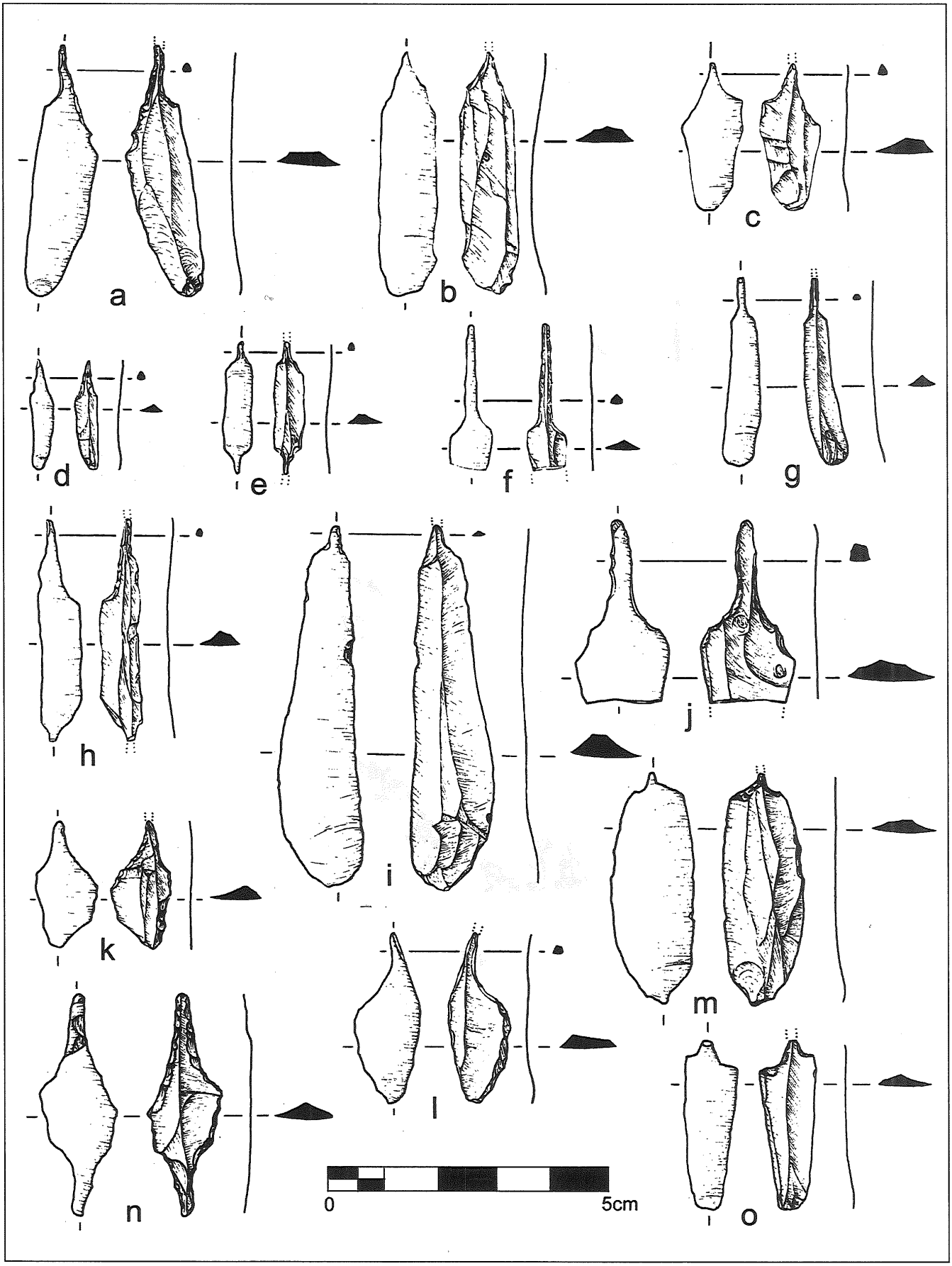


3. a-e. projectile points (drawings: Qais Tweissi).

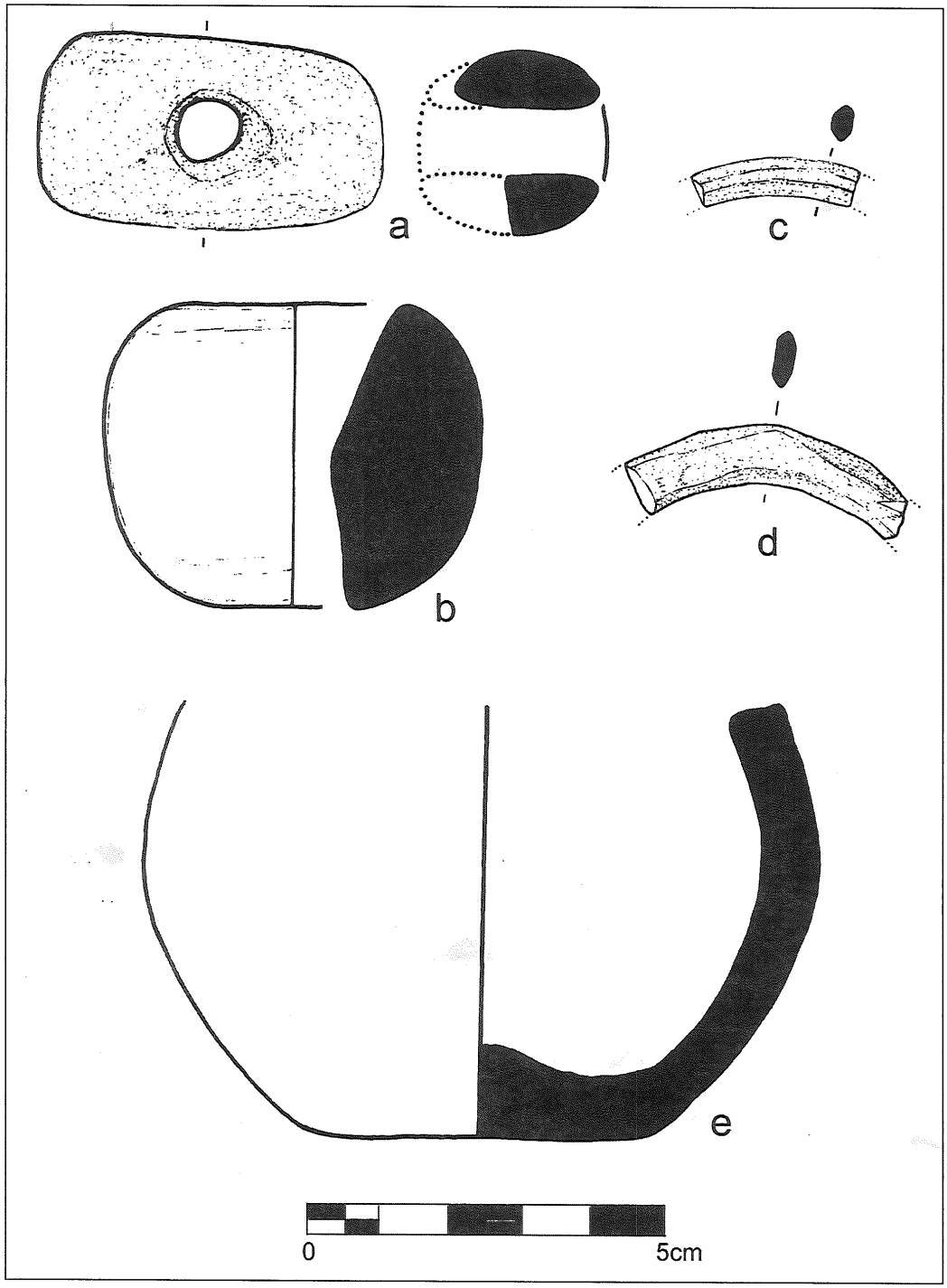


4. a. denticulated blade; b, d. tanged knives; c. knife; e. naturally-backed knife; f, g. knives or unglossed sickles; h. glossed, denticulated sickle blade (drawings: Qais Tweissi).

the west-central part of the site. The pit (Ba02) was recorded on 10 October 1998 during the archaeological work on the "Wādī Mūsā Water Supply and Wastewater Project". It was found cut by the



5. a-o. drills and borers (drawings: Qais Tweissi).

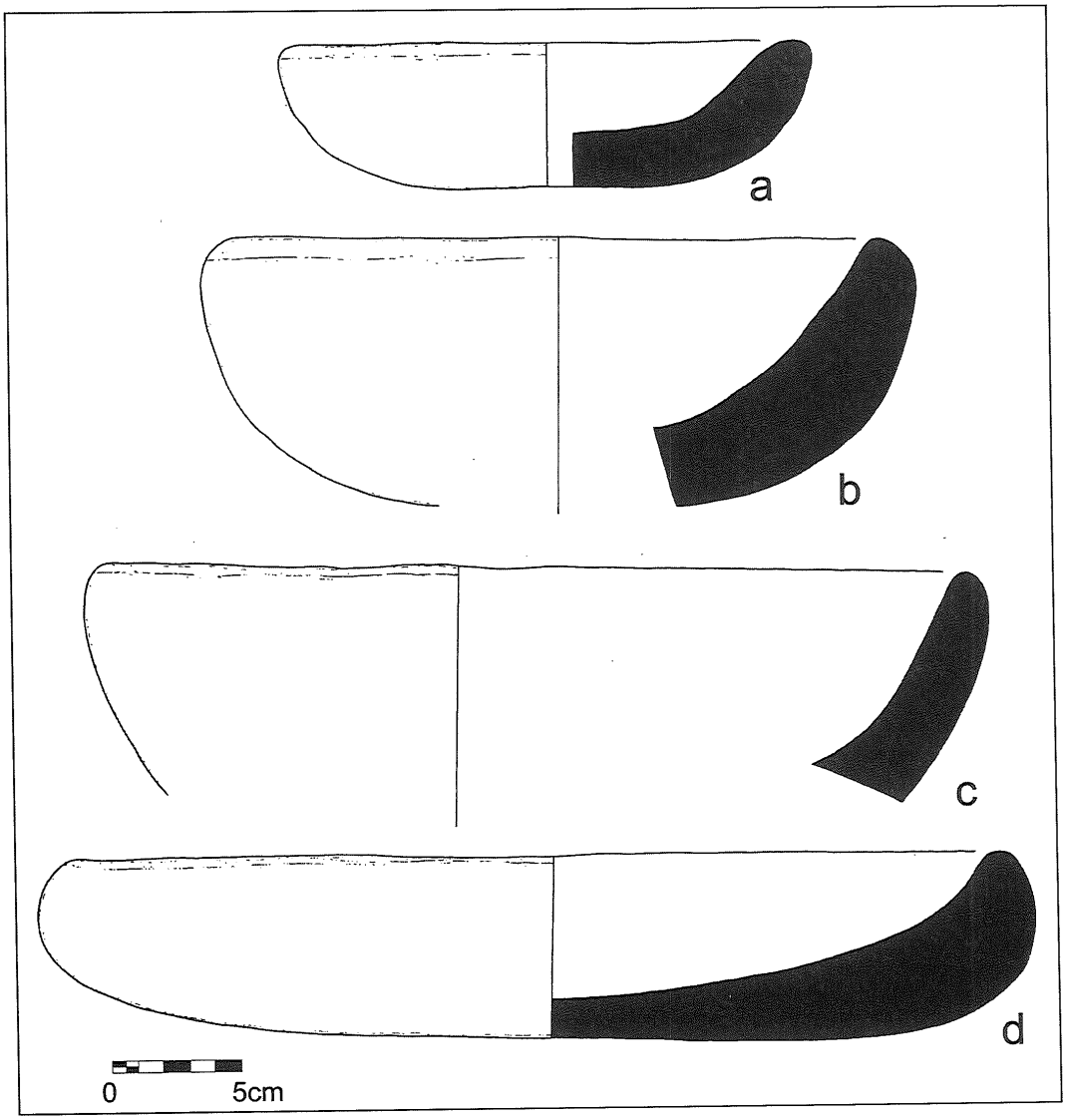


6. a. perforated sandstone object; b. mace head; c-d. sandstone "bracelet" fragments; e. Pottery Neolithic pot (drawings: Qais Tweissi except for 6e, by Hala Suyuf).

northern section of the Wastewater Line A-16A-24.1-2, its top at 1.04m below the surface. The width of the pit as showing in the section is 92cm, and its interior depth is 29cm. The interior is covered with mud and plaster layers, making up a thickness at the bottom of 12cm. It had been cut into an earlier stone-built structure that shows signs of an intense fire (walls burnt, much ash and brick-red strata). We also recorded several structures in the vicinity that belong to the same phase as the pit, the tops of which are at ca. 70cm below the present surface. They are preserved up to ca. 75cm in height and they all have mud floors lying above the structures of the earlier (LPPNB) phase.

The pottery vessel is a small jar, broken with the whole of the rim and parts of the body missing. Hand-made starting with a flat base, the body was then built up vertically (vertical pulling marks are evident on the interior). The vessel has a rough unfinished exterior.

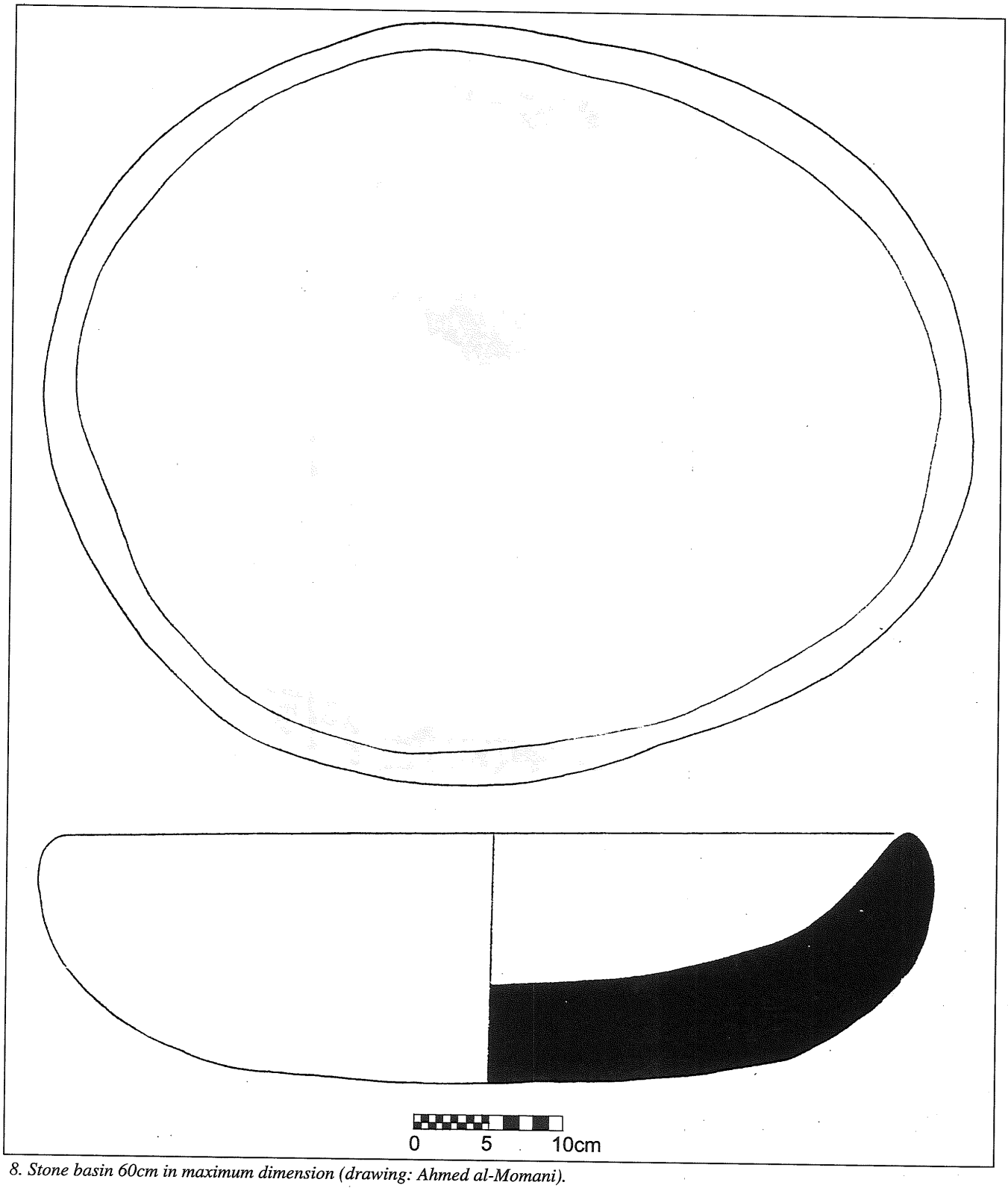
The ware is coarse with numerous small - medium white (lime), grey (flint) and red (grog?) inclusions, and some small-medium angular voids. The



7. Stone vessels from al-Basīṭ (drawings: Qais Tweissi).

Table 10: *Ornaments and small finds from al-Basīṭ.*

Item	Raw material	n	Comments
"Bracelets"	Sandstone	2	
Perforated cylinder	Sandstone	1	Resembles a small "hammer head"
Rubber	Hematite	3	Two are gritty, one is not gritty
Malachite fragment	Malachite	1	
Egg-shaped stone	Sandstone	1	Utilitarian?
Pendant	Marine shell	3	Conical
Pendant	Mother-of-pearl	2	Fragments; one drilled
Pendant	Bone	1	Or spacer bead?
Bead	Land snail	3	Cf. Rollefson, Kafafi & Simmons 1993: Fig. 13
Bead	Stone	1	
Beads?	Marine shell	3	Fragments; similar to marine shell pendant above
"Finger ring"	Bone	1	Fragment
Crystal	Quartz	2	Fragments
Spatula	Bone	1	Fragment
Microfossil	Shell	1	



8. Stone basin 60cm in maximum dimension (drawing: Ahmed al-Momani).

firing is uneven: the exterior and ~3mm of the outer section are mainly 2.5YR 6/6 light red, with a large patch of 5YR 4/1 dark grey – 5YR 6/1 grey/ light grey – 5YR 6/3 light reddish brown; the interior and inner section are 5YR 6/1 grey/ light grey at the base – 5YR 7/3 pink at the upper wall. The vessel is fired to medium hardness.

Discussion

The Late PPNB was a period of dramatic response to the tumultuous events of the later MPPNB throughout the southern Levant, when long-occupied farming settlements in Palestine and the Jordan Valley were abandoned. Jordan witnessed a major population explosion and immense

towns grew in Jordan's highlands as a consequence (Rollefson 1992; Quintero, Rollefson and Wilke, in press; Gebel, in press).

Al-Basīṭ was one of the LPPNB towns that mushroomed in southern Jordan in the latter half of the seventh millennium (uncalibrated). The proximity to Baṣṭa and Ba'ja suggests that there would have been relatively intense communication among all three settlements, a supposition that is strengthened by similarities in architecture and artifact inventories. A small collection of animal bones from the backdirt sifting turned out to be mostly caprines, but sheep were not present (A. Wasse, personal communication), although sampling problems may explain this departure from Baṣṭa (Becker 1991), Ba'ja (Gebel and Bienert 1997: 257), and aṣ-Ṣifiya (Mahasneh 1997: 211). Fino briefly mentions animal bones from his probes (Fino 1998: 106), and analysis of these larger samples might shed more reliable light on the faunal inventory.

Unfortunately, so much construction has been undertaken across the former Neolithic site that little remains for additional archaeological investigation. Nevertheless, we are planning a small-scale effort to investigate the "standing stone room" environs in and near the wastewater trench in the near future, and one area just under a hectare in area is also a candidate for future exploration.

Acknowledgments

I would like to warmly thank Dr. Fawwaz al-Khraysheh, Director-General, and Dr. Khairieh 'Amr of the Department of Antiquities, for the providing me with the opportunity to undertake the research reported in this study. I also am indebted to Nazeh Fino for his help and encouragement. Matthew C. Parker of Whitman College assisted enthusiastically in the recovery and processing of the surface collections and the backdirt sample. And I would also like to express my gratitude to Dr. Pierre Bikai and Dr. Patricia Bikai for providing laboratory facilities and equipment for this project, as well as their advice and warm friendship.

G.O. Rollefson
Department of Anthropology
Whitman College
Walla Walla, Washington 99362
U.S.A.

Bibliography

'Amr, K.
in press A Note on the Discoveries at al-Baseet During the Implementation of the 'Wadi Musa Water Supply and Wastewater Project". In H.-D. Bienert, H.G.K. Gebel and R. Neef (eds.), *Central Settlements in Neolithic Jordan.* Proceedings of the Symposium Held in Petra, July 1997. Berlin: ex oriente.

'Amr, K. and al-Momani, A.
2001 Preliminary Report on the Archaeological Component of the Wadi Musa Water Supply and Wastewater Project (1998-2000). *ADAJ* 45: 253-285.

'Amr, K., al-Momani, A., Farajat, S. and Falahat, H.
1998 Archaeological Survey of the Wadi Musa Water Supply and Wastewater Project Area. *ADAJ* 42: 503-548.

Baird, D.
2001 The Analysis of Chipped Stone. Pp. 639-651 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan.* Sheffield: Sheffield Academic Press.

Becker, C.
1991 The Analysis of Mammalian Bones from Basta, a Pre-pottery Neolithic Site in Jordan: Problems and Potential. *Paléorient* 17(1): 59-75.

Fino, N.
1997 Al-Baseet, a New LPPNB Site Found in Wadi Musa, Southern Jordan. *Neo-Lithics* 3/97: 13-14.
1998 Al-Basît Neolithic Site in Southern Jordan. *ADAJ* 42: 103-111.

Gebel, H.G.K.
in press Core and Corridor Areas of the Spread of Large Complex Settlement Organization in Jordan. In H.-D. Bienert, H.G.K. Gebel and R. Neef (eds.), *Central Settlements in Neolithic Jordan. Proceedings of the Symposium Held in Petra, July 1997.* Berlin: ex oriente.

Gebel, H.G.K. and Bienert, H.-D.
1997 Ba'ja Hidden in the Petra Mountains: Preliminary Report on the 1997 Excavations. Pp. 221-262 in H.G.K. Gebel, Z. Kafafi and G.O. Rollefson (eds.), *The Prehistory of Jordan II. Perspectives from 1997.* Berlin: ex oriente.

Mahasneh, H.
1997 The 1995 Season at the Neolithic Site of es-Sifiya, Wadi Mujib, Jordan. Pp. 203-214 in H.G.K. Gebel, Z. Kafafi and G.O. Rollefson (eds.), *The Prehistory of Jordan II. Perspectives from 1997.* Berlin: ex oriente.

Nissen, H., Muheisen, M. and Gebel, H.G.
1987 Report on the First Two Seasons of Excavation at Basta (1986-1987). *ADAJ* 31: 79-119.

Quintero, L.A., Rollefson, G.O. and Wilke, P.J.
in press Highland Towns and Desert Settlements: Origins of Nomadic Pastoralism in the Jordanian Neolithic. In H.-D. Bienert, H.G.K. Gebel and R. Neef (eds.), *Central Settlements in Neolithic Jordan. Proceedings of the Symposium Held in Petra, July 1997.* Berlin: ex oriente.

Quintero, L.A., Wilke, P.G. and Waines, J.G.
1997 Pragmatic Studies of Near Eastern Neolithic

Sickle Blades. Pp. 263-287 in H.G.K. Gebel, Z. Kafafi and G.O. Rollefson (eds.), *The Prehistory of Jordan II. Perspectives from 1997*. Berlin: ex oriente.

Quintero, L., Wilke, P. and Rollefson, G.
n.d. From Flint Mine to Fan Scraper: The Late Prehistoric Jafr Industrial Complex. *BASOR* (in press).

Rollefson, G.
1984 'Ain Ghazal: An Early Neolithic Community in Highland Jordan, Near Amman. *BASOR* 255: 3-14.
1990 Neolithic Chipped Stone Technology at 'Ain Ghazal, Jordan: The Status of the PPNC Phase. *Paléorient* 16(1): 119-124.
1992 Neolithic Settlement Patterns in Northern Jordan and Palestine. Pp. 123-127 in *SHAJ* 5. Amman: Department of Antiquities.

Rollefson, G. and Kafafi, Z.
1996 The 1995 Season at 'Ayn Ghazal: Preliminary Report. *ADAJ* 40: 11-28.
1997 The 1996 Season at 'Ayn Ghazal: Preliminary Report. *ADAJ* 41: 27-48.

Rollefson, G., Kafafi, Z. and Simmons, A.
1990 The Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1988 Season. *BASOR Supplement* 27: 95-116.
1993 The Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1989 Season. *AASOR* 51: 107-126.

Rollefson, G. and Parker, M.
2002 Craft Specialization at al-Basît, Wadi Musa, Southern Jordan. *Neo-Lithics* 1/02: 21-23.

Rollefson, G., Quintero, L. and Wilke, P.
1999 Bawwab al-Ghazal: Preliminary Report on the Testing Season 1998. *Neo-Lithics* 1/99: 2-4.

Rollefson, G. and Simmons, A.
1985 The Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1983 Season. *BASOR Supplement* 23: 35-52.

Rollefson, G., Simmons, A. and Kafafi, Z.
1992 Neolithic Cultures at 'Ain Ghazal, Jordan. *JFA* 19(4): 443-470.

Savage, S. and Rollefson, G.
2001 The Moab Archaeological Resources Survey: Some Results from the 2000 Field Season. *ADAJ* 45: 217-236.

Wilke, P. and Quintero, L.
1996 Near Eastern Millstone Production: Insight From Research in the Arid Southwestern United States. Pp. 243-260 in S.K. Kozlowski and H.G.K. Gebel (eds.), *Neolithic Chipped Stone Industries of the Fertile Crescent and Their Contemporaries in Adjacent Regions*. Berlin: ex oriente.

Wright, K.
1992 A Classification System for Ground Stone Tools from the Prehistoric Levant. *Paléorient* 18(2): 53-81.

THE MOAB ARCHAEOLOGICAL RESOURCE SURVEY: TEST EXCAVATIONS AND FAUNAL ANALYSIS FROM THE 2001 FIELD SEASON

Stephen H. Savage and Mary L. Metzger

Introduction

The Moab Archaeological Resource Survey (MARS) accomplished its 2001 field season from July 20th through August 15th. Building on our successful initial field season in 2000, the MARS project continued its survey of the region indicated on **Fig. 1**, and conducted test excavations at the site of Khirbat Qarn al-Kabsh (خربة قرن الكبش). Our field crew consisted of Dr. Stephen H. Savage, Project Director, Mr. Sidney Rempel, Ms. Monique Blom, and Mr. Mohammad Khalifa (Malkawy). Ms. Caroline Puzinas also assisted us in the field. We had the pleasure of having Mr. Musa Malkawy as our Department of Antiquities representative. He ably represented the DOA, helped us communicate with local residents, and became a good friend of the entire crew. We would also like to thank Dr. Fawwaz al-Khraysheh, Director-General of the DOA, for his constant support of our research efforts. Thanks to the efforts of all, our 2001 field season was a tremendous success.

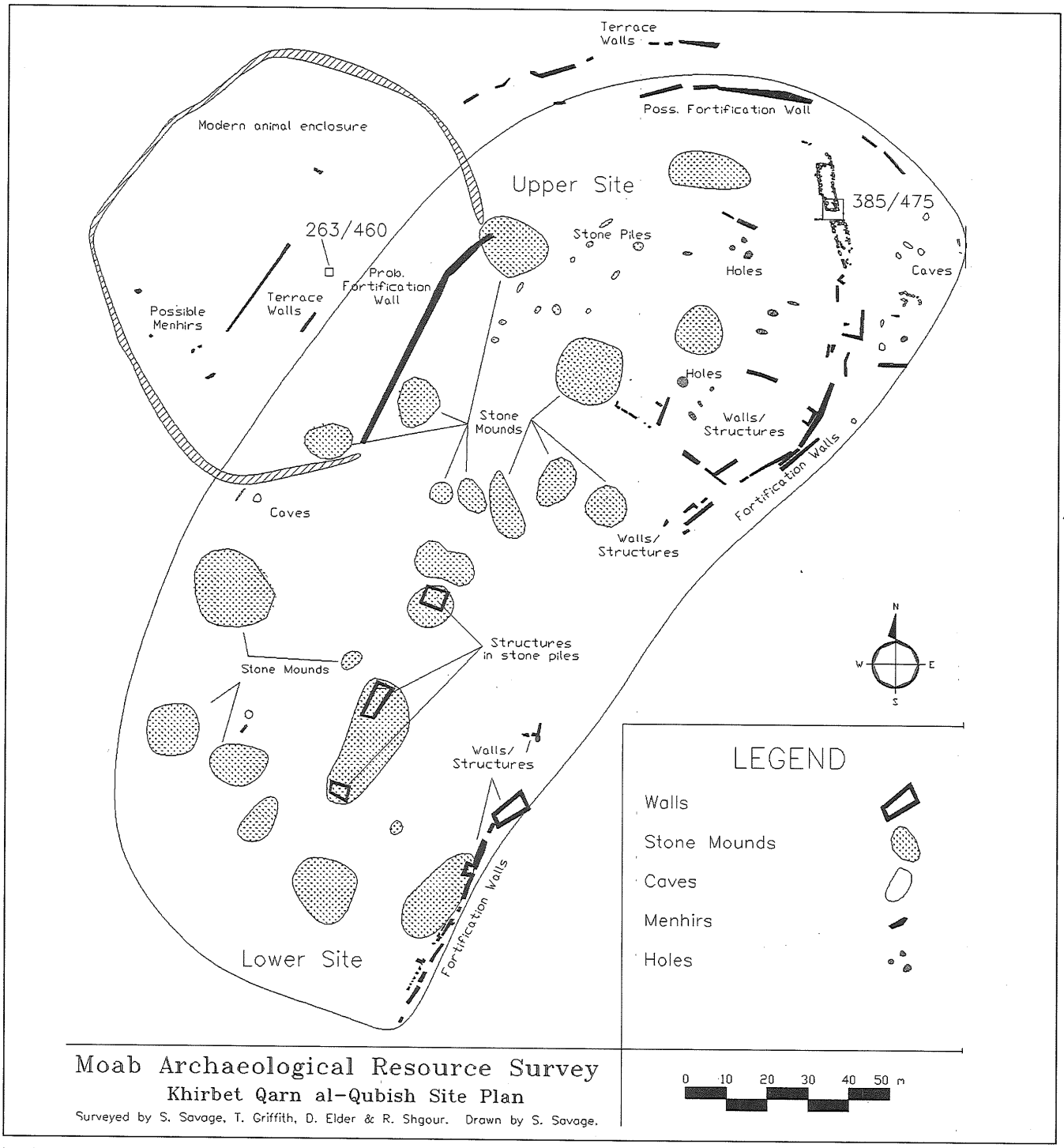
MARS Project Goals

The Moab Archaeological Resource Survey was established to collect settlement, archaeological, and environmental data from the western part of the Mādabā Plain (سهول مادبا) in the highlands of central Jordan (Savage and Rollefson 2001: fig. 1). The field program for this long-term project includes detailed mapping, surface collections, and test excavations at known archaeological sites and pedestrian survey of the western Mādabā Plain to discover additional sites. The general goal of the fieldwork is to gather settlement, ceramic, lithic, faunal and botanical data from an area that appears to have contained a single cluster of sites (Savage and Rollefson 2001: fig. 2), and therefore probably a single settlement system, in the Early Bronze Age (EBA, ca. 3600-2000 BC). The lab program includes establishing an absolute radiocarbon chronology for the region, analysis of faunal and botanical remains to establish dietary parameters in the EBA, and lithic analysis (including raw material source investigations), and petrographic analysis of ceramics to investigate the nature of ceramic production/exchange in the settlement system. These data will be used to test a model of early social organization based on heterarchy (see Crumley 1995 and Philip 2001). Our field and lab work will describe a single settlement cluster, and then compare it to similar archaeological datasets from similar contexts (e.g. domestic/residential, administrative/public, etc.) at urban and rural-village sites in other site clusters in the region. The unique contribution of this project lies in its emphasis on individual settlement clusters as an appropriate comparative scale, and its emphasis on testing the heterarchy model of early social organization in a region characterized by shifting settlement systems and flexible adaptive responses to an unpredictable physical environment.

Summary of Results from the 2000 Field Season

In 2000, we conducted detailed mapping of surface features and 20 percent, random, stratified, non-aligned surface collections at Khirbat Qarn al-Kabsh (al-Qarn) and al-Murayghāt (المريغات). We collected over 7,000 sherds and more than 10,000 lithics from the two sites (see Savage 2001; Savage and Rollefson 2001). We also began pedestrian survey of the region around the sites, recorded several additional features related to Byzantine agriculture near al-Qarn, and visited a large lithic scatter (MARS Site 0011) northwest of al-Murayghāt. This report will concentrate on our work at al-Qarn.

The village site of Khirbat Qarn al-Kabsh (**Fig. 1**) was initially founded during the Early Bronze I period, and reached its zenith in the Early Bronze III period. By that time, an extensive fortification system had been constructed around at least three sides of the hill (excluding the very steep south side). A gate complex dominated the northeastern approach to the site, where the natural hill is connected by a "saddle" of land to the rest of the Mādabā Plain. The evidence of the EB I occupation is not abundant on the surface — only a small percentage of the pottery from the surface collection could be assigned firmly to the early period. Most of the surface ceramic assemblage comes from the EB III period. There are a number of sherds that are assigned to the EB II/III period as



1. Khirbat Qarn al-Kabsh site plan. Excavation units were placed across the gateway (Unit 385/475) and in the midden (Unit 263/460).

well. Given the preponderance of EB III material at the surface, it seems likely that the EB II/III sherds probably belong with the EB III material. However, they may represent an EB II occupation of the site. The surface collection failed to find any material that could be assigned to the EB IV period.

By the EB III, a substantial number of large, stone buildings occupied the upper and lower site. These are preserved under the stone mounds on the hilltop, and excavation can reveal their shape and function; it is quite likely that there are preserved floor and room-fill deposits inside the structures.

Goals of the 2001 Field Season

We had a number of questions about al-Qarn after the 2000 field season, which could only be answered by test excavations: 1) What is the nature and extent of subsurface material in the midden on

the west side of the site? 2) When was the fortification system built? 3) Is there evidence of multiple occupational phases at the site? 4) What was the nature of the "food system" at the site? Answering these questions became the focus of our 2001 field season at al-Qarn. A testing strategy was developed that would help answer the questions, by excavating limited areas on the site with the following goals in mind:

- Place an excavation unit across the gate complex on the northeast side of the site, in such a way that part of the unit included the gateway itself (between the north and south flanking towers), and part of the unit was inside one of the towers.
- Collect artifacts and C-14 samples from the gateway that would help establish its dates of construction and use.
- Establish, through excavation, the method of construction of the gate complex, and any changes in its form through time.
- Place an excavation unit in the midden (trash deposit) on the steep west side of the site, in an area where our surface collection from the 2000 field season indicated a significant amount of sherds and lithics would probably be found.
- Collect ceramics, lithics, seeds and faunal remains from the site, to be used as the basis for comparison with similar collections from other EBA sites on the Mādabā Plain.
- Collect organic material for radiocarbon dating, to help sort out vexing chronological issues related to the EB II and EB III periods.

Results from the 2001 Season

To accomplish the goals set for the 2001 field season, two units were excavated at al-Qarn (**Fig. 1**). These were:

1. Unit 385/475, placed over the south end of the north gate tower and the gateway, on the northeast side of the site;
2. Unit 263/460, placed in the midden on the west side of the site.

Unit 385/475

Placed across the gateway and the southern part of the northern gate tower, Unit 385/475 was a 5x5 meter square, excavated in order to understand the construction of the gate complex and obtain artifacts that could date its construction, use, and abandonment. The excavation accomplished all these goals. Our work established a number of important points concerning the gate complex:

1. The gate towers were constructed as solid structures, rather than rooms that subsequently filled in with rubble and post-abandonment debris.
2. The gate towers are founded on soil, rather than bedrock. Some of this soil represents the original ground surface of the hill, but on the south side, the gate was built on a thin layer of soft, gray soil that is part of an early midden deposit from as early as the late EB I to Early EB II (based on a radiocarbon date, see below).
3. The tower was built and filled in course by course. Large boulders were placed around the perimeter of the tower; rock rubble and soil were dumped into the interior space to the top of the outer boulders. Then the next course of boulders was placed, and so on.
4. The construction of the tower has been firmly dated to the Early Bronze III period (ca. 2800-2350 BC), probably earlier in the period, rather than later.
5. A flagstone pavement was placed in the entranceway between the two gate towers. The pavement was later repaired by rimming its perimeter with rocks and filling in and leveling the interior with small cobbles and pebbles.
6. Thus, there are two clear use phases in the gateway; both originated in the same period as the gate towers (i.e. EB III), but they were built after the towers.
7. The entry pavement was covered with post-abandonment fill by the Roman/Byzantine period. Loci assigned during excavation of Unit 385/475 include:

Locus 000: This was the modern ground surface inside the north gate tower, at the time excavation began. Because of the way Unit 385/475 was placed on the tower and gateway, this locus included an area about 3m north-south by about 2m east-west. Our strategy was to excavate the interior portion of the tower separately from the entranceway, and separate from the narrow strip of Unit 385/475 that fell outside the fortification wall to the east. There were no artifacts on the surface inside the tower.

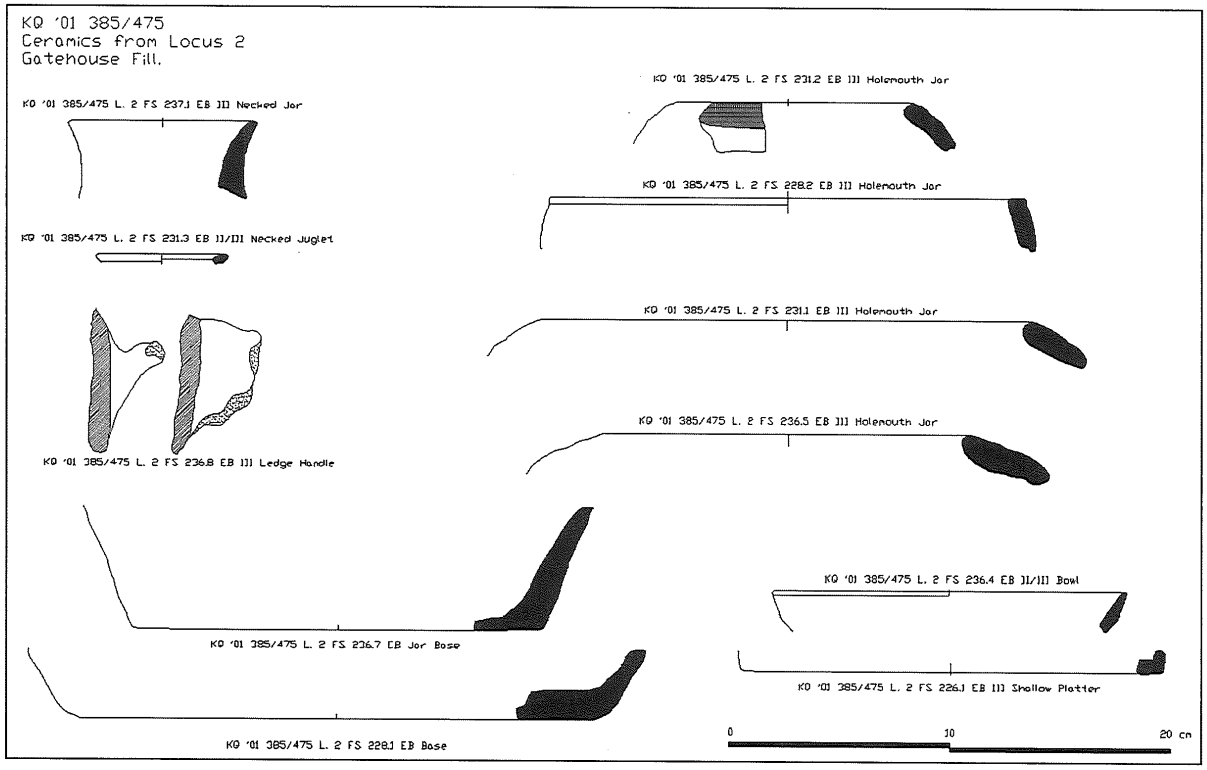
Locus 001: The north gate tower in its entirety was assigned locus number 001, but only the southern part of the tower was cleared. The tower is about 11.8m long by 4.3m wide overall; it long axis is oriented at about 343 degrees. The tower is thus an irregular rectangle, whose width varies somewhat. The tower was free-standing, boulder and chink construction, with rubble fill (Locus 002). Its perimeter consists of boulders, ranging in size from 25cm up to 1m across. About 75% of these were in the 0.75 to 1m range; about 20% were in the 0.5 to 0.75m range; the remaining 5% were in the 0.25 to 0.5m range. Chink stones between boulders and

courses were cobbles in the 6-25cm range. The rocks comprising the tower were exclusively unhewn, hard limestone, and the tower was unfaced. Two courses were immediately visible, and a third was identified during excavation in the gateway. The outer perimeter is one row wide. There is no foundation trench. The tower rests partly on Locus 004 midden-like material, and partly on Locus 005, which was identified as the original ground surface. No artifacts were collected from Locus 001.

Locus 002: Fill inside North Tower. The fill inside the tower was given a separate locus number. The locus consisted of large pebbles (2mm-6cm) to medium sized boulders (>25cm) in a matrix of pale brown (Munsell 10YR 4/4 wet, 10YR 6/4 dry) loam. Following initial penetration of the surface, the fill was found to be very loose, slightly friable, and rubbly. The locus is entirely contained by, and seals against, the North Gate Tower (Locus 001). It measured about 2.98m N-S by 2.5m E-W (on the north side of Unit 385/475, on the south side, the locus is about 2m EW). The locus represents deliberate fill, placed into the tower at the time of its construction. From the way the boulders in Locus 001 extended over the fill from Locus 002, it was clear that the fill had been placed in the tower in layers that correspond with the courses of the boulder perimeter (Locus 001). That is, a course of perimeter boulders was laid, and then filled in with rubble and soil to the top of the course. Then the next course of perimeter boulders was laid, and filled in with rock rubble and soil. Clearly, then, the Locus 002 material is contemporary with the construction of Locus 001, and therefore, Locus 001 was a solid construction, rather than a room or gatehouse that was filled later by post-abandonment collapse and deposition. **Table 1** summarizes the materials collected from Locus 002. **Fig. 2** illustrates diagnostic sherds from the gate tower fill,

Table 1: Items collected from Unit 385/475, Locus 002.

Artifact Type	Count (Ceramics) or Weight (gr)	Reading	Comment
Bone	30 g	Sheep/Goat	Fragmentary
Charcoal (C-14)	10 g		
Chipped Stone	295 g	Not diagnostic	Primarily debitage
Ceramics	221 (19 diagnostics)	EB II/III, EB III	



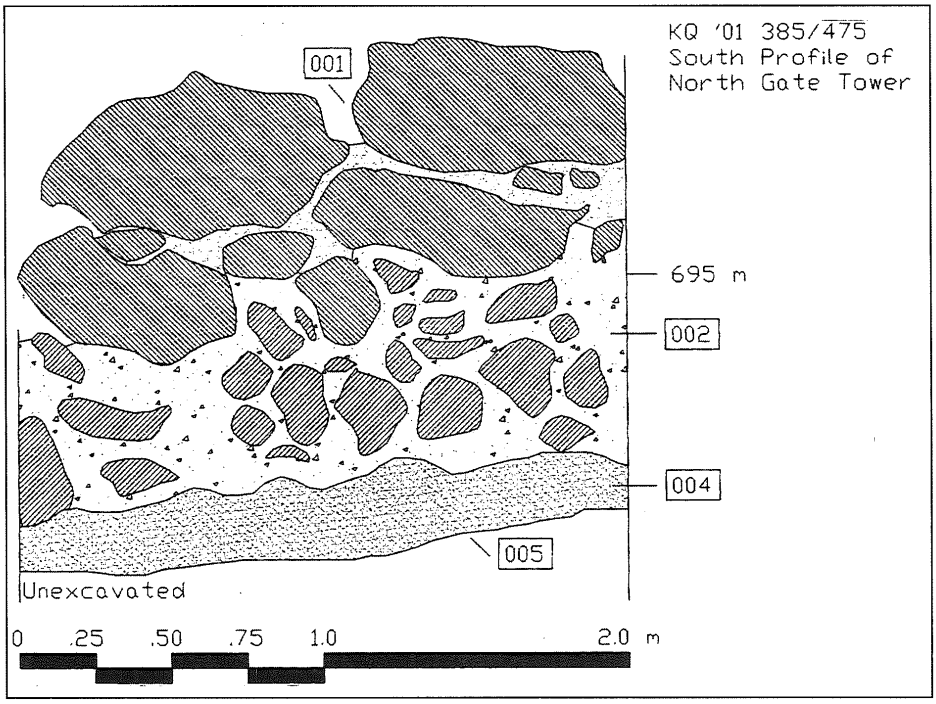
2. Sherds recovered from the gate tower fill at al-Qarn.

which, along with radiocarbon dates discussed below, enable us to say with certainty that the gate structure was built in the EB III period.

Locus 003: One by one meter probe. After having excavated approximately 20cm of Locus 002, we placed a 1 x 1m test probe in the southeast corner of the north gate tower. The purpose of the probe was to determine the depth of Locus 002, and the nature of the deposit(s) underneath it. The upper 25cm of soil in the probe conforms to the Locus 002 matrix and rubble. Below this level, a light brownish gray, sandy clay loam was encountered, overlaying the natural slope of the hill. On the surface of the natural hill a few flat-lying sherds were noted. At this point, the probe was terminated. The lower soil deposit was designated as Locus 004, and the original surface of the hill was given locus number 005. Sixty-one sherds were collected from Locus 003; all were Early Bronze body sherds that could not be assigned to a specific sub-period in the EBA. In addition, 15 grams of bone fragments, 2 grams of charcoal, and 65 grams of lithic debitage were collected.

Locus 004: Fill above Locus 005. The Locus 004 deposit was identified in the Locus 003 probe discussed above. The matrix of Locus 004 was light brownish gray (Munsell 10YR 6/2 dry) sandy clay loam, which was loose, somewhat gravelly, and dry. There was a very low frequency of pebbles and cobbles, and boulders were not present. The locus lies under Locus 002, over Locus 005, and seals against Locus 001. As such, its top surface represents the surface of the ground at the time the north gate tower was built. Since the rubble fill from Locus 002 and the boulder wall of Locus 001 are clearly above this locus, it is plain that the tower was built on soil rather than bedrock, and that there had already been some deposition on the original ground surface when the tower was built (see **Fig. 3**). Locus 004 varies in depth from about 20 to 40cm on the south side of the tower, but is not present on the north side of the excavation unit, having thinned out across the N-S extent of the area excavated inside the north gate tower. Two radiocarbon dates from Locus 004 are discussed below; they indicate that the locus had begun to form by as early as late EB I to early EB II. Five grams of bone, five grams of charcoal, 450 grams of lithic debris were collected from Locus 004. One hundred five sherds were recovered; of these, three were diagnostic of the EB II/III and EB III periods. In addition, five grams of olive seeds were collected. Together with the seeds and charcoal fragments collected from Locus 002, these will provide bracket radiocarbon dates for the construction of the north gate tower.

Locus 005: Original ground surface. Locus 005 was identified in the Locus 003 probe, and exposed across the full extent of the area excavated inside the north gate tower. It is a firm earthen surface that slopes from southwest to northeast, conforming to the slope of the hill upon which the tower was built. The locus was not excavated, because the excavation in the tower was already well below



3. South profile of the excavation inside the north gate tower.

the bottom of the fill associated with the construction of the tower, and had collected artifacts and organic samples that can be used to date the tower's construction. It is overlain by Locus 002 (in the north) and 004 (in the south).

Locus 006: Present surface of gateway. Once Locus 005 had been uncovered inside the north gate tower, our attention shifted to the entryway between the towers. Locus 006 was assigned to the present ground surface in the region between the towers. Three undiagnostic EBA sherds were recovered from the present ground surface.

Locus 007: Fill in entryway. The entry fill is post-abandonment colluvium and collapse from the towers. The entryway is approximately 3.35m long by 3m wide, but Locus 007 was initially set up as a 2m wide trench across the entryway. Subsequent expansion of the entryway excavation to the west included soil assigned to Locus 011, which is equivalent to Locus 007. The soil matrix was pale brown (Munsell 10YR 6/3 dry), silty loam that was loose, dry, and contained considerable gravel and rock rubble. Pebbles (2mm-6cm), cobbles (6-25cm) and boulders (>25cm) were present in the matrix, distributed at random throughout, at medium to high density. We also encountered one mud-brick fragment, approximately 12cm by 6cm, in the matrix. The upper surface of the locus slopes to the northeast, but the lower extent is relatively flat, overlaying Loci 008, 009 and 012. **Table 2** summarizes the artifacts recovered from Locus 007.

Locus 008: Ashy fill above Locus 009. Immediately below Locus 007 we encountered a thin lens of brown (Munsell 10YR 5/3 dry) silt loam, which was devoid of the large stones that characterized Locus 007, with a low frequency of pebbles and a medium frequency of small cobbles. The soil matrix was loose, dry, and slightly gravelly/rubbly in texture. The matrix was somewhat ashy, and probably represents cooking activity associated with a time period after the abandonment of the towers. Five grams of bone fragments, a few EB III sherds, and 15 grams of chipped stone were recovered from Locus 008.

Locus 009: Entry pavement repair. Below Locus 008, we encountered a surface that consisted of a high frequency of pebbles (2mm-6cm) and a medium frequency of cobbles (6-25cm) bordered by larger stones, in a matrix of pale brown (Munsell 10YR 6/3 dry) silty clay loam **(Fig. 4A).** The locus is a repair/rebuild of the entryway pavement (which was later identified as Locus 012). It has been designated as Field Phase 1. Locus 009 overlies Locus 012, seals against the two towers (Loci 001 [North tower] and 010 [South tower]), and is overlain by Locus 008 in the east side of the entryway and by Locus 011 in the western one-meter extension of the excavation. The repair of the entryway pavement was accomplished by placing a perimeter of relatively flat stones across the east side of the entryway, and along the faces of the towers. These stones served to contain the pebble/gravel fill that was used to level the surface of the entryway after the Locus 012 flagstone pavement had become uneven. Some of the stones used in Locus 009 were originally part of Locus 012 **(Fig. 4A, B).** A few EB III sherds were found in association with Locus 009, which thus dates this second phase of the entryway to later in the same period as its construction. Five grams of seeds (olive pits) were found in the soil matrix of the surface, which were submitted for radiocarbon dating to the University of Arizona AMS Radiocarbon Facility. The date on these seeds, plus the seeds and charcoal recovered from Locus 007, provides a date range between the construction of Locus 009 and its aban-

Table 2: *Items collected from Unit 385/475, Locus 007.*

Artifact Type	Count (Ceramics) or Weight (gr)	Reading	Comment
Bone	5 g	Sheep/Goat?	Fragmentary
Charcoal (C-14)	15 g		
Chipped Stone	930 g	Canaanean blade	Primarily debitage
Ceramics	46 (2 diagnostics)	EB III	Bowl/juglet rim, vat body sherd, roll rim jar sherd
Seeds	2 g	Olive pits	

donment. These dates are discussed below.

Locus 010: South Gate Tower. The south gate tower was designated as Locus 010, after the decision was made to extend the excavation of the entryway to the northern face of the south gate tower. During excavation of Locus 009, material between the south edge of Unit 385/475 and the north face of the south tower became unstable, because of the short distance involved. Therefore, to keep the lower levels from being contaminated by fill from higher strata, and to uncover the face of the south tower and full extent of the Locus 009 entry floor, the excavation was extended south to the north face of the Locus 010 tower. The material excavated from above Locus 009 was considered to be mixed — the equivalent of balk trimming soil — and was discarded. Locus 010 was not excavated. It is probably similar to Locus 001 (the north tower) in its construction date and techniques.

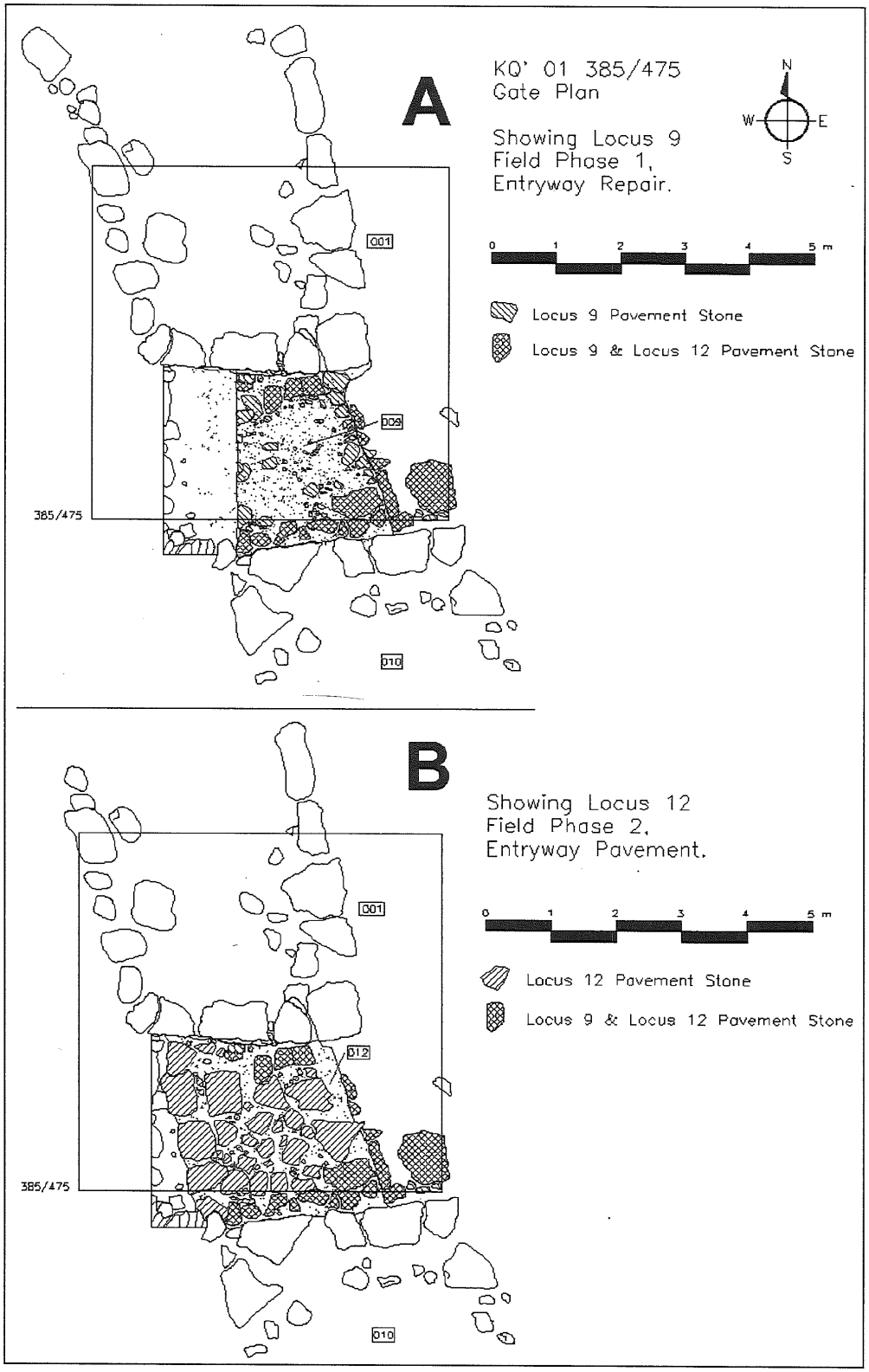
Locus 011: One meter westward extension of entryway excavation. The western part of the gateway was not uncovered in the initial two meter wide trench. The excavation was extended by one meter to the west to include the rest of the area between the gate towers. The locus is the equivalent of Locus 007, and need not be described again. Five grams of bone fragments, five grams of charcoal, 76 sherds (4 diagnostic), 315 grams of chipped stone, and five grams of olive seeds were recovered from the soil in Locus 011. We did not identify Locus 008 material below Locus 011, and Locus 009 was not well defined under Locus 011 either. Rather, large, flat flagstones belonging to Locus 012 were encountered. It is likely that some of these were re-used in the repair of the entryway that is represented by Locus 009. At its western edge, Locus 011 was clearly west of the entry pavements, which were not extended past the inside edge of the gate towers. Of the ceramics recovered from Locus 011, one was EB I, two were EB III, and one was from the Roman/Byzantine period. Since Locus 011 is, in origin, post-abandonment fill overlaying the gateway pavement, the presence of the Roman/Byzantine body sherd (the only one found in Unit 385/475) indicates that the gateway had been covered by colluvium and post-abandonment collapse by the Late Classical period. Clearly, the gateway itself dates to the EB III period. Loci 007, 008 and 011 must be assigned to Field Phase 1 (post-abandonment), Locus 009 to Field Phase 2 (second phase of the gateway), and the towers and original gateway to Field Phase 3. These were built upon soil from Locus 004, which is assigned to Field Phase 4.

Locus 012: Entryway pavement. Below the Locus 009 pavement repair/rebuild, and below the Locus 011 post-abandonment fill, we encountered the original entryway pavement (**Fig. 4B**). Locus 012 consists of an irregular flagstone pavement that extends between the two towers, but ends at their inside (western) edge. No artifact concentrations or activity areas were found on the surface. The pavement was contiguous across the entire gateway, but highly uneven. Presumably, the flagstones had begun to settle during the EB III period after some undefined length of use. At that point, the residents of al-Qarn repaired the surface in the manner described under Locus 009. There are clear threshold stones along the eastern side of the pavement, and a very large, flat boulder set into the ground outside the gateway. It is possible that this boulder represented an extension of the entry pavement outside the gate complex. Overall, it seems clear that Locus 012 must date to shortly after construction of the two gate towers. It is part of Field Phase 3, which includes the towers and the pavement.

Locus 013: Probe against Locus 001 southeast corner. Excavation in the gateway was terminated at Locus 012. A final locus in Unit 385/475 was assigned to a one by one meter probe placed against the outside of the north gate tower, at its southeast corner. The purpose of the probe was to try to reach bedrock, but a large quantity of post-abandonment rubble and wall collapse was encountered within about 20cm of the surface. The locus was terminated when it no longer became possible to excavate without enlarging the probe to remove the large boulders fallen from the gate tower. Consequently, the base of the locus is highly uneven, and marked by rubble and collapse. The soil matrix was brown (Munsell 10YR 5/3 dry) silt loam, loose and gravelly. It contained a high percentage of cobbles (6-25cm) and boulders (>25cm). Five grams of bone, ten grams of chipped stone debris, and a few undiagnostic EB body sherds were recovered from the locus.

Unit 385/475 Summary: Based on the excavations inside the north tower and across the gateway between the entry towers, it is clear that there are four field phases represented. These include:

1. *Post-abandonment fill*, represented by Loci 007, 008 and 011 in the entryway. These loci are essentially equivalent. While no ceramics later than EB III were found in Locus 007, a single



4. Two phases of entry pavement between the gate towers at al-Qarn.

Roman/Byzantine body sherd was found in Locus 011. Thus, it is clear that the gateway floors had already been covered over by post-abandonment colluvium and collapse by the Roman/Byzantine period. This finding is consistent with the assessment we made in 2000, based on the surface collection. The Roman/Byzantine presence on the site is essentially "camping", or related to temporary use such as pastoralism, which probably occurred with some frequency from the time of the site's abandonment. The thin lens of ashy soil that comprises Locus 008 seems to be exemplary of this kind of behavior. Clearly, the architecture of the gate complex

dates to the EB III period, and was already in ruin by the Roman/Byzantine period.

2. *Entryway repair/rebuild,* represented by Locus 009. This field phase represents a repair or rebuilding of the entryway pavement, probably after it had become uneven due to a poor foundation. Artifacts recovered from Locus 008, immediately above Locus 009, indicate an EB III date.
3. *Construction of the gate and entryway*, represented by Loci 001, 002, 010 and 012. It is clear from the associated artifacts that the towers and gateway were constructed in the EB III period, and from stratigraphic relationships, prior to the Locus 009 repair to the entry pavement. Since the EB III period is over 400 years long, it is not possible to discern the length of time between Field Phases 2 and 3. However, enough seeds were recovered from the various loci that radiocarbon dates bracketing the construction of the tower and two pavement phases are possible, and initial results of radiocarbon dating are presented below.
4. *Pre-fortification deposition*, represented by Locus 004, found to underlay the south end of the north gate tower, which belongs to Field Phase 3.

Of the more than 500 sherds recovered from the gate tower and entryway, 471 were unspecified EBA, and 28 were judged to be EB III. Only one sherd was later than the EB III period — the Roman/Byzantine sherd found in the Locus 011 post-abandonment fill in the gateway. Thus, it is clear that the gate structure and entryway are to be dated to the EB III period. Most of the diagnostic forms were storage vessels, principally holemouth jars. This is consistent with the findings of the surface collection from the 2000 field season. Storage appears to have been an important function of the site as a whole, and the fortification clearly implies guarded storage.

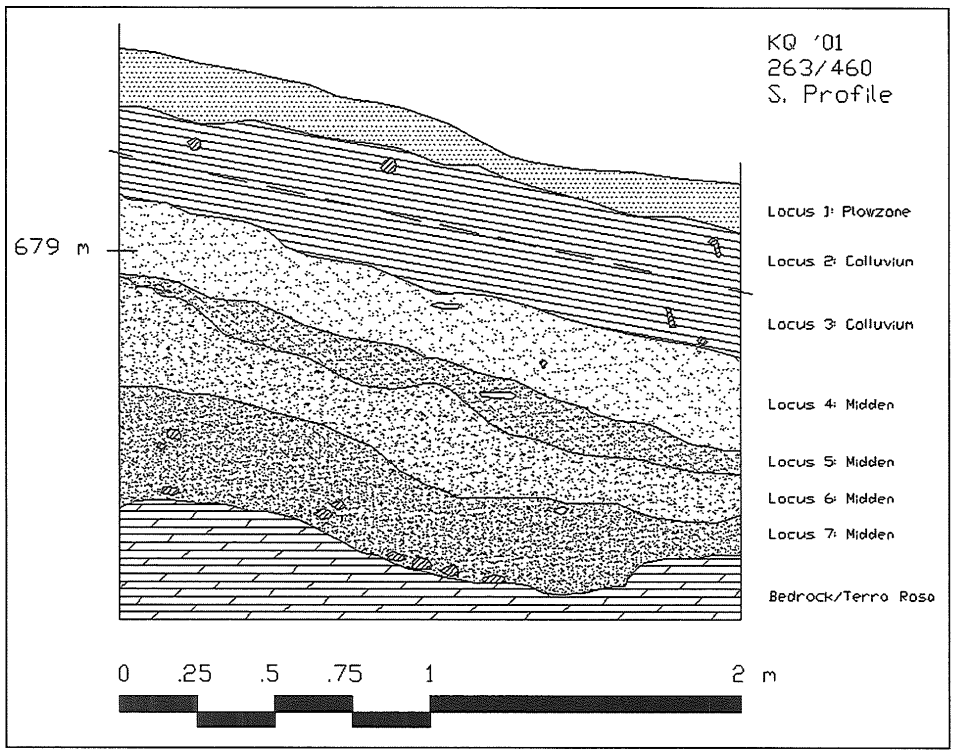
The construction of the north gate tower is remarkable because it is not founded on bedrock. It rests on the soil of Loci 004 and 005. This gives the impression that the fortification system was built quickly, perhaps in response to a perceived emergency or threat. The abundance of storage vessels indicated by the surface collection and excavation further suggest the accumulation of supplies in a secure, fortified site.

Unit 263/460

One of the primary goals of the 2001 field season at al-Qarn was to collect ceramics, lithics, bone and seeds in quantities sufficient to allow comparison with other collections from sites such as Tall Mādabā تل مـــادبا (Harrison and Savage 1997; Harrison *et al.* 2000), and Tall al-'Umayrī تل العـميري (Harrison 1997; 2000). Furthermore, one of the larger goals of the MARS project is to collect similar samples from other Early Bronze Age sites in the Mādabā Plain Site Cluster. Since extensive samples of this kind are not to be expected in public architectural spaces such as the gate tower and entryway, we turned to the midden at al-Qarn for these materials. Unit 263/460 is located on the western slope of the site, outside the fortification wall, but inside a lower series of terrace walls (see **Fig. 1**, above). The location for the midden excavation was chosen based on the results from the 2000 surface collection; the two-by-two meter test unit was placed in the southeast corner of one of the ten-by-ten meter surface collection units. The unit was chosen because it had an abundance of ceramic and lithic material in the surface collection (it was in the highest range collected for both sherds and lithics). Our expectations were fulfilled; we collected more than 4,000 sherds (217 diagnostics), 2,615 grams of bone, 15 grams of charcoal, 6,410 grams of lithic material, and 42 grams of seeds from the unit. In addition, we collected 21 soil samples for floatation, which will enable us to recover smaller seeds and plant pieces. Loci assigned in Unit 263/460 include the following:

Locus 000: Present Surface. The ground surface at the time the excavation began was designated as Locus 000. Ceramics and lithics were collected from it. Ceramics date to the EB III period, and include two diagnostic ledge handles and other rim sherds. The unit is located in the animal enclosure built about 80 years ago, and the site is used daily by flocks of sheep and goats. It was also clear that the slope (and parts of the top of the site) had been farmed during the previous winter. Obvious plow marks and the stubble left from a wheat crop were present on the surface.

Locus 001: Plowzone. Thus, the top level of the excavation was plow disturbed, and, therefore, mixed (**Fig. 5**). Plowing has been shown to drag artifacts for some distance, but it is clear that the plowing practiced on the slope at al-Qarn was shallow (Locus 001 was about 10-20cm deep), and was probably done with animal power, rather than a tractor (which would leave deeper plow scars). The soil in Locus 001 was a fine, silt/loam (loess), and brown in color (Munsell 10YR 5/3 dry). It was very loose, very dry, and full of gravel and small cobbles. Moreover, the constant grazing activity on the hillside have given the soil a distinctively organic con-



5. Unit 263/460, south profile.

tent. The locus was formed by wind deposition, downslope erosion, grazing, and subsequent plowing. It bottoms out on a clear interface that is harder and more compact than the Locus 001 material (this would correspond to the "hard pan" that forms below plow zones when they are repeatedly plowed to the same depth). Of the 184 sherds recovered from the plowzone, 8 were diagnostic of the EB III period.

Locus 002: Colluvium-Post Abandonment Deposition. Similar in composition to the Locus 001 material, Locus 002 was assigned when the bottom of the plowzone was reached. However, it is clear that the matrix of Locus 002 is of the same origin as that in Locus 001 (except that it has not been plowed). The soil in Locus 002 was a fine, brown (Munsell 10YR 5/3 dry) silt/loam (loess). It was full of gravel and small cobbles, but was considerably more firm than Locus 001. Of the 406 sherds recovered from Locus 002, 15 were temporally diagnostic. Periods represented include EB I, EB II/III, EB III, and Roman/Byzantine. It was clear from the nature of the deposition that this soil layer was the result of downslope erosion and wind-deposited loess, and that it represents post-abandonment soil accumulation. Thus, the single Roman/Byzantine sherd (the second of only two found in the 2001 season) confirms that the site had been abandoned by the Late Classical period, and the midden was already being covered by colluvial deposits. In addition to the ceramics, 75 grams of bone fragments were recovered; 515 grams of lithic debris were collected. The locus was terminated at an arbitrary level, after approximately 20cm of soil was excavated, in order to begin a new locus and isolate material in the upper part of the soil deposit from that in the lower part of the layer.

Locus 003: Colluvium-Post Abandonment Deposition. Locus 003 is a continuation of Locus 002. It is identical in color, texture, composition and origin. Eight diagnostic sherds were identified from the 458 recovered. They are all from the EB II/III and EB III periods. One hundred eighty-five grams of bone, 650 grams of lithic debris and 7 grams of seeds (mostly olive pits) were also collected. Locus 003 was terminated when the soil color changed to a darker grayish brown color, which indicated the beginning of the midden deposit in the unit.

Locus 004: Midden Level 1. Below Locus 003 we encountered the top of the midden deposit from the EBA occupation of the site. The matrix was dark grayish brown (Munsell 10YR 4/2 dry) silt loam. It was moderately firm and contained a low frequency of pebbles (2mm-6cm) and small cobbles (6-25cm). Its origin is random deposition associated with trash dumping activity on the site in the EBA. The matrix contained some pockets of softer, slightly more ashy soil, and some pockets almost the texture of mudbrick fragments. It thus represents mixed origins and multiple depositional episodes, which is consistent with true midden depos-

its. Fifty-three of the 907 sherds recovered were diagnostic of the EB I, EB II/III and EB III periods. Over 1,100 grams of bone fragments were collected, and identifiable parts come from sheep, goats, and small birds (see below). There was more than twice as much lithic debris in Locus 004 as in the previous locus (1,315 grams), plus ten grams of seeds (mostly olive pits).

Locus 005: Midden Level 2. Locus 005 represents a level in the midden that is slightly darker in color than Locus 004. The locus was uneven in thickness, from 1-20cm, and sloped from the northeast corner to the southwest. The soil texture is essentially the same as Locus 004; inclusions such as pebbles and small cobbles are similar as well. One ca. 20cm chunk of mudbrick was noted. The locus was terminated when a slightly more yellow soil was noted. Seven hundred thirty-three sherds were recovered; 41 were diagnostic of EB I, EB II, EB II/III and EB III. Of particular note was the presence of small amounts of a highly fired gray ware, which appears similar to Metallic Ware. These were exclusively body sherds, so no forms could be identified, but their presence may be a significant indicator of the EB II period, and suggests contacts between al-Qarn and locations further to the north and west. We also recovered 275 grams of bone, 5 grams of charcoal, 1,075 grams of lithic debris, and 10 grams of seeds from Locus 005.

Locus 006: Midden Level 3. Locus 006 was initiated when we noted a change in soil color and texture. Here, the soil matrix is dark brown (Munsell 10YR 4/3 dry), and was slightly moist, moderately crumbly, silty clay loam. There was a low frequency of pebbles (2mm-6cm). Like the midden levels above it, this locus was formed by random episodes of dumping, and contains abundant ceramics (904 total, 49 diagnostic of the EB I, EB II, EB II/III and EB III periods), 575 grams of bone (mostly sheep and goats, but some small birds and fish bones also), 1,235 grams of chipped stone debris and 10 grams of seeds (olive, grape, and charred wheat). The locus was terminated when bedrock was reached in the northeast corner of the unit, and the soil color changed.

Locus 007: Midden Level 4. The lowest level of the midden was a very dark gray brown (Munsell 10YR 3/2 dry) silty clay loam, situated over a bedrock step. The soil matrix was slightly moist due to its proximity to bedrock, loose, and very rubbly. It contained a high frequency of small cobbles (6-25cm), located primarily in pockets in the limestone bedrock. Because bedrock had been reached in the northeast part of the unit, the locus was approximately 2m by 1m, on the west side of the unit, instead of the usual two by two meters. It varied in thickness from about 8 to about 30cm, and clearly overlaid bedrock and *terra rosa* soil (which was deposited in cracks in the bedrock). A significant discovery was a single body sherd of burned, Red Burnished Ware on the bedrock near the west side of the unit, as well as several red "trickle painted" jar rims. We also recovered 440 grams of bone from sheep/goat, birds, and fish, 10 grams of charcoal, 615 grams of chipped stone debris and 5 grams of seeds (olive pits). The locus was terminated when bedrock or *terra rosa* soil was found across the floor of the unit.

Summary of Unit 263/460

The excavation in the midden at al-Qarn was a tremendous success. We recovered more than 4,000 sherds, and abundant quantities of bone, seeds, and lithic debris. These materials are exactly what we had hoped to find when we planned to open a unit in the midden, and will provide important comparative material for the site. The ceramics clearly indicate that the upper levels of the midden in this area were formed during the EB III period, and the lower levels during the EB I period. Significantly, there is no obvious gap in the occupation of the site, based on the midden formation. This suggests that the site was occupied from EB I through EB III. EB II is difficult to distinguish from EB III on the Mādabā Plain, because several of the temporal markers (such as true "Metallic Ware") that are indicative of EB II further north are not generally found as far south as the Mādabā Plain. However, the quantities of seeds and charcoal we recovered will allow us to date the site independently of the ceramic assemblage, and suggest continuous occupation from EB I to III (see below).

Radiocarbon Dates from al-Qarn

Thirteen samples were submitted for radiocarbon dating to the University of Arizona's AMS Radiocarbon Dating Facility. Twelve usable dates were received; **Table 3** lists each raw date and the individual calibrated date range(s) for one and two-sigma confidence intervals, using the OxCal Program, version 2.18 (Bronk-Ramsey 1995). The dates generally confirm the EB I to EB III occupation range for the site (**Table 4**, from Philip 2001: table 5.1).

The individual dates from the gateway strata are instructive by themselves, but can be a bit confus-

Table 3: Radiocarbon dates from al-Qarn.

Unit	Locus	Material	Sample #	Raw Date	1 Sigma Cal.[1]	2 Sigma Cal.[1]
385/475	002	Olive Pits	2001-001	4,054+-66	2840BC (0.08) 2810BC 2670BC (0.92) 2470BC	2880BC (1.00) 2460BC
385/475	004	Olive Pits	2001-003	4,061+-77	2860BC (0.14) 2810BC 2680BC (0.86) 2470BC	2900BC (1.00) 2350BC
385/475	004	Charcoal	2001-004	4,346+-61	3080BC (0.04) 3070BC 3030BC (0.96) 2890BC	3330BC (0.05) 3230BC 3120BC (0.95) 2870BC
385/475	007	Charcoal	2001-005	4,072+-40	2840BC (0.13) 2810BC 2670BC (0.69) 2560BC 2530BC (0.19) 2490BC	2860BC (0.15) 2810BC 2750BC (0.04) 2720BC 2700BC (0.81) 2470BC
385/475	007	Olive Pits	2001-006	4,001+-41	2570BC (1.00) 2460BC	2630BC (1.00) 2400BC
385/475	009	Olive Pits	2001-013	4,096+-78	2870BC (0.22) 2810BC 2760BC (0.71) 2560BC 2520BC (0.07) 2490BC	2880BC (1.00) 2470BC
263/460	004	Olive Pits	2001-007	4,600+-130	3520BC (0.66) 3260BC 3240BC (0.34) 3100BC	3650BC (1.00) 2900BC
263/460	005	Olive Pits	2001-008	4,079+-45	2860BC (0.19) 2810BC 2680BC (0.68) 2560BC 2520BC (0.13) 2490BC	2870BC (0.17) 2800BC 2780BC (0.83) 2470BC
263/450	005	Charcoal	2001-009	4,010+-68	2830BC (0.02) 2820BC 2660BC (0.03) 2650BC 2630BC (0.93) 2450BC 2420BC (0.02) 2400BC	2900BC (1.00) 2300BC
263/460	006	Olive Pits	2001-010	4,143+-61	2870BC (1.00) 2600BC	2890BC (0.99) 2570BC 2520BC (0.01) 2500BC
263/460	007	Olive Pits	2001-011	4,328+-51	3020BC (1.00) 2880BC	3100BC (1.00) 2870BC
263/460	007	Charcoal	2001-012	3,970+-51	2580BC (0.96) 2400BC 2370BC (0.04) 2350BC	2620BC (1.00) 2300BC

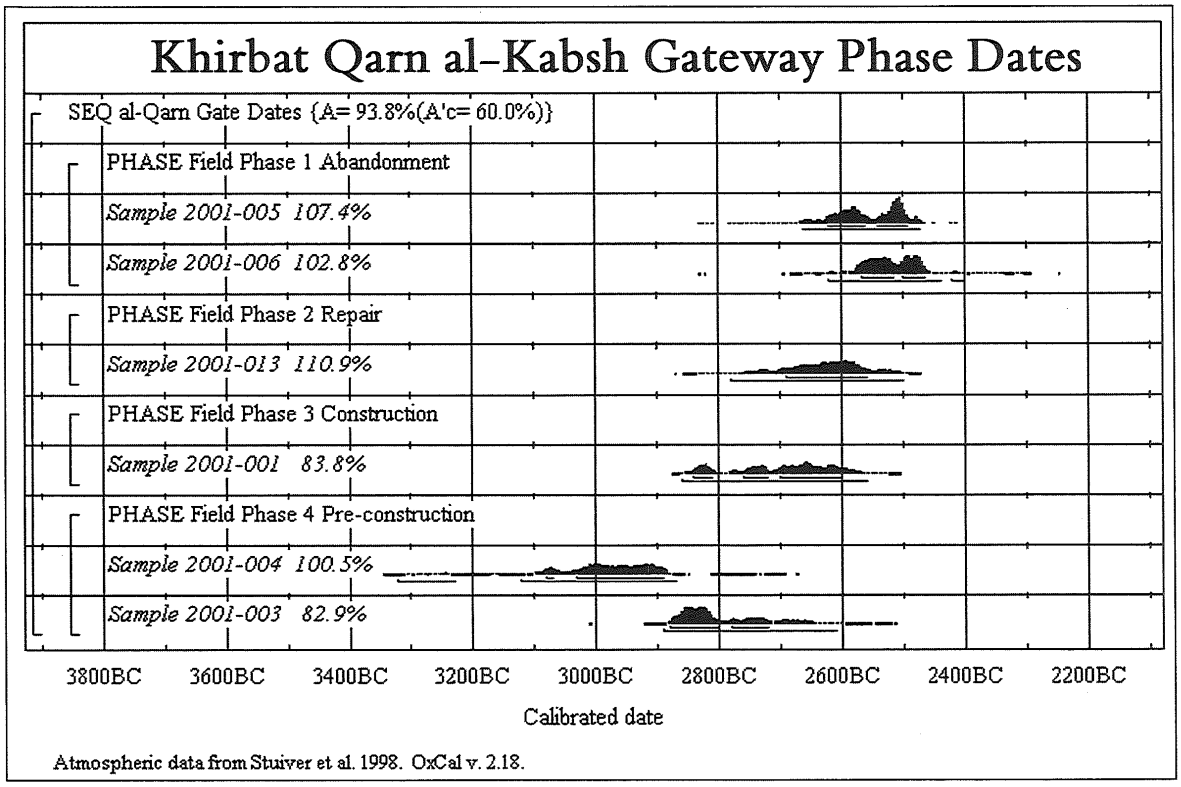
[1] Individual dates calibrated with the OxCal Program. The Bayesian post-probability estimate for each individual date's possible range is given in parentheses.

Table 4: Radiocarbon chronology of the Early Bronze I-III periods.

Period	Absolute Dates BC
Early EB I	3600/3400 to 3300
Late EB I	3400/3300 to 3100/3000
EB II	3100/3000 to 2850/2750
EB III	2850/2750 to 2400/2300
Dates from Philip 2001:Table 5.1.	

ing, because of the clear overlapping between them. Combining the dates with their stratigraphic and phase information yields a better sense of the likely chronological relationships between the four observed field phases. The OxCal Program allows sequences of phases and dates to be created, then calibrates the dates, and performs a Gibbs Sampling algorithm on the dates, as they are constrained by the sequence and phases. The program calculates the agreement between Bayesian post- and prior probabilities for individual dates and the overall sequence (Bronk-Ramsey 1995). The overall agreement for the six dates related to the gateway, A, was 93.8 %. The threshold value for determining good agreement for the sequence is approximately 60% (Bronk-Ramsey 1995), so there is good agreement between the dates (**Fig. 6**).

These results indicate that the gate complex was built on Field Phase 4 deposits that probably date from the late EB I through the EB II periods (**Fig. 6**: Sample 2001-004 and Sample 2001-003, respectively). Sample 2001-004, with a date in the late EB I to early EB II, has an agreement index greater than 100%, indicating that the date fits well with the stratigraphic sequence. Sample 2001-003, is later, dating within the EB II, and probably falling between 2900 and 2800 BC; this sample's agreement index is 82.9%, less than the earlier sample from Locus 004, but still well above the agreement threshold of 60%. The dates from Locus 004 in Unit 385/475 are significant for three reasons: 1) they indicate that al-Qarn was probably occupied throughout the EB II period, as well as in the EB I and EB III, which had been indicated by the ceramic evidence; 2) they show that the early occupation of the site was more extensive then previously appreciated, being found now on the east side of the site as



6. Khirbat Qarn al-Kabsh gateway radiocarbon phase dates, based on constrained sequence and field phases.

well as at the base of the midden on the west side; 3) they indicate that EB I and EB II deposits are to be found under EB III strata, which holds out great prospects for discovering an entire stratified EB I–III sequence in the area of the site where extensive EB III walls are present at the surface (**Fig. 3**).

The Field Phase 3 deposit, discussed above with Unit 385/475, is dated on olive pits recovered from the fill of the north gate tower. Taking the stratigraphic and phase information into account, the most likely date for the construction of the gate complex is early EB III (**Fig. 6**: Sample 2001-001), which confirms the estimation made in the field, based on ceramics and stratigraphy. Sample 2001-001 has an agreement index of 83.8%, well above the 60% agreement threshold. Within this period, construction of the gate tower (and very shortly thereafter, the first entry pavement) most likely occurred around 2650 BC, or slightly earlier.

It does not appear that much time elapsed before the repair of the pavement was made, which is assigned to Field Phase 2 at the gate complex. A date on olive pits found on the Locus 009 repaired surface, combined with phase and stratigraphic information (**Fig. 6**: Sample 2001-013), suggests the repairs occurred sometime around 2600 BC. This sample's agreement index was 110.9%, which achieved the highest agreement of any of the samples from the gate complex. These results are quite satisfying, since the date on the final gateway surface is probably the most critical of the sequence.

Two samples, one on charcoal (Sample 2001-005) and one on olive pits (Sample 2001-006) were recovered from the Locus 007 material, which represents post-abandonment colluvium that covered the gateway pavements in Field Phase I. Both dates have agreement indices greater then 100%, and together, they suggest that the gate complex was abandoned by about 2500 BC (**Fig. 6**: Samples 2001-005 and 2001-006).

Taking all the dates from the gate complex into consideration with their stratigraphic and field phasing, it seems that the gate complex was probably in use for about 150 years, from its construction around 2650 BC to its abandonment around 2500 BC. These dates place the gate complex (and probably the rest of the fortifications, firmly in the middle of the EB III period (see **Table 4**). At this point in our research, we do not know firmly if the site continued to be occupied after the gate complex was abandoned, but some dates from the midden (Unit 263/460) suggest that it was.

Six dates were run from materials recovered in the midden excavation, Unit 263/460 (**Table 3**). The dates range from EB I through EB III, but are mixed stratigraphically. The mixing is typical of middens, which are a mixture of individual deposition episodes, as well as ongoing downslope ero-

sion and other disturbances during the formation of the midden. Thus, while it would be desirable to find only early dates in the lower levels of the midden, and later ones in the upper levels, it is not unusual to see mixing.

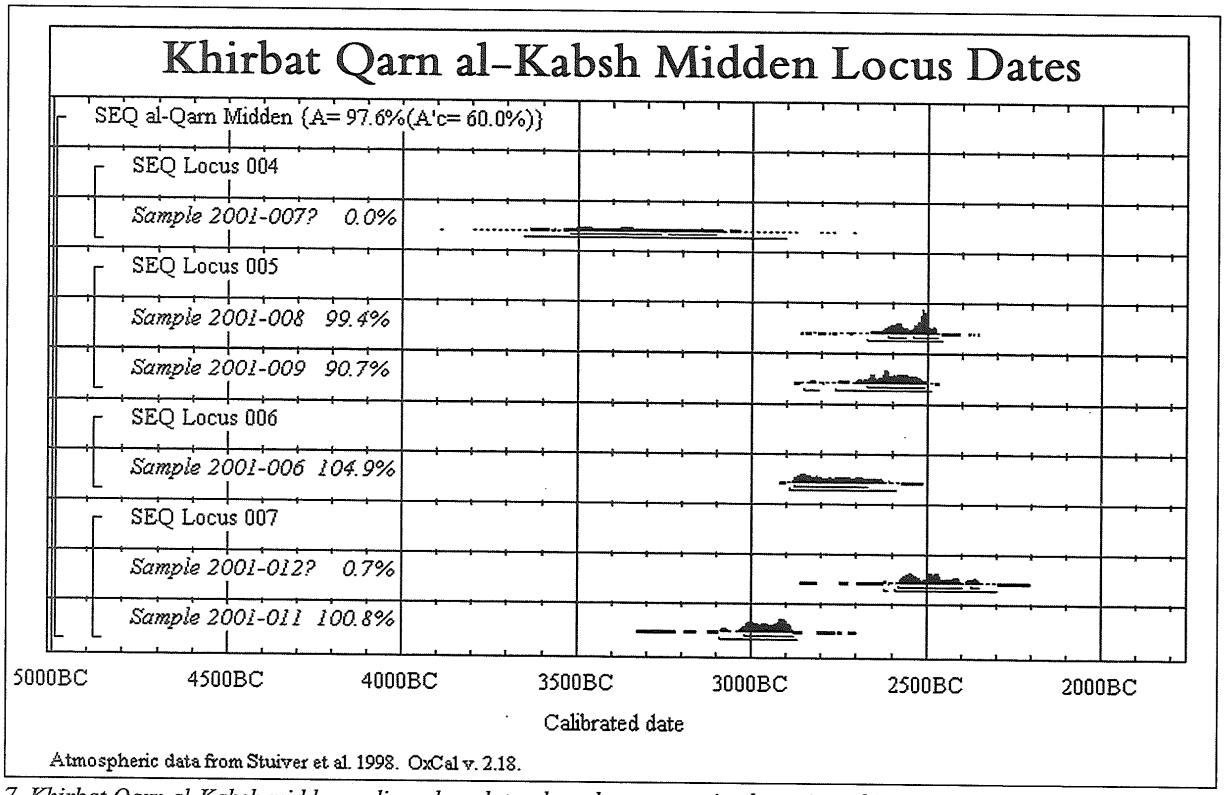
The dates clearly show that the midden began to form at al-Qarn by the EB I period (perhaps as early as 3650 BC, based on the two-sigma calibrated date from Locus 004, Sample 2001-007), and continued to develop until as late as 2300 BC (based on the two-sigma date from Locus 007, Sample 2001-012). These dates indicate that al-Qarn was occupied probably from early EB I through late EB III (**Table 4**).

However, Samples 2001-007 and 2001-012 are clearly out of stratigraphic position. Sample 2001-007, the oldest sample date returned, is in the upper strata of the midden (Locus 004), while Sample 2001-012, the youngest recovered, is in the lowest level of the midden (Locus 007). These samples are clearly the result of mixing in the midden, perhaps due to episodic deposition, downslope erosion, and rodent disturbances. As such, they do not contribute to the overall dating of the midden layers, though they do clearly indicate that the site was in use during these earlier and later years.

The overall dating of the midden (**Fig. 7**) can be accomplished once again using the OxCal Program, including the sequences of dates as assigned to their various loci. For this calculation, a question mark after Samples 2001-007 and 2001-012 tells the program to not use these dates in calculating the sequence, but will give the probability that the date occupies this position in the sequence. The results show that these dates have virtually no chance of being in sequence. Beyond clearly excluding these samples, OxCal shows that the overall agreement for the rest of the midden samples is 97.6%. We can say with considerable confidence that Locus 007 dates to late EB I through early EB II (which makes it contemporary with Field A at Tall Mādabā). Locus 006 dates to the EB II period, and Locus 5 to the EB III period. Comparing **Figs. 6 and 7**, we can see that the construction and repair of the gateway complex overlaps the deposits in Locus 006 and Locus 005 in the midden, and that midden Locus 005 may have continued to be in use beyond the abandonment of the gateway. Although Sample 2001-012 is clearly out of place in the midden developmental sequence, it may help corroborate the use of the site beyond the abandonment of the gateway.

Faunal Remains from al-Qarn

The 2001 faunal collection from al-Qarn consists of 692 bones, teeth, and fragments. Within this assemblage are 122 identifiable bones, teeth, and fragments and 570 fragments that are too small to be identified as to species and bone element. The faunal material was sorted initially to



7. Khirbat Qarn al-Kabsh midden radiocarbon dates, based on constrained stratigraphic sequence.

divide identifiable from non-identifiable fragments. Within the identifiable sample, bones of the left and right side were separated. Age-at-death was determined for the bones using Silver (1969). Sheep bones were distinguished from goat bones using criteria established by Boessneck, Muller and Teichert (1964) and Boessneck (1969). The collection totals, listed by field specimen (FS), are presented in **Table 5.** Most of the faunal specimens (638) were recovered from Unit 263/460.

Species Present

Eighty-one bones are clearly identifiable as to species and element. Of this total, 66 of the bones represent sheep (*Ovis aries*) or goats (*Capra hircus*). Within the sheep/goat collection, 13 bones are from sheep, and two are from goats. The MNI, based on the sample of distal humerii, is 5, although more individuals may have been used at the site. Several specimens within the sheep/goat collection demonstrated features relevant for both sheep and goats, and so could not be confidently classified as one or the other. Seven bones and teeth represent cattle (*Bos taurus*). Five bones represent small mammals, the precise identification of which is in progress. Final identification is also in progress for the two bird bones, and the lizard mandible.

The ancient human community whose activities these bones represent husbanded a mixed flock of sheep and goats, supplemented by cattle. Members of the community may have also occasionally hunted gazelle. While none of the clearly identifiable bones represent gazelle, the animals were not uncommon in the area (Atallah 1977/8) and most smashed gazelle bone fragments are nearly indistinguishable from those of sheep and goats. Therefore, the possibility that some of the bone fragments, such as broken vertebrae and ribs, may represent gazelle is suggested. The precipitation limitations of the al-Qarn area may explain the absence of pig bones in the collection.

Carcass Distribution

The carcass distribution pattern (see **Table 6**) at al-Qarn illustrates a pattern of primary butchering. The presence of bones with low meat utility is characteristic of communities which generally are consuming meat from animals culled from within the community's flock. The distribution pattern also reflects preservation factors. The faunal elements that tend to occur in greatest numbers in archaeological sites are early-to-fuse specimens as well as elements that are durable. The early fusing specimens include phalanges, proximal metapodials, distal humerii, and proximal radii. Durable elements include teeth and ankle bones, such as astragali. Phalanges did not present cut marks, which can be an indicator of skinning activities. The asterisk marking vertebrae and rib fragment categories in **Table 4** indicates that some of these fragments may belong to gazelle.

Slaughter Schedule

The slaughter schedule can be assessed from data presented in **Table 7**, which lists mature and immature ovi-caprid bones. The bones listed belong to midden loci 003-007. The bone fusion

Table 5: *Faunal assemblage totals.*

FS	Unit	Locus	Number
235	385/475	002	5
239	385/475	002	11
244	385/475	003	12
249	385/475	002	12
255	385/475	004	13
268	385/475	007	1
279	263/460	001	8
284	385/475	008	3
287	263/460	002	11
291	263/460	002	26
297	263/460	003	49
305	263/460	003	25
320	263/460	004	86
324	263/460	005	94
333	263/460	006	71
338	263/460	006	71
342	263/460	007	127
356	385/475	011	3

Table 6: *Small ungulate bones, teeth, and bone fragments.*

Element	Number
Skull	1
Jaw & Teeth	11
Vertebrae*	16
Rib*	30
Scapula	3
Humerus	9
Radius	4
Ulna	3
Metapodial	6
Innominate	3
Femur	1
Tibia	3
Ankle	4
Phalanges	16

Table 7: Fused and unfused small ungulate bones.

Fusion age	Element	007 U	007 F	006 U	006 F	005 U	005 F	004 U	004 F	003 U
6-8 mo.	Scapula								1	
6-10	Innominate				2			1		
10	Distal Humerus		2	2	2	1				
13-16	Phalange 1			1	1	2		1	1	
13-16	Phalange 2			3						1
13-16	Distal Tibia			1						
20-28	Distal Metatapodial	1								
30	Proximal Ulna		1			1				
30-36	Calcaneus			2						
30-36	Proximal Femur				1					
36	Distal Radius	1								
36-42	Proximal Humerus		1				1			
		2	4	9	6	4	1	2	2	1

timetable is based on Silver (1969). Each column represents the midden locus (003, 004, 005, 006, or 007) and whether the bone was mature (fused=F) or immature (unfused=U). While most of the bones are from Locus 006, the general pattern for midden loci 003-007 is that animals were usually slaughtered within the first two years. A small number of bones represent animals over two years. Mature bones that fuse after age three are not present. The sample of teeth in the collection is quite small and does not permit design of a slaughter schedule based on tooth wear. However, there is one M3 in the collection which can be aged at 3+ years. In general, the slaughter pattern suggests a cull skewed toward young animals. This pattern very likely reflects a goal to obtain meat and milk (Payne 1973). Certainly, the absence of fused specimens over three years points away from a strategy of keeping older animals for wool.

Botanical Remains from al-Qarn

Most of the seeds recovered from screening are olive pits, with a few grape seeds and some charred wheat. Flotation of the soil samples taken from each locus will probably provide additional data on plant species. These initial observations are consistent with the location of al-Qarn and appear to be precursors of the current agricultural economy of the region. In the present, wheat is grown on the flatter areas where there is sufficient soil formation; olive trees and grapevines are currently grown in areas where bedrock steps dominate the landscape. Often, such steps have natural pockets between fractures in the bedrock, which are frequently filled with soil, and have been planted with olive trees or grapes. Thus, EBA al-Qarn appears to have established a pattern that continues to resonate to the present day.

Conclusions

Although brief, and staffed by a small crew, the 2001 field season of the Moab Archaeological Resource Survey was completely successful. At al-Qarn we were able to conclusively demonstrate that the gate complex on the northeast side of the site was built in the EB III period on soil deposition dating from the late EB I and EB II periods. The gateway has two architectural phases, represented first by the gate towers and a flagstone entryway, and second by a repair/rebuild of the entry pavement using small cobbles framed with larger stones. The upper surface was sealed by more than 50cm of post-depositional fill, which contained EB III material and a single Roman/Byzantine sherd. Thus, it was clear that the site had been abandoned, and was being filled with wind deposited soil and collapse by the Late Classical period (and probably since the end of the EB III period). We were able to recover a number of seeds and charcoal samples from the various loci associated with the gate tower and entryway, which have been used in conjunction with the ceramic and stratigraphic evidence to provide a fine-grained chronology for the fortification system.

The excavations in the midden uncovered significant amounts of ceramics, lithic debris, bone, and seeds; radiocarbon dates from the midden, while somewhat mixed due to the nature of midden formation processes, nevertheless indicate that al-Qarn was occupied from early EB I through late EB III, perhaps after the gateway complex had been abandoned.

Faunal remains, mostly from the midden excavation, show that residents of al-Qarn relied mostly

on sheep and goats, with some evidence of cattle and possibly gazelle. The carcass distribution suggests that the animals were culled from the community's flock, mostly within the first two years. A few small bird bones were also recovered. These faunal remains will be comparable to materials collected from other EBA sites on the Mādabā Plain, to help establish the nature of production and exchange among the EBA sites in the Mādabā Plain Site Cluster. As this evidence accumulates through additional survey and testing of other parts of the project area, we will, in the future, be able to determine how various sites in the cluster are related to each other and to the local economy in the Early Bronze Age.

The Early Bronze Age represents the first in a series of cycles of settlement development and decline, and established patterns of social organization, land use, construction and environmental utilization that resonate even to the present day. As Philip (2001: 202) has stressed, "From the later fourth millennium BC onwards, the inhabitants of Jordan would have moved within a landscape much of which originated in the Early Bronze Age". Thus, continued exploration of EBA settlement, subsistence, and social relations should be one of our primary concerns. The site of Khirbat Qarn al-Kabsh presents an excellent opportunity to explore these factors as they were articulated at a small, agricultural village, which formed part of a larger group of communities on the southwestern part of the Mādabā Plain.

S.H. Savage
Department of Anthropology
Box 82402
Arizona State University
Tempe, AZ 85287-2402
USA

M.C. Metzger
Department of Humanities and Social Sciences
331 Cullimore
New Jersey Institute of Technology
University Heights
Newark, NJ 07102
USA

References Cited

Atallah, S.I.
1977/8 Mammals of the Eastern Mediterranean Region; their Ecology, Systematics and Zoogeographical Relationships. *Saugetierkundlichen Mitteilungen* 25: 241-320; 26: 1-50.

Boessneck, J.
1969 Osteological Differences Between Sheep (*Ovis aries* Linne) and Goat (*Capra hircus* Linne). In D.R. Brothwell and E.S. Higgs (eds.), *Science and Archaeology*. New York: Praeger.

Boessneck, J., Muller, H.-H. and Tiechert, M.
1964 Osteologisch Unterscheidungsmerkmale zwischen Schaf und Ziege. *Kuhn-Archiv* 78: 1-129.

Bronk-Ramsey, C.
1995 *OxCal User's Manual, Version 2.18*. Oxford: Oxford Radiocarbon Accelerator Unit.

Crumley, C.
1995 Heterarchy and the Analysis of Complex Societies. Pp. 1-6 in R. Ehrenreich, C. Crumley and J. Levy (eds.), *Heterarchy and the Analysis of Complex Societies*. Archaeological Papers of the American Anthropological Association Number 6. Arlington, Virginia.

Harrison, T.P.
1997 Shifting Patterns of Settlement in the Highlands of Central Jordan during the Early Bronze Age. *BASOR* 306: 1-37.
2000 The Early Bronze III Ceramic Horizon for Highland Central Jordan. Pp. 347-364 in G. Philip and D. Baird (eds.), *Ceramics and Change in the Early Bronze Age of the Southern Levant.* Sheffield: Sheffield Academic Press.

Harrison, T.P. and Savage, S.H.
1997 The 1996 Field Season at Tell Madaba. *AJA* 101(3): 508-510.

Harrison, T.P., Hesse, B., Savage, S.H. and Schnurrenberger, D.
2000 Urban Life in the Highlands of Central Jordan: A Preliminary Report of the 1996 Tall Madaba Excavations. *ADAJ* 44: 211-229.

Payne, S.
1973 Kill-off Patterns in Sheep and Goats: The Mandibles from Asvan Kale. *Anatolian Studies* 22: 281-303.

Philip, G.
2001 The Early Bronze I-III Ages. Pp. 163-232 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press.

Savage, S.H.
2001 The Moab Archaeological Resource Survey – 2000 Season. *AJA* 105(3): 431-433.

Savage, S.H. and Rollefson, G.O.
2001 The Moab Archaeological Resource Survey: Some Results from the 2000 Field Season. *ADAJ* 45: 217-236.

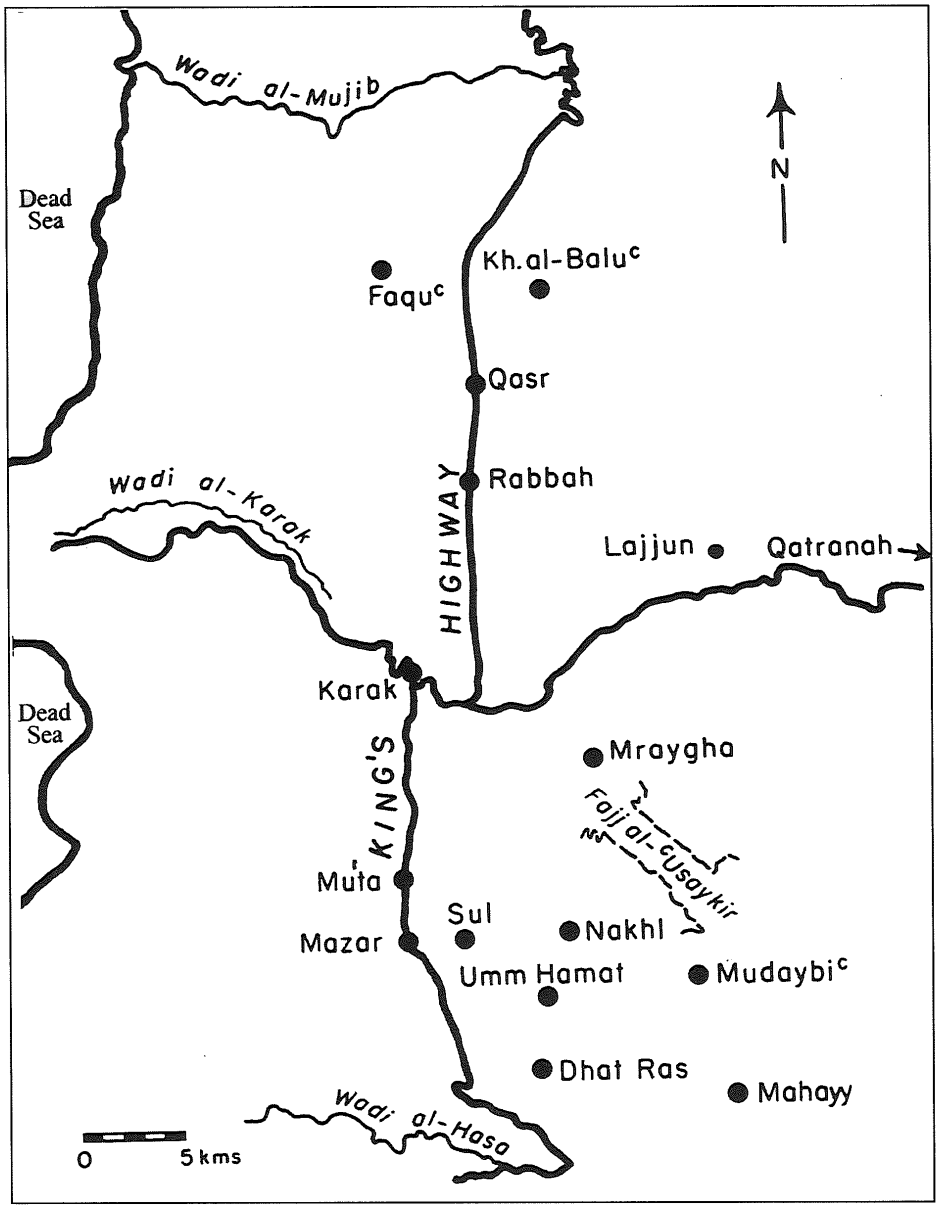
Silver, I.A.
1969 The Aging of Domestic Animals. In D.R. Brothwell and E.S. Higgs (eds.), *Science in Archaeology*. New York: Praeger.

THE KARAK RESOURCES PROJECT 1999: EXCAVATIONS AT KHIRBAT AL-MUḌAYBI‘

Stephen J. Andrews, David R. Berge, John I. Lawlor and Gerald L. Mattingly

Introduction

A third field season of the Karak Resources Project (KRP), the second season of excavation at Khirbat al-Muḍaybi‘ (خربة المضيبع) **(Fig. 1)**, was held from June 25 to July 27, 1999. A total of 43 staff members, representing 24 institutions, participated in the project. The project's purpose is to document ways in which occupants of the Karak plateau have utilized natural resources, including site locations and local and long-distance trade. In addition to the continued work of KRP's regional archaeological survey team, a geological survey team and a National Geographic Society-funded ethnographic team, three fields of excavation were operated at Khirbat al-Muḍaybi‘ — KRP's case study in resource utilization. Various aspects of the project's research are featured on the "Virtual Karak Resources Project" website, www.vkrp.org.



1. Map of the al-Karak plateau, with Khirbat al-Muḍaybi‘ in the south-eastern region.

Work in Fields A (north side) and B (east side) continued from 1997; a new, two-square field, Field C, was opened in the site's southeastern quadrant (**Fig. 2**). The following report considers the history of use/construction (i.e., phases) in each of the three fields.

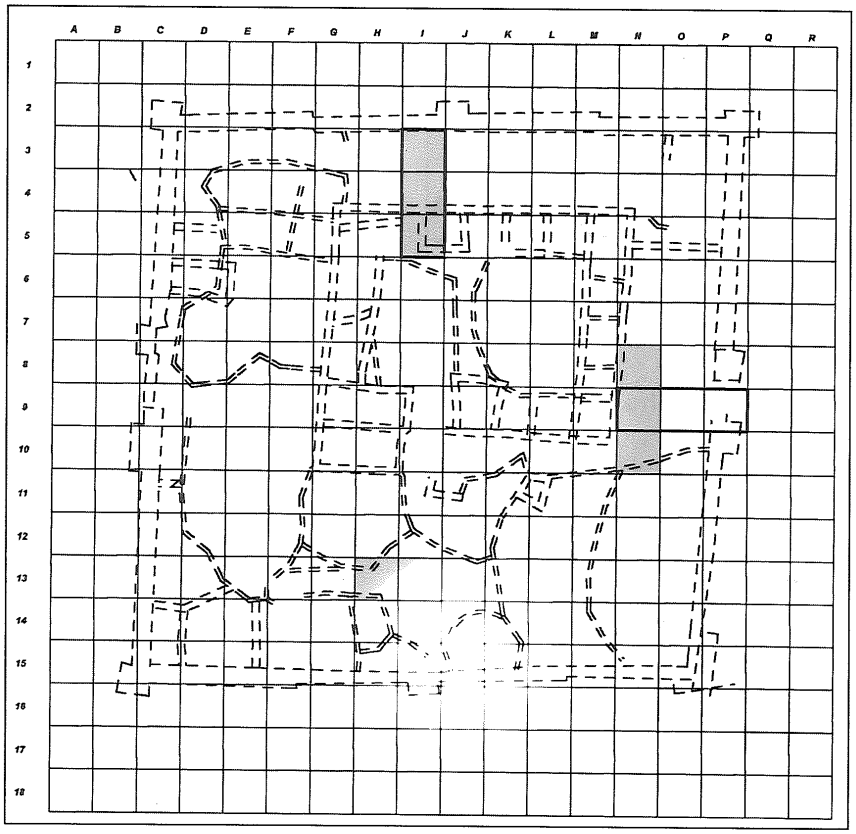
Field A: The North Side (John I. Lawlor)

Five field phases were reported for Field A in 1997, ranging from Byzantine (AD 325-640) to Modern (1918-present) (Mattingly *et al.* 1999). Expanded field phasing for Field A is based on the results of the 1999 season. Some revisions of the Byzantine and Islamic loci/ phase association also seem appropriate, based on continued excavation and observation. The expanded and revised field phasing is reported here in the sequence in which the phases were historically developed.

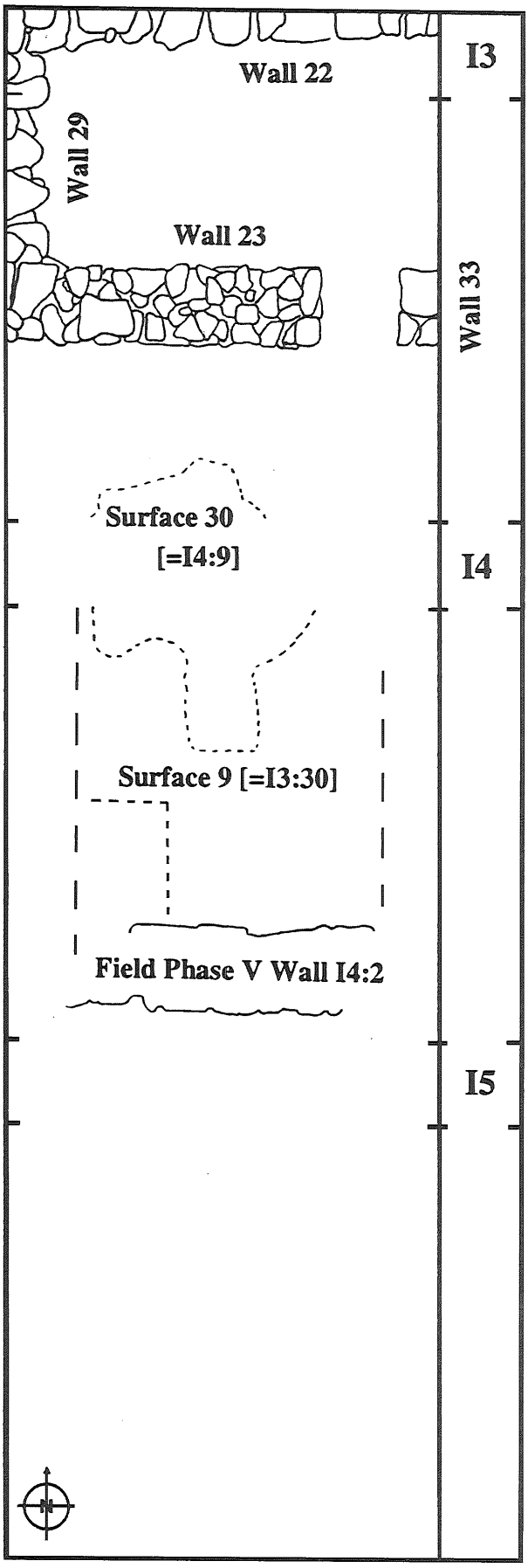
Field Phase IX (Iron II: ca. 925-586 BC) **(Fig. 3)**

Evidence supporting four Iron Age II phases in Field A was clear. Sterile soil (Earth Layer 13), directly beneath Field Phase IX I4 Surface 9, was encountered in a 1 x 1.5m probe in the southwest quadrant of Square I4. The very hard, dry earth in this probe was "strong brown" (7.5YR 5/6; dry: "pink" 7.5YR 7/4) in color and contained no pottery; KRP's soil scientist identified this as the "B horizon" soil. Protruding through this earth layer was large boulder-size basalt rock, believed to be bedrock **(Fig. 4)**. The excavation of Square I3's north balk provided access to the south face of Wall 22 — the site's exterior wall. This east-west (76°) oriented wall extended 0.3-0.5m into Square I3's domain, based on the official site grid, and became the square's north balk **(Figs. 2, 3)**. Although the founding level of the wall was not reached, the upper 3-4 courses of the wall's south face were exposed. Constructed mostly of basalt, its individual components were chiefly medium-to-large boulders. Wall 22's south face extended along the entire 5m of the square's north balk **(Fig. 3)**. This wall is visually traceable from Square I3 both west and east to points where it bonds with corner towers; from these northwest and northeast towers, walls extend southward, continuing the west and east perimeter walls of the site **(Fig. 2)**.

Approximately 2.5m south of Wall 22, Wall 23, another east-west (76°) oriented wall was founded parallel with Wall 22. Wall 23 extended eastward out of the west balk for 3.6m. This boulder-and-chink wall was 2-3 rows wide (0.85-1m) and was excavated to a depth of 0.72-1.27m (4-5 courses). East of Wall 23's east end, and aligned with it, was a wall stub protruding 0.5m westward out of the square's east balk. Identified as Wall 33, it was 0.9m wide (2 rows) and was excavated to a depth of 0.48-0.59m (4 courses). The west end of Wall



2. Survey grid of Muḍaybi' that illustrates Field A on the north side of the site (Squares I3, I4, and I5), Field B on the east (Squares N8, N9, and N10), and Field C on the south (Squares H13 and I13).



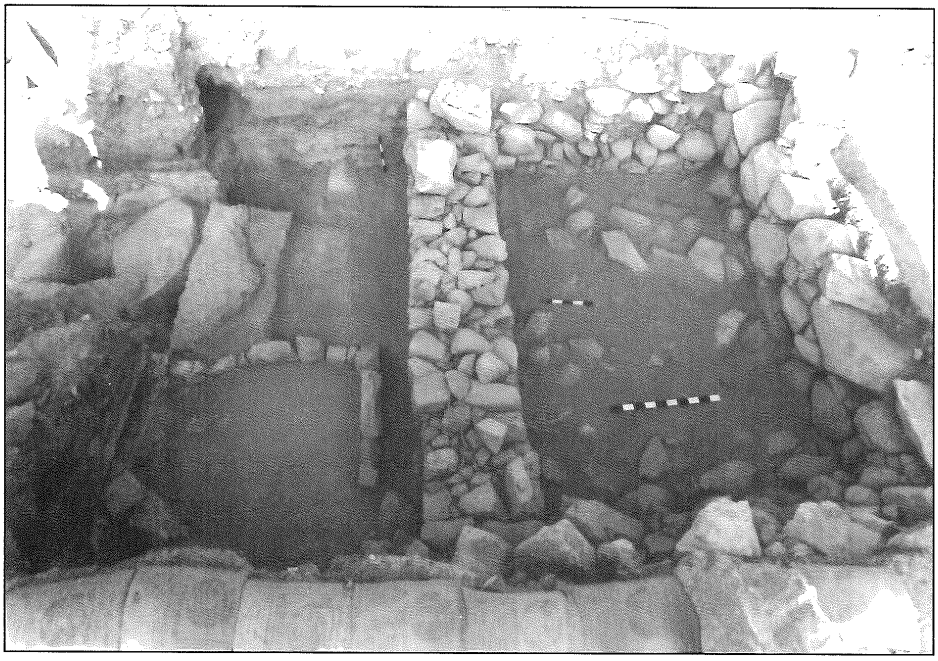
3. Plan of Field A's Field Phase IX.



4. Photo of Square I4 probe into sterile soil, with basalt boulders protruding from bedrock; view to the south.

33 stopped 0.9m short of the east end of Wall 23, thus creating a doorway in this wall line. At 0.4m inside I3's west balk, Wall 23 bonded with north-south (350°) Wall 29 which extended 2.5m north — as far as the south face of Wall 22. The precise nature of the relationship of Wall 29 to Wall 22 (i.e., bonding versus abutting) was unclear. Thus, it could not finally be determined if the construction of Walls 23, 33, and 29 was contemporary with the construction of the site's perimeter wall. The plan and alignment of Walls 22, 23, 29 and 33, however, indicated that these architectural features created a room with a 0.9m wide entrance on the room's south side (**Fig. 3**). Wall 29 demarcated the western end of the room, the exposed dimensions of which were 4.5m (east-west) x 2.5+m (north-south) (**Fig. 5**). Further excavation in the northern half of Square I3 is required to answer the critical question of Wall 29's precise relationship to Wall 22. Excavation in Square J3 will, perhaps, further clarify the plan, nature and purpose of this Iron II room (**Fig. 2**).

To the south in Square I4, Surface 9 (=I3:30) was situated directly above sterile soil (B horizon, as in I4:13) (**Fig. 6**). Surface 9 (=I3:30), exposed over an area 3.55m (east-west) x 4.80m (north-



5. Photo of Iron II room in Square I3 (on the right = north); view to the west.



6. Photo of Field Phase IX Surface I4:9 (in foreground); view to the north.

south), was a hard, compact beaten earth surface which appeared to extend north into Square I3 where it was interrupted by later Iron II activity. Pottery associated with Surface 9 was Iron II. Field Phase V Wall 2A in Square I4 was founded directly on top of Surface 9 (**Fig. 7**).

Field Phase VIII (Iron II: ca. 925-586 BC) (Shaded Pits in **Fig. 8**)

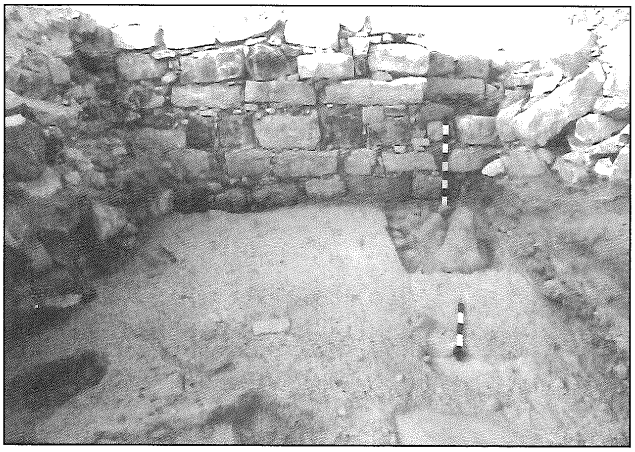
Field Phase VIII was characterized by a series of pits, which are shaded in **Fig. 8**. Pits 14, 16, and 18, located in the northern half of Square I4, were dug from Surface I4:9; they were dug through Surface 9, through sterile soil (I4:13) and around bedrock (**Fig. 9**). The purpose of these pits was undetermined. The earth layers in the pits (Earth Layer 15 in Pit 14, Earth Layer 17 in Pit 16, and Earth Layer 19 in Pit 18) were distinct from the sterile soil of Field Phase IX and contained only Iron II pottery; Earth Layer 19 yielded no pottery.

Field Phase VII (Iron II: ca. 925-586 BC) (**Fig. 8**)

Field Phase VII was, in part, represented by the blocking of the doorway in the south wall of the Field Phase VIII room-Blockage Wall 32 (**Fig. 10**). The dimensions, orientation (76°) and alignment of this blockage clearly indicated that while the intent was to close the doorway of the Field Phase VIII room, the preservation of the wall line was also intentional. A series of ephemeral bin walls (I3:24, 35, 37), located in the southeast quadrant of Square I3, was constructed subsequent to the blocking of the Field Phase IX wall (**Fig. 8**). The purpose of these bin walls was undetermined. Evidence of Field Phase VIII appeared to be limited to Square I3. Earth Layer I3:34, a 0.20-0.44m deep layer of light, yellowish brown (10YR 6/4) earth, seems to have been the "transitional" earth layer between Field Phase VII and Field Phase VI above. Its matrix included characteristic features of Field Phase VI, while its deposition covered the series of bin walls.

Field Phase VI (Iron II: ca. 925-586 BC) (**Fig. 11**)

Extensive evidence of furnacing activity distinguished Field Phase VI. Slag from the furnacing operation was spread over the entire southern half of the Square I3, south of Walls 23, 33 and Blockage 32. Ash Layer I3:25, which was 0.16-0.23m deep and covered an area 2 x 2m in the southeast corner of the square, appears to represent the location of this furnacing activity on the site's north

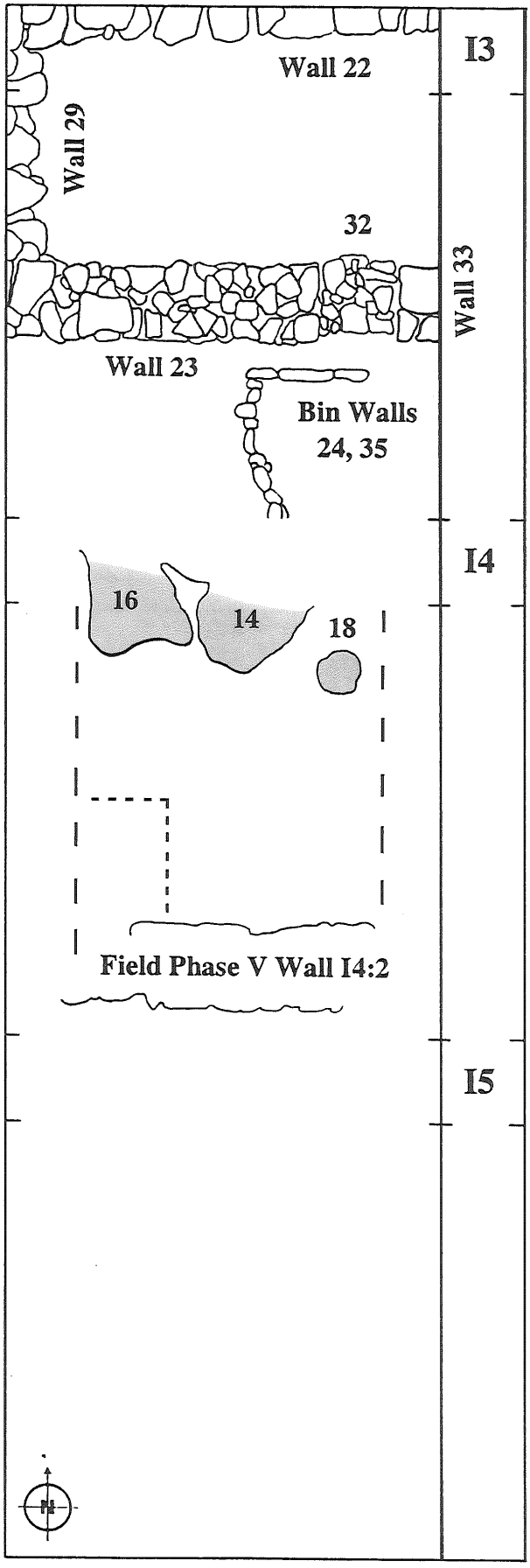


7. Photo of Field Phase V Wall 4:2A, which sits directly on top of Field Phase VIII Surface I4:9; view to the south.

side. Earth Layers I3:27 and 28, located in the southwest quadrant of Square I3, were fill layers associated with this furnacing activity and contained large amounts of slag. Traces of this furnacing activity, including slag, extended 2.5m south into Square I4, where it was situated above Field Phase IX, VIII, and VII Surface I4:9 (=I3:30). Field C also yielded some slag, although not in a quantity equal to that of Field A.

Initial tests of the slag from Squares I3 and I4 in Field A, as well as Field C slag, indicate that the slag was, most likely, the by-product of the burning of limestone, probably for plaster production. Some obvious questions emerge from this information. For what purposes was plaster manufactured at Muḍaybi'? What was the source of this limestone? While much of the gate architecture in Field B was constructed of fossiliferous limestone, it appears to have been brought to the site from several kilometers to the northwest in al-Fajj (الفج). A "bench" located immediately east of the main gate was plastered; might this represent at least one use of such plaster at the site? Can it be shown that the plaster used on the bench was manufactured at the site? No other evidence of the use of plaster at Khirbat al-Muḍaybi' has yet been encountered. Does the presence of this furnacing activity on the north side of Muḍaybi' relate to the characteristic daily northwest-to-southeast wind pattern of the area?

This latest Iron II phase also appears to have been represented in Square I5, the southernmost square in Field A. Surface 21, located in the northeast corner of Square I5 was isolated, but not excavated. The exposed area of this isolated segment of Surface 21 was 0.90m (east-west) x 1m (north-south) and was situated about 0.70m south of the south face of I4's Wall 2. Earth Layer 22, situated north of Surface 21, sealed against the south face of I4's Wall 2; a 0.40m deep probe (0.90 x 0.80m)



8. Plan of Field A's Field Phases VIII and VII.



9. Photo of Pits 14, 16, and 18 in Square I4 (below = west of the sandbagged balk); view to the east.



10. Photo of Square I3's blocked doorway (32) in Walls 23 and 33 (left = west of scale stick); view to the north.

yielded only Iron II ceramics. I5:21's level was 985.63, while Field Phase IX I4:9's level in the square's southeast corner was 985.47. No definitive stratigraphic connections between this surface and earth layer in Square I5 and Field Phases VII or VI remains, north of I4's Wall 2, were established. Given the limited area of access and exposure in Square I5, excavation in Square J5 may be necessary in order to integrate Earth Layer I5:22 and Surface I5:21 with the Iron II phasing sequence north of Wall I4:2.

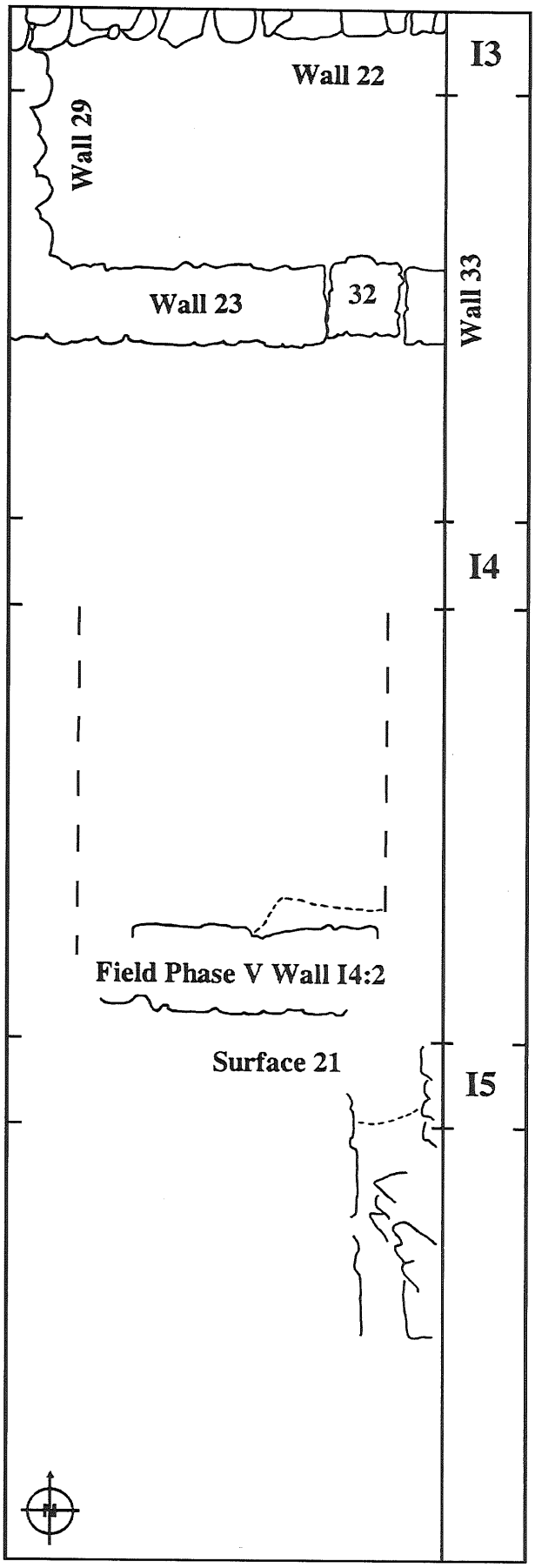
Field Phase V (Byzantine: ca. AD 325-640) (Shaded Wall in **Fig. 12**)

Subsequent to the abandonment of the Field Phases IX, VIII, and VI Iron II surface, Wall I4:2A (shaded in **Fig. 12**) was founded directly above Surface I4:9. That there was no accumulation of windblown soil between Surface I4:9 and Wall I4:2A suggests that either the wall was founded soon after the Iron II surface was abandoned or the area was scraped down to the surface in preparation for founding the wall; probably the latter. While the westernmost exposed 2m of Wall I4:2A sat directly on Surface I4:9, a 1.5m foundation trench (I4:20) was dug in order to found the easternmost exposed 1.5m of Wall I4:2A. Probes on both the north (Square I4) and south (Square I5) sides of Wall I4:2A's east end indicated that the wall's builders had apparently cut through the surface in order to lay founding courses for that 1.5m of the wall. This might have been done in order to level up a sharp decline to the east of the site's natural contour at that point. Further excavation in I4's southeastern quadrant and I5's northeastern quadrant is necessary in order to clarify the exact reason for this phenomenon.

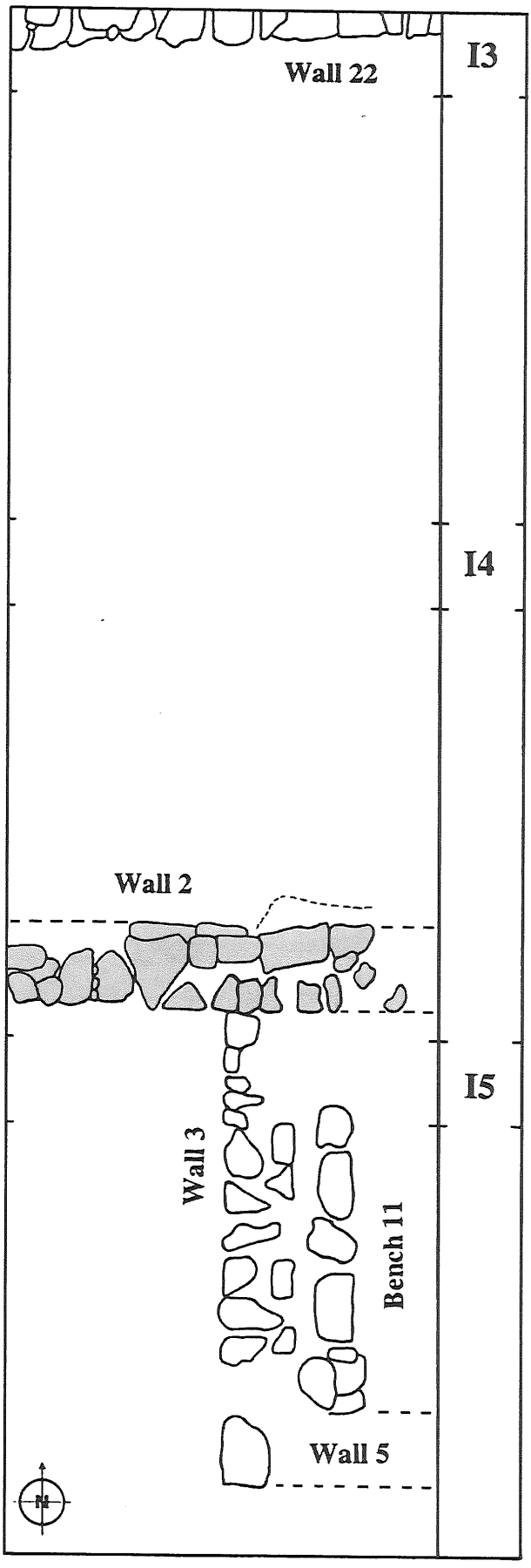
Two phases for the east-west (77°) oriented Wall I4:2 were clarified; the first appeared to be associated with the wall's initial construction. This initial phase was preserved in the wall's lowest three courses, and stood 1.10m. The uppermost course of Wall 2A was exposed for 5m; because subsidiary balks were maintained on both the square's west and east sides, the lower two courses of Wall 2A were exposed to a length of 3.30m **(Fig. 13)**.

Field Phase IV (Early Islamic: ca. 640-1100) **(Fig. 12)**

Square I5's north/south Wall 3 was previously associated with 1997's Middle Islamic phase (Field Phase III; Mattingly *et al.* 1999). Further examina-



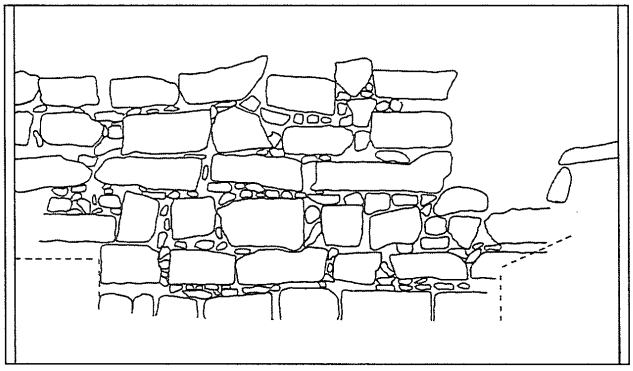
11. Plan of Field A's Field Phase VI.



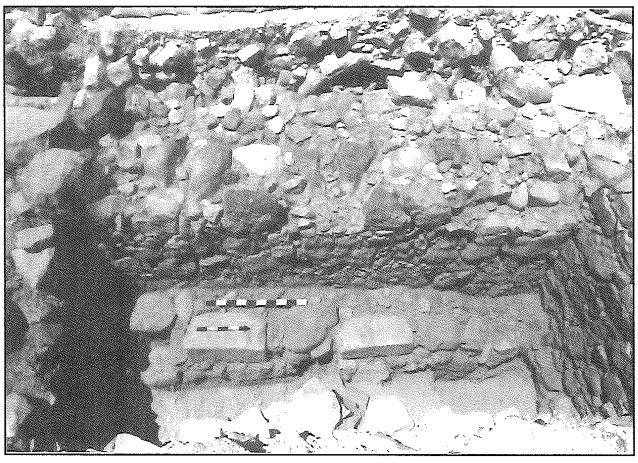
12. Plan of Field A's Field Phases V and IV.

tion during the 1999 season, however, suggested that the two-row Wall 3 in I5, which abutted the south face of I4's Wall 2, was constructed earlier than initially suggested. That its founding preceded that of Field Phase III Wall I5:4 was evidenced by its apparent western face, the line of which was clearly identifiable in plan. Although Field Phase III Wall I5:4 was subsequently laid up against the western face of I5's Wall 3, the facing line of the latter's uppermost course was evident.

Square I5's "Pedestal 11," which was constructed against the east face of Wall 3, proved to be more substantial than first thought (Mattingly *et al.* 1999). What was initially described as a 0.8m (north-south) x 0.7m (east-west) "pedestal", built against the east face of Wall 3, actually was a 4.60m (north-south) bench along the east face of Wall 3, between the south face of I4's Wall 2 and the north face of I5's Wall 5 (**Fig. 14**). Founded on Surface 23, the bench was constructed of alternating large limestone and basalt boulders; three limestone components were hewn ashlars, while the basalt components were unhewn. The limestone ashlars retained chevron-like tooling marks on their east faces. Their use in this architectural context was, most likely, secondary. At the south end, the



13. Elevation of Wall I4:2A/B's north face.



14. Photo of Square I5 Bench 11; view to the west.

bench featured a basalt storage bin created by two rectangular basalt members set on edge which supported the larger basalt boulder "top" (**Fig. 14**). The precise function of the bench was undetermined. While its construction was clearly subsequent to that of Wall 3, it could not be determined how much later. Earth Layer I5:14, a 0.33-0.38m thick layer of wind-blown loess sealed against the bench's east face.

Field Phase III (Middle Islamic: ca. 1100-1516) **(Fig. 15)**

Wall I5:4, described in the 1997 report (Mattingly *et al.* 1999), was laid up against the west face of Field Phase IV's Wall I5:3. At the time of the construction of Wall I5:4 a realignment of Wall I4:2 also occurred, hence, a later phase was evident in Wall I4:2. At the point where Wall I5:3 abutted the south face of Wall I4:2, a corner was created and a doorway was opened in Wall I4:2, west of the newly created corner (**Fig. 16**).

At the north end of Field A, Rock Tumble I3:21, excavated to a depth of over a meter, sealed against the south face of Wall I3:22 and dated to the Middle Islamic period. Numerous medium-to-large basalt boulders were part of the rock tumble's matrix, suggesting that the rock tumble represented wall collapse. Ceramic material taken from the tumble dated the locus to the Middle Islamic era (1100-1516). The wall collapse, which appeared to have been caused by seismic activity and which collapsed the wall in a southward direction, signals the conclusion of Field Phase III.

Field Phase II (Late Islamic: 1516-1918)

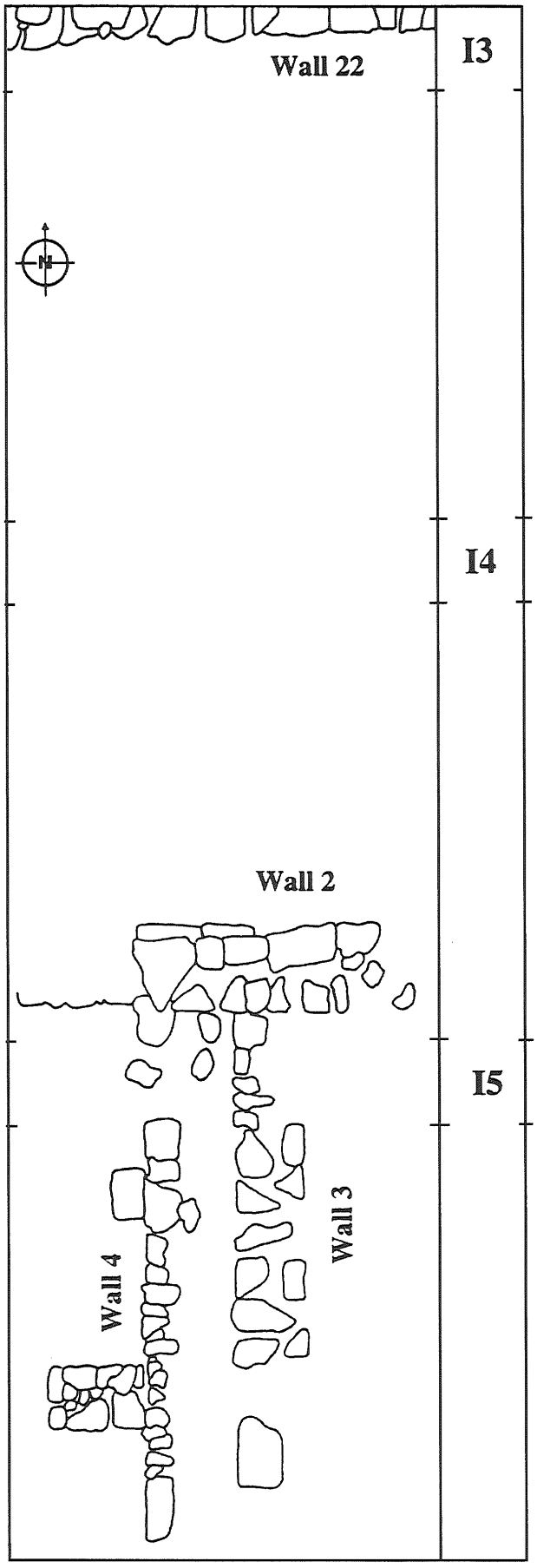
No new evidence relating to Field Phase II was encountered during the 1999 season.

Field Phase I (Modern: 1918-Present)

No new evidence relating to Field Phase I was encountered during the 1999 season.

Field B: The Eastern Gate (David R. Berge)

The 1997 season of excavation in Field B placed three 6 x 6m squares (N9, O9, P9) (**Fig. 2**) in a west-east line traversing the southern half of the gate entrance. The 1997 excavation revealed, in addition to the large gate tower visible on the surface, the remnants of two walls that appeared to comprise the inner pier walls of a four-chambered gate. Excavation in 1999 sought to define further both the history and overall plan of the gate area. To this end, the westernmost square of the 1997 season (N9) and two new squares, one to its north (N8) and south (N10), were excavated in the 1999



15. Plan of Field A's Field Phase III.



16. Photo of "cornering" or I4:2 with I5:3, with threshold of doorway visible in the photo's lower half, just left of center; view to the east.

season. Four field phases were reported for Field B following the 1997 season extending from the Iron II period to the present (Mattingly *et al.* 1999: 133-138). New excavation uncovered an additional phase. Further analysis has also suggested a revised phasing scheme that comprises six field phases. These phases will be discussed in the order in which they occurred historically.

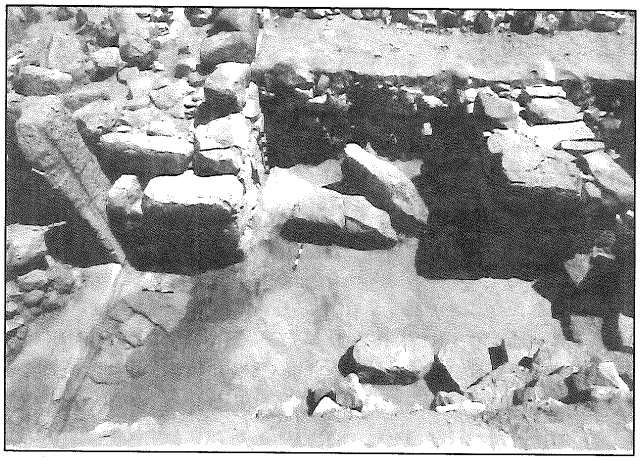
Field Phase VI (Iron II: ca. 925-586 BC)

Earth layers that were cut during the construction of the Field Phase V gate complex demonstrate the occupation of the site before the gate construction. The extent of these layers was limited to a 4m^2 area in the northwest corner of Square N10. No associated features were discovered. The limited pottery from these layers was identified as Iron II. No distinction from the pottery found in association with the Field Phase V gate could be determined. It is unclear whether these layers are remnants of a significant occupation before the construction of the gate, or are to be attributed to settlement associated with the development of the site as found in the following phase.

Field Phase V (Iron II: ca. 925-586 BC)

The 1997 excavation uncovered the southern gate tower and portions of the gate piers belonging to the southern half of the gate complex (Mattingly *et al.* 1999: 134-137) (**Fig. 17**). Additional excavation in 1999 uncovered the southwestern corner of the gate in Square N10 and a portion of the innermost pier of the northern half of the gate in Square N8. Although much remains uncovered, sufficient portions are now visible to demonstrate the existence of a four-chambered gate (**Fig. 18**). From the portions uncovered, it can be extrapolated that the gate complex measured 14.6m east-west and 19.7m north-south. The southern gate rooms meas-

ured ca. 3.45m in width and 6.4m in length. The passageway between the two westernmost piers measured 4.1m in width. The three piers uncovered thus far ranged in width from ca. 1.55-1.65m. Wall N10:10, the back wall of the southwestern chamber, was slightly narrower at ca. 1.4-1.45m in width. The construction style throughout the gate was boulder and chink; however, there was a clear tendency to use large rectangular stones, several measuring over a meter in length, especially at the ends of the piers that flank the gate passage (**Fig. 19**). The walls are composed of predominantly semi-hewn stones. A few stones showed signs of partial dressing, but no clear tooling was evident. The construction style suggests a familiarity with ashlar masonry. Lack of time and/or financial resources may have necessitated a slightly cruder construction. The presence of skilled masons and imported limestone is evident from the capitals, which required both of these elements.



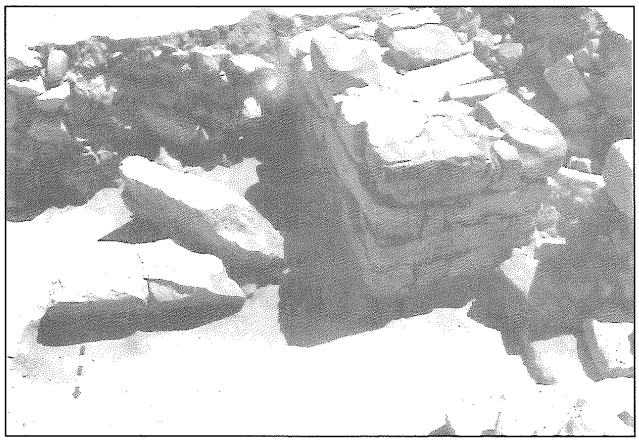
17. Photo of Field B's Phase V southern gate tower and threshold (on the left = east) and first chamber and pier wall (on the right = west); view to the south.

Apart from the expected features of a four-chambered gate, several additional architectural features were partially uncovered which require further investigation for a proper interpretation. Along the eastern balk of Square N8 alongside Wall N8:17 near its southern end, one large, flat-lying stone was uncovered suggesting an east-west wall or an installation of some kind within the northeastern chamber of the gate. A large monolith was also found fallen over apparently in a pit resulting from the investigation of Negueruela (Negueruela 1982). Although further excavation is needed to clarify its original position, it is possible that this stone originally stood upright near the southern end of Pier Wall N8:17, narrowing the entranceway at this point. At the southwestern corner of the gate complex in Square N10, an additional wall extending to the south was uncovered (N10:11; see **Fig. 20**). Although this wall was not essential to the four-chambered gate plan, all three walls (N10:8, 10, and 11) were clearly bonded together. This simultaneous construction technique demonstrates that the original plan of the gate complex involved more than the gate proper; however, much more excavation is needed to reveal the plan of this larger complex.

There is no clear evidence for multiple phases of use for the four-chambered gate. This lack of evidence may be due in part to the limited excavation to date. Only the founding level of Pier Wall N9:10 has been excavated thus far. Here the builders



18. Wide angle photo of Field B gate excavation, with gate tower and threshold and two chambers and piers in Squares P9, O9, and N9 (moving from left to right = east to west); view to the south.



19. Photo of Pier Wall O9:5, illustrating general construction style of the gate complex; note broken lintel in chamber left (= east) of the gate pier; view to the southwest.



20. Photo of southwestern corner of Field B's chambered gate; note how Wall N10:11 was incorporated into the plan of the chambered gate; view to the north.

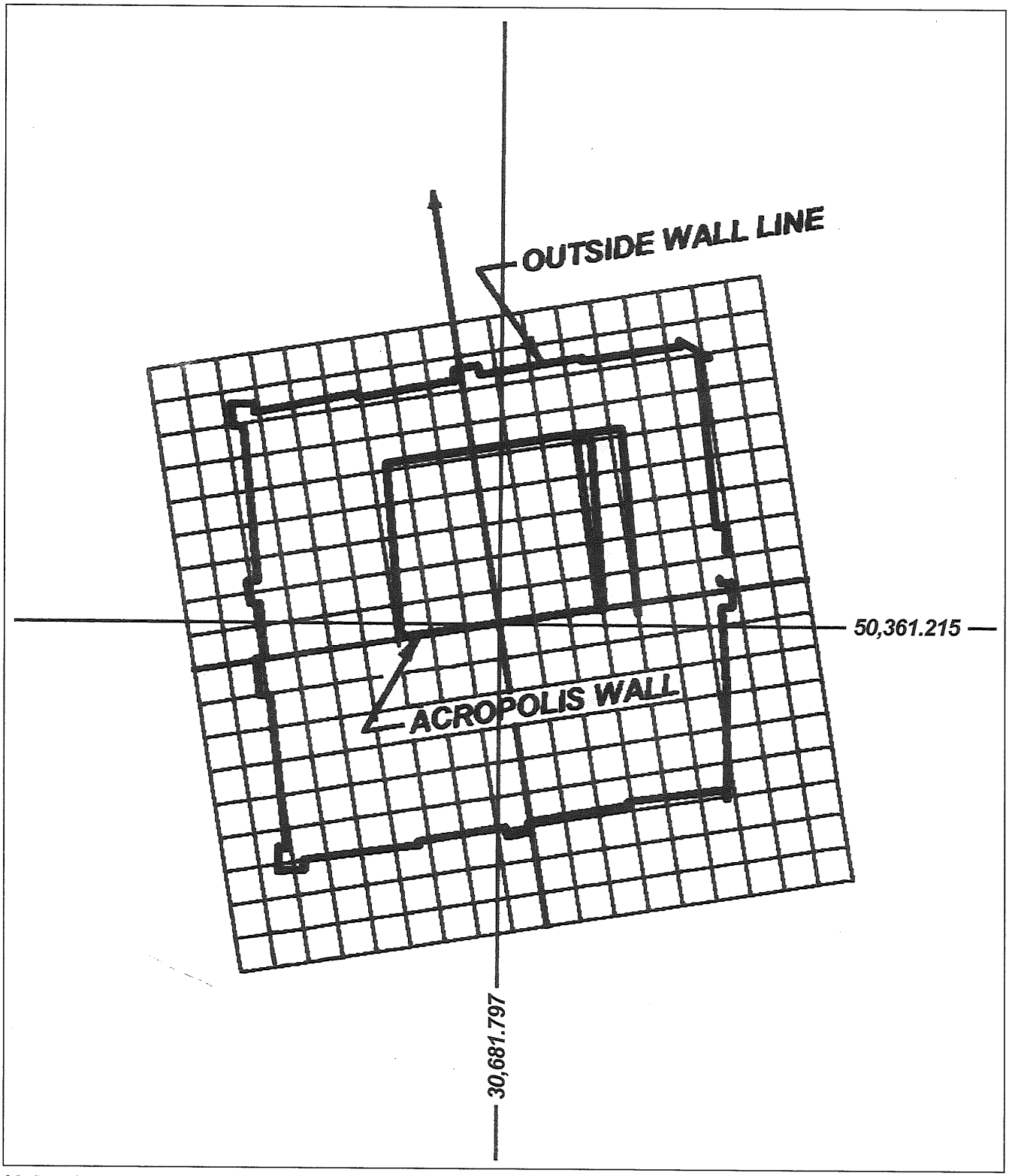
founded the wall upon bedrock. The identification of actual use surfaces for the gateway has been difficult. The lack of clarity stems from two factors: the scarcity of material remains and the destructive force of the collapsing superstructure. The latter may have disturbed much of the surface in the gate passageway. A small fragment of paving was found just inside the gate threshold in the 1997 season (P9:24). Beaten Earth Surface N9:29 and the previously excavated Surface P9:25 suggest that significant portions of the gate passageway may not have been paved. The two gate chambers which have been partially excavated appear to have had beaten earth surfaces (N9:20, P9:23); however, to date, only a small percentage of these chamber surfaces has been uncovered. In addition, these surfaces were not firmly packed and did not show signs of significant use.

Little new evidence was discovered for the nature of the destruction of the gate complex. The gate passageway in Square N9 contained more evidence of the wooden beams and baked earth containing reed impressions. Although the burnt remains were concentrated in the gate passageway, the collapse from the gate superstructure filled the passageway and chambers with fallen boulders to a depth of 1-1.5m. The capitals and many of the large architectural fragments have been found in the upper layers of this rock tumble and on the modern surface. It seems likely that other smaller stones from the gate superstructure were included with and possibly even covered, these architectural pieces, and that a significant portion of this stone material was reused in the construction of the later Islamic structures. The capital fragment that was found in the Field Phase IV perimeter wall illustrates this phenomenon. Although it is possible that the collapse could have been spread out over some time, there is to date no visible separation within the meter or more of collapse. Small pottery sherds dating from the Late Byzantine and later periods have been found within the rock tumble. This is most probably due to rodent activity of which there was much evidence and to small pieces percolating down through the crevices of the rock tumble.

Dating of this phase is based upon the recovery of Iron II pottery and the Carbon 14 dating of two charcoal samples from different wooden beams recovered in the 1997 season. The sample from O9:14 returned a calibrated date of 760 BC with a +/- 50-year margin of error. The sample from P9:22 returned a calibrated date of 740 BC with a +/- 40-year margin of error. These dates correspond with the pottery recovered and "fit" well with the style of gate and decorated volute capitals.

Field Phase IV (Late Byzantine/Early Islamic: ca. AD 500-1100)

After a substantial period of abandonment, the site was again reoccupied at the end of the Byzantine Period. The construction during the period is confined primarily to an area of ca. 40 x 35m within the larger Iron II walls (**Fig. 21**). The eastern pe-



21. Site plan showing later Byzantine-Islamic structure, the so-called "acropolis," sits within the larger Iron Age perimeter wall.

rimeter wall of this building complex runs along the western edge of Field B (N8:3B=N9:1B= N10:20B). To date excavation in Field B is outside of the building complex of Phases IV-II, and excavation has provided little information about these periods. Due to the scarcity of pottery and other material remains, precise dates for these periods are not available.

In addition to the portion of the eastern perimeter wall excavated in 1997 (N9:1B; see Mattingly *et al.* 1999: 137-138), the east face of the sections of the wall located in N8 and N10 were excavated

in 1999. Foundation Trench N9:14=N10:17 cut into the rock tumble remains of the Iron II gate complex in order to found the earliest phase of this wall. Excavation in N8 did not reach the founding level. The wall continues out of the field to the north, but its southern end (N10:20B) extended less than 1m into Square N10 before cornering toward the west. The wall continues to maintain its use of rectangular limestone in a boulder and chink fashion as discovered in 1997.

Given that the area of Field B was outside the Phase IV building complex, it is not surprising that clear surfaces were hard to trace. Earth Layers N8:16 and N10:14 likely comprise the surface associated with the construction of the first phase of the above-mentioned wall. The accumulation of Ash Layer N8:15 on this surface supports this conclusion. The ash was not a solid layer as would result from a single destruction, but, rather, a complex mixture of ash and soil lenses. Such an accumulation supports the previous interpretation that this area likely served as a place for campfires, using the building's eastern wall as a windbreak. Rock Tumbles N8:14 and 19 signal the collapse of Wall N8:3B=N9:1B=N10:20B.

Field Phase III (Middle Islamic: ca. 1100-1516)

The pattern of use during the present phase is similar to the previous. The eastern perimeter wall was reconstructed (N8:3A=N9:1A=N10:20A) although in a cruder fashion. Instead of rectangular blocks, boulders of various shapes were used. Instead of the preference for limestone evident in the earlier periods, the builders readily used basalt. This more haphazard construction suggests a lower level of organization at the site. As in the previous period, the lenses of ash and earth were laid down along the eastern face of the wall, suggesting further use of this wall as a windbreak for occasional campfires.

Field Phase II (Late Islamic: 1516-1918)

The area to the east of Wall N8:3A=N9:1A =N10:20A continued to be used for campfires into the Late Islamic Period. The separation between Phases II and III is not distinct. The isolation of this phase is based upon the secondary buttressing of Wall N9:1A (Mattingly *et al.* 1999: 138), the possible remains of two ephemeral walls (N8:9, 10), and architectural modifications elsewhere on the site (see Field A Phase II; Mattingly *et al.* 1999: 132-133). These two walls, placed at right angles to one another, were constructed of one row of medium and large boulders (**Fig. 22**). Only one course of each wall was preserved. Although Wall 9 abutted Wall 3A, it was far from perpendicular to it. Such an angle precludes the use of these walls as an exterior room. In fact, given the nature of their construction, these walls were probably never much more than one course. Unfortunately, no evidence for their usage was uncovered. They may have been additional windbreaks or *ad hoc* bin walls. In Square N10, the ash remains of a small hearth were identified. The end of this phase is marked by a line of rock tumble (N8:8, N9:6, and N10:4) along Wall N8:3A=N9:1A=N10:20A.

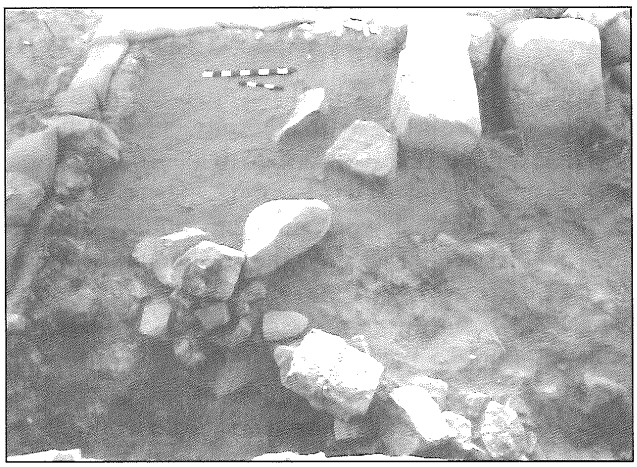
Field Phase I (Modern: 1918-Present)

The primary use of the site in recent history has been as an assemblage of sheepfolds. Pen Wall N10:1 was constructed following the contour created by the collapse of the Iron II gate complex. The pit created by Negueruela, partially detected in 1997 within Squares N9 and O9, was further encountered in Square N8.

Field C: The Southern Plaza (Stephen J. Andrews)

In keeping with KRP's primary purpose of investigating and documenting resource utilization at Khirbat al-Muḍaybi', the 1999 KRP team opened a new field of excavation, Field C, in the extensive open area or "plaza" south of the interior acropolis and north of the southern defense wall (**Fig. 2**). At issue was the nature of the function played by this plaza area in the utilization of natural or imported resources through the site's various occupational levels. Two 6 x 6m squares (H13 and I13) were surveyed and opened on an east-west axis over the tumbled remains of modern sheepfolds constructed of basalt boulders robbed from older structures.

Ceramic evidence from both squares in Field C revealed an occupational sequence consistent with that discovered elsewhere on the site. This same basic sequence extended from Iron Age II to Late



22. Photo of ephemeral walls in Field B's Phase II walls in Square N8, in lower half of the photo; view to the east.

Islamic times. Both squares hit bedrock beneath Iron II deposits.

In general terms, Field C contained multiple layers of lightly beaten earth surfaces, thinly dispersed destruction debris, and windblown deposits, suggesting that the area may have functioned as the outer area or courtyard of a domestic area. The lack of major architectural features and the presence of several garbage pits tend to confirm this conclusion. The Iron II remains of two unrelated walls and a finely constructed stone lined pit built upon the bedrock slope suggest the need for future investigation in Field C to the west and north of square H13. The following provisional field phasing for Field C is based on the results of the 1999 season.

Field Phase X (Iron II: ca. 925-586 BC)

Hard-packed soil containing a small number of Iron II sherds (Earth layers H13:20, 21 and I13:36) was encountered quite quickly in both H13 and I13 at an average depth of less than 0.75m in the northern quadrant of the squares and sloping to a depth of over 1.5m toward the south. These earth layers were similar in color (7.5YR 5/6) and consistency with that encountered in a 1 x 1.5m probe in Field A (I4:13; cf. the discussion of "B horizon" above). In addition, large boulder-size basalt rock protruded through these layers in both squares (**Fig. 23**). A total of 24 Iron II sherds were sifted from the earth layers in both squares. The majority were body sherds. Only three diagnostic pieces were discovered. Given the results of the probe in Field A, Square I4 (see above) the existence of Iron II sherds in what appears to be B horizon soil in Field C is perplexing. However, this may be due to the large amount of disturbance in the earth layers in both squares due to the cutting of pits and robber trenches — which might actually equate Field Phase X with Phase IX, which is more clearly demarcated.

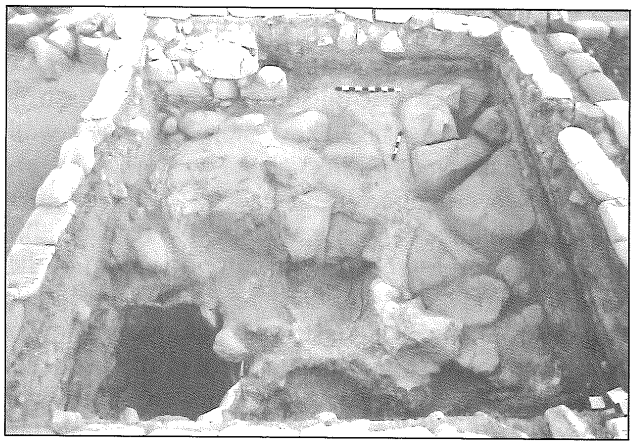
Field Phase IX (Iron II: ca. 925-586 BC)

Another phase of Iron II occupation in Field C may be provided by "garbage" pits cut into the B horizon soil of Phase X down to bedrock. In the northeast quadrant of H13, along the east balk, a small pocket of ash containing no pottery (Locus 23) was discovered cut into the sterile soil down to bedrock (Locus 22). Another elongated pit, Locus 24, was also cut through the sterile soil (Locus 20) to bedrock along the southern balk. This "pit" was rectangular in shape, 3.5m in length and on the average 0.5m wide, and continued into the south balk of H13. It contained a large number of Iron II sherds and a polished bone object, possibly a gaming piece. The same phase may be represented in the southeast quadrant square I13 by Earth Layer 33 and Pit 34. Both of these loci were located above the B horizon of I13:36 and contained a large number of Iron II sherds, as well as an iron point.

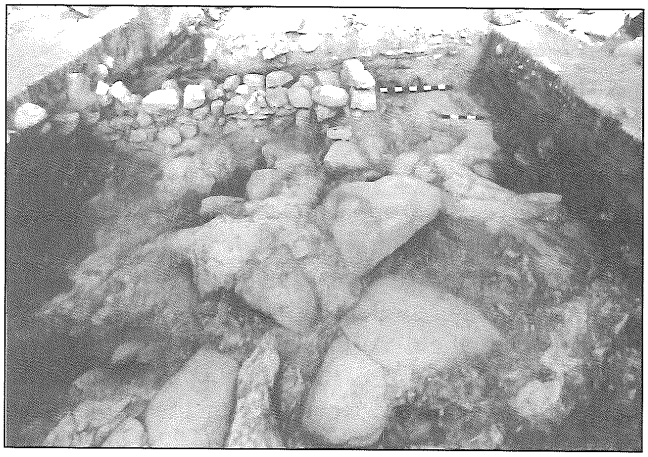
Field Phase VIII (Iron II: ca. 925-586 BC)

Two significant architectural features in Field C are assigned to this phase. The first, Wall 25 in Square I13 extends just over 3m on a north-south axis along the west balk (**Fig. 24**). This wall was founded on bedrock (Locus 39). A portion of the wall remains unexcavated in the east balk of H13. The width of the exposed wall averages just over 0.75m. The function of the wall is unclear.

The second significant feature is a finely constructed stoned-lined storage pit in square H13 (**Fig. 25**). Pit 27 is located in the southwest corner of the square. It cuts through Earth Layer 20 and is cut an additional 1m into a softer limestone section of the bedrock. Soil samples were taken for flotation specimens. The pit was empty when it fell into disuse. Flat cobble and small boulder size rocks



23. Photo of H13:23 bedrock, with Pit 27 in southwest corner; view to the north.



24. Photo of Wall 25 in Square I13; view to the west.

filled the pit. This may have been done intentionally or resulted from the lining collapsing. A large cobble size piece of "slag" was found near the bottom of the pit. This "slag" was probably from lime slaking process. Many Iron II pottery sherds were recovered from the contents of the pit.

Field Phase VII (Iron II: ca. 925-586 BC)

In this occupational phase Pit 27 in H13 was filled and a new surface, Locus 19, which sealed over the debris utilized to fill the pit. Surface 19 extended nearly the entire length and width of H13 and was encountered through the east balk of H13 into I13 as Surface 10. Surface 19 contained small and large cobbles, rodent droppings, and a large number of Iron II sherds. Surface 19 sealed against the base of Wall 17 in H13 (**Fig. 26**). A 1 x 1m probe in the southern end of the east balk between H13 and I13 indicated that Surface 19 also sealed against the top course of Wall 25. Wall 25 of I13 continued in use during this period but its exact purpose is not known. Wall 17 extended 1.5m parallel to the north balk of H13. A robber trench to the east of the wall indicates that the wall originally extended another 1m. The exact function of Wall 17 is unclear.

Field Phase VI (Iron II: ca 925-586 BC)

A very compact Surface 12 extended over the entire area of H13 (and possibly into the northwest section of I13 as Surface 6). Surface 12 sealed against Wall 17 in H13 and fell into disuse when Wall 17 collapsed onto it (**Fig. 27**). Several layers of extremely hard plaster directly above the pit in the southwest corner of the square are associated with this surface. One Iron II body sherd was found in Surface 12. However, this surface effectively sealed the Iron Age occupational levels discovered below.

Field Phase V (Byzantine: ca. AD 325-640)

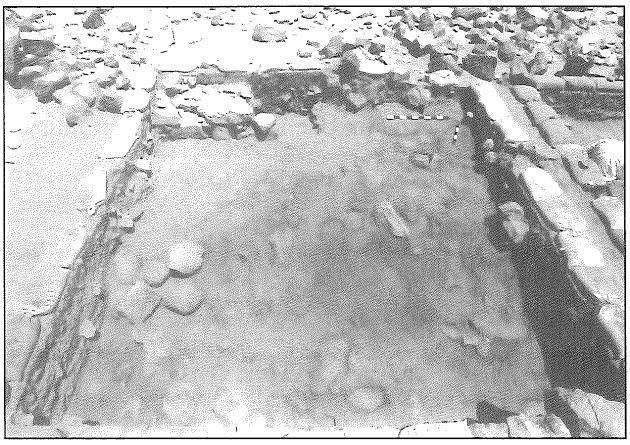
Pottery from the late Roman and Byzantine period were unearthed in Field C, but none was found in clearly sealed loci. This may be due to the large number of pits, trenches, and general disturbances discovered in Field C. No architecture that could be attributed to this period was found. This may be due to the possibility that Field C was outside of any domestic area during the period.

Field Phase IV (Early Islamic: ca. 640-1100)

Pottery from the Early Islamic period was also unearthed in Field C in mixed contexts. It is possible that Wall 8 in H13 and Wall 14 in I13 may date to this period. Part of Wall 8 appeared to have been constructed with the collapse of Wall 17. These low walls may have been used as terrace walls or sheepfold walls. Several coins, lamp and pipe fragments, metal objects and glass fragments were discovered in loci related to the Islamic periods discerned in Field C.



25. Photo of Pit 27 in Square H13; view to the west.



26. Photo of Square H13's Surface 19 and Wall 17 (in upper left = northwest); view to the north.



27. Photo of Square H13's Surface 12 and Wall 17; view to the north.

Field Phase III (Middle Islamic: ca. 1100-1516)

Pottery from the Middle Islamic period was unearthed in mixed contexts in Field C. A number of small installations (fire pits, small rock bins, etc.) may be dated to this period. Because of a lack of sealed loci for this period, however, it is not possible to ascertain the exact dating sequence for these installations. A leather fragment found in Earth Layer 5 in Square I13 may also date to this period.

Field Phase II (Late Islamic: 1516-1918)

A sheepfold wall (Wall 1 in H13) was constructed on Surface 5. A fragment of a Turkish pipe was found on Surface 5. Late Islamic pottery found in Trench 15 suggests that the Iron Age Wall 17 was robbed out at this time.

Field Phase I (Modern: 1918-Present)

Wall 1 in H13 continued to be used as a sheepfold on into modern times.

KRP plans to continue its fieldwork in the summer of 2001, when further excavation will be undertaken to answer some of the questions raised by the first two seasons.

S.J. Andrews
Midwestern Baptist Theological Seminary
5001 North Oak
Kansas City, MO 64118
USA

D.R. Berge
2316 Clackamas Street
Portland, OR 97232
USA

J.I. Lawlor
Grand Rapids Baptist Seminary
1001 East Beltline Avenue, NE
Grand Rapids, MI 49525
USA

G.L. Mattingly
Johnson Bible College
7900 Johnson Drive
Knoxville, TN 37998
USA

Bibliography

Mattingly, G.L., Lawlor, J.I., Wineland, J.D., Pace, J.H., Bogaard, A.M. and Charles, M.P.
1999 The Kerak Resources Project, 1997: Excavations at Khirbet al-Mudaybi'. *ADAJ* 43: 127-144.

Negueruela, I.
1982 The Proto-Aeolic Capitals from Mudeibi'a, in Moab. *ADAJ* 26:395-401, 569-572.

PRELIMINARY REPORT OF THE EXCAVATIONS AT JABAL AL-QAL'A (LOWER TERRACE): THE IRON AGE WALLS

Sahar Mansour

Introduction

The "Development of Amman Citadel Project", carried out by the Ministry of Tourism and Antiquities with technical cooperation from the Department of Antiquities, includes a restoration component at the southern fortification wall of Jabal al-Qal'a ('Ammān Citadel قلعة عمّان).

In preparation for the project, excavations were conducted from 16 April to the end of October 2000 at the southeastern sector of the Lower Terrace. Work started by a survey of the walls, and cleaning the modern debris.

The Study Area

The work area is located at the southeast corner of the Lower Terrace, overlooking the modern region of Jabal al-Qal'a from the east, and downtown 'Ammān and the theater from the south. The site chosen for this season was divided into three areas: **Area SEa**, located inside the southern fortification wall, which in turn was divided in to five squares. **Area SA4** and **Area SA3** were located outside the wall.

The trench supervisors were graduate students in archaeology: Merna Hussen, Najd Mazahrah, Firas Bqain and Jihad Abu-Ali. Draftspersons from the Department of Antiquities were: Ahmed al-Horani, Jamal Safi, Yusef Mherat and Qutiba Dasuqi. Photographers: Osama Jaber and the late Mohammad Fayez.

This report presents the main results of six months of excavation, which revealed part of the defense system of the Iron Age II period.

At the outer façade of the southern fortification wall, in an area near the southeastern corner, the earliest remains found dated to the Iron Age II, although below them a few scattered pottery sherds that may date to the Middle Bronze Age were found in cavities in the bed rock, with no associated architectural remains. The Middle Bronze Age fortifications identified by previous excavators are located to the west of our excavation area (Zayadine *et al.* 1989: 359).

Area SA4

In this area, the Iron Age remains consist of remains of badly damaged walls due to modern constructions. These walls were built on the natural bedrock. Their function cannot be identified because of the disturbance. The collected sherds date mainly from the Iron Age period. The few recovered Middle Bronze Age sherds are probably remainders of Bronze Age structures that were originally erected in this areas.

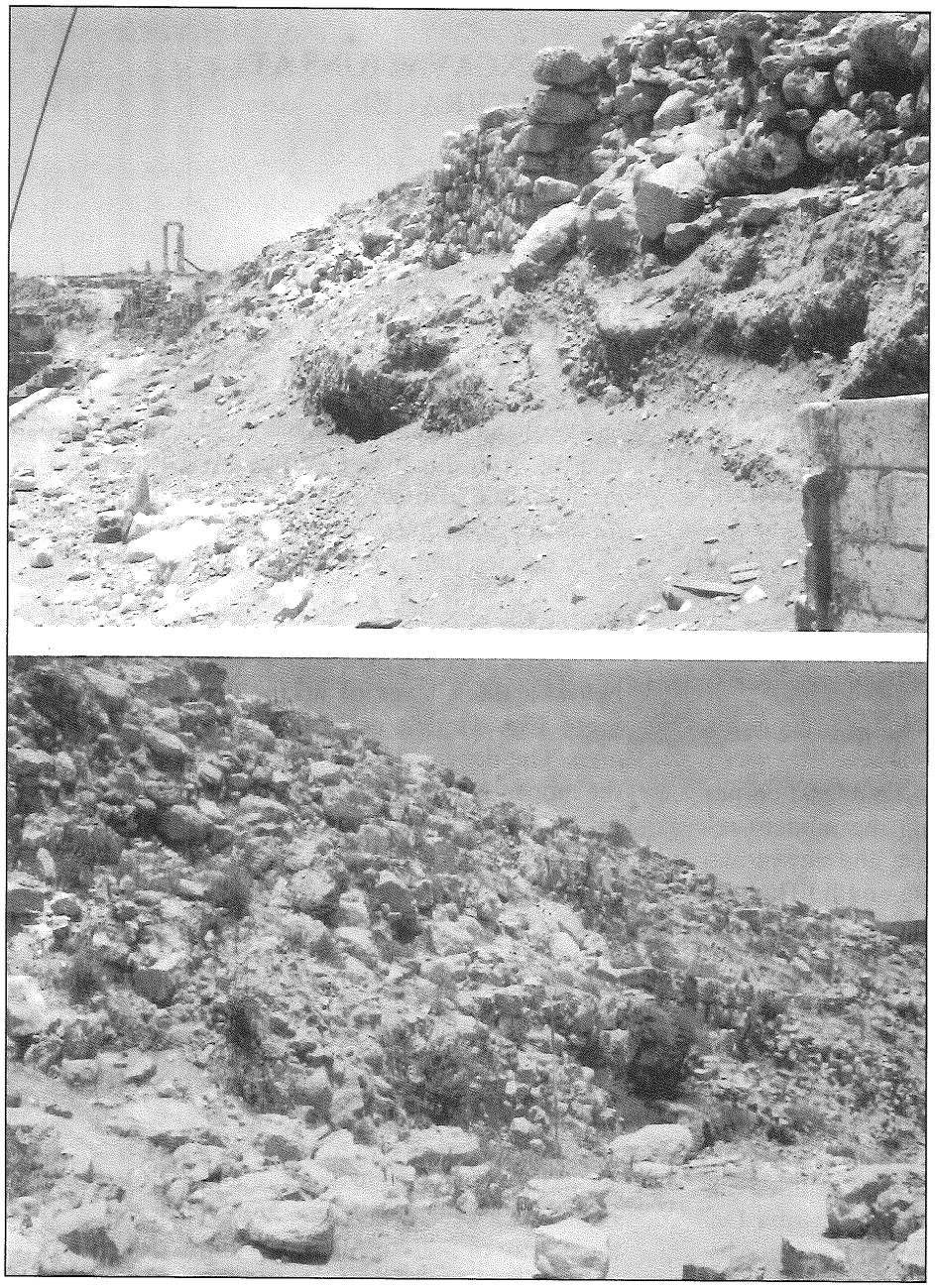
Area SA3

In this area the Iron Age II remains were found below a thick layer of accumulated debris (3-7m high, **Fig. 1**) that covered the whole excavation area. The debris were probably washed down from the upper areas. They contain large quantities of mixed pottery sherds dating from the Iron Age to the Byzantine period.

In squares 8e and 9e, two parallel walls built of medium and small-sized rough lime and flint stones were revealed (**Figs. 2, 3**). The northern wall (B) extends for 10m in length, is 0.65-0.75m thick and has preserved height of 1-5m. The southern wall (A), also running east-west, has the same length and preserved heights. Between these parallel walls a floor was formed of a smooth surface of small stones over which the Iron Age deposits lay. At the eastern side of the floor there were the remains of a staircase. The whole structure suggests a gateway or path in relation with the Iron Age city wall. It should be noted that Dornemann identified two Iron Age walls in the northwest corner of the Upper Terrace outside the fortification wall, in 1969, and suggested a structure with a defensive function (Dornemann 1983: 19, 91-93). Ateyat also exposed what he calls an "Ammonite settlement" at the outside of the Upper Citadel's northeast area (personal communication, unpublished).

In the Lower Terrace, at the outside of the southeast corner, Zayadine (1973; 1977-8) exposed Iron Age walls that may be related with the parallel walls A and B.

The Iron Age deposit between the two parallel walls produced fragments of clay figurines retrieved in an ashy soft soil layer (**Figs. 4, 5, 6**), and sherds of cooking pots, lamps and jars, while the upper layer of the deposit contained a large amount



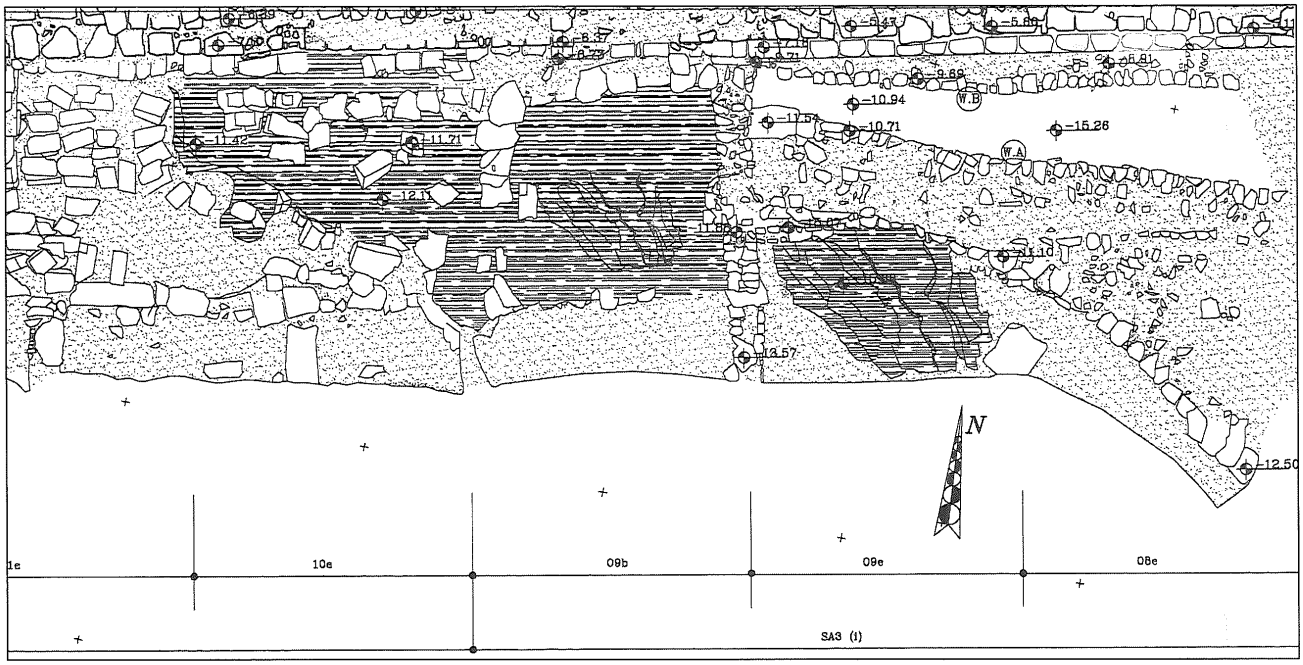
1. Area SA3 before excavation.

of mixed pottery shreds (Roman and Byzantine) with large quantity of whitish wall plaster. Parts of the plaster are still *in situ*, adhering at many places to the southern fortification wall. It should be noted here that the southern fortification wall is superimposed on part of the northern parallel wall (B) (**Fig. 2**). At the present I cannot give a definite date to this part of the southern fortification wall. One difficulty, as pointed out by Dornemann when he reported on fortifications in Jordan in the Iron Age, is that it is not possible to distinguish between Bronze Age, Iron Age, Roman or Byzantine megalithic structures.

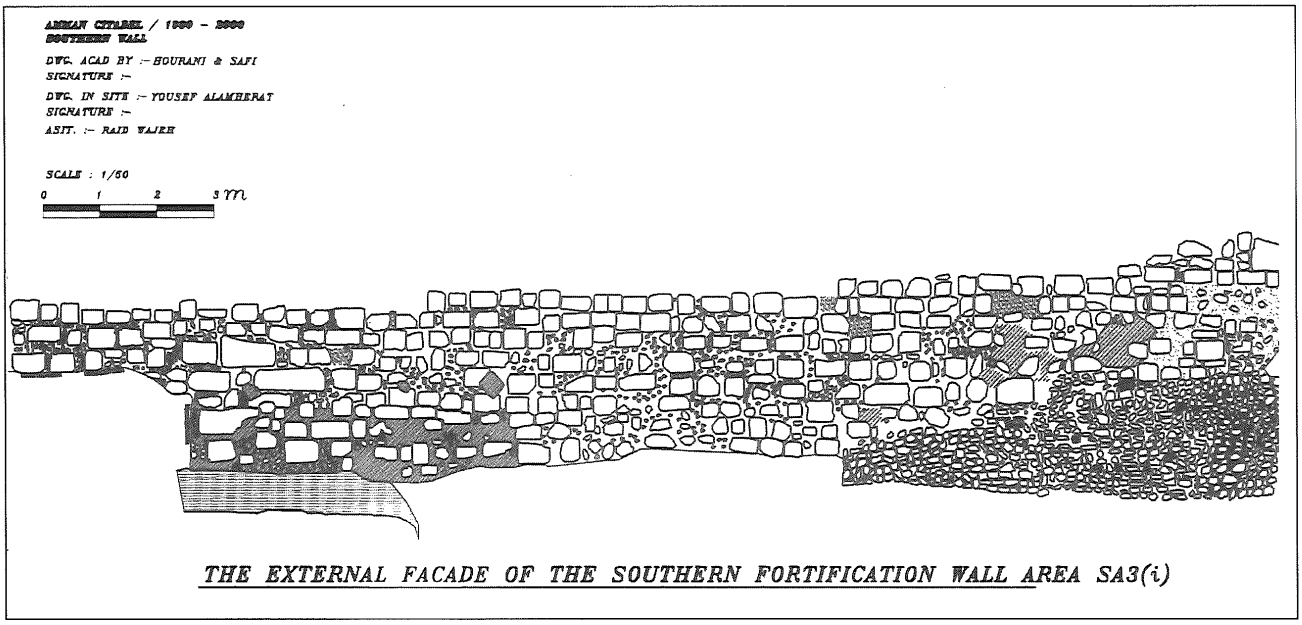
In this area another structure was found, located directly at the border to the west of Squares 8e and 9e (**Fig. 2**). Its level suggests difference in time. There are traces of the foundations of walls in Squares 9b, 10e, 11e, and 12e, but the plan is not clear. Five cooking pots dated to the Byzantine period were found on the bedrock. These remains, which seem to be domestic, are outside the southern fortification wall. They are probably linked with a newly-discovered Byzantine buildings inside the southern fortification wall. A report on this excavation will be published separately.

Area SEa

The most unexpected discovery at the interior line of the southern fortification wall was a unique construction at Area SEa, Squares 4, 5, 6, 7, and 8,



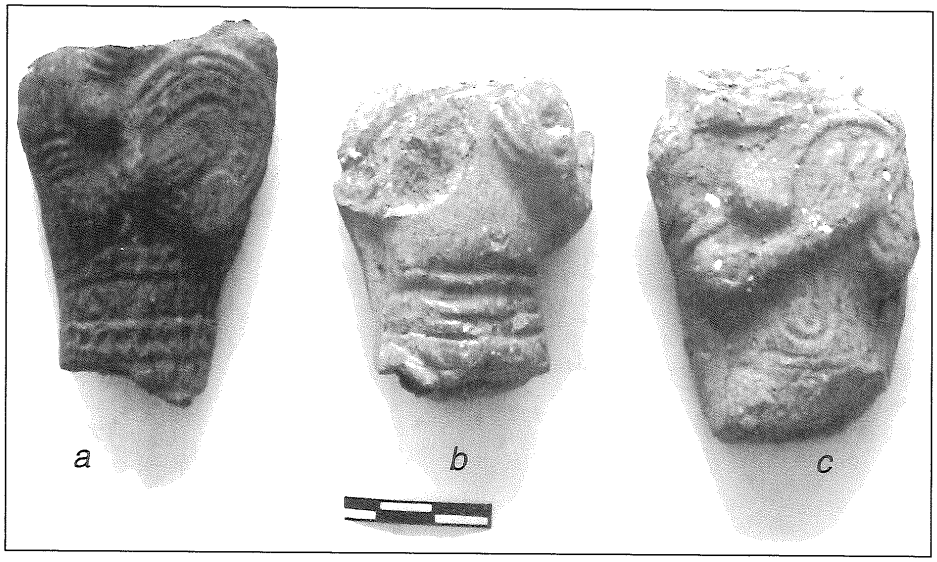
2. Top plan of the Area SA3, showing the two Iron Age II parallel walls, and the southern fortification wall which is superimposed on part of the northern parallel wall (B).



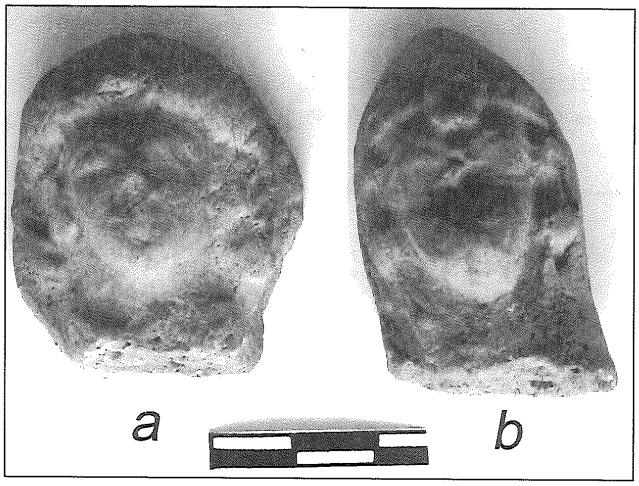
3. Elevation of Area SA3.

which proved that the Ammonite City was fortified by a casemate wall. This type of defense is common in the Iron Age II in Palestine and Jordan. Examples in Palestine are Bīr as-Sab' (Aharoni 1973), Tall Bayt Mirsīm (Herzog 1992b), Hazor (Yadin *et al.* 1956), Samaria (Herzog 1992) and Megiddo (Yadin 1970). In Jordan there are the examples at Tall al-Khulayfī (Glueck 1977), Khirbat al-Mudayna (Chadwick *et al.* 2000), al-Judayda (Hendawi 1999) and al-'Umayrī (Geraty *et al.* 1987).

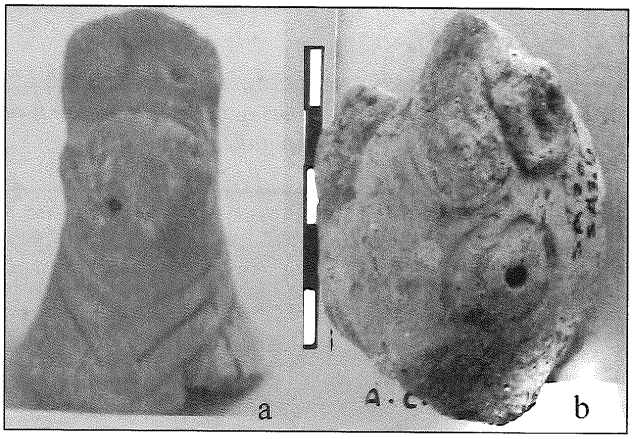
The casemate fortification system extends in a straight line (**Fig. 7**). The outer wall is constructed of two rows of limestone boulders. This wall is 2-2.50m thick, being the heaviest wall in the fortification system. The internal façade is of good quality courses standing up to 7m high, and exposed length is 30m, with a thick layer of plaster still intact in some places on the outer side of western part of the casemate wall, which is constructed of big rough hard limestone blocks in a header-stretcher manner, with some flint, chinked with many pebbles and small cobble stones to give bet-



4. Human figurines from Area SA3: a. torso of a woman holding a circular object in her left hand, well preserved, height 6.8cm, length 3.3-4.6cm, width 2.4-2.8cm, ware 2.5YR 7/6 light red, slip 5YR 7/4 pink; bad firing, molded, many grog and lime grits of various size, incised lines on body, bracelets and armlets; b. pregnant woman holding her breast in her left hand, the other arm and breast are missing, ware 7.5YR 8/4 pink, slip 2.5YR 6/6 light red; bad firing, molded, lime grits, blues ochre, incised lines on belly; c. torso of a woman holding a circular object (loaf or musical instrument), ware 10YR 5/2 grayish brown, slip 7.5YR 6/4 light brown; good firing, lime, grog and flint grits.



5. Human figurines from Area SA3: a. probably a female head, unclear features, wearing a head cover, slip 2.5YR 7/6 light red; bad firing, molded, many flint and lime grits of various sizes; b. female head, oval shape with pointed top, some parts are applied as ear ornament and diadem, ears and eyes are clear while nose is scratched, ware 2.5YR 6/6 light red, slip 7.5YR 7/4 pink; medium to good firing.



6. Animal figurines from Area SA3: a. probably a camel, molded, deep pierced holes for nose and eyes, ware 2.5YR 7/6 light red, slip 10YR 7/2 light gray; bad firing, many ochre, flint and lime grits of various sized; b. horse, molded with pierced ears, mouth and eyes, and grooved lines, ware 7.5YR 7/4 pink, slip 2.5YR 7/6 light red; probably used for liquids; good firing, lime grits of small and medium size.

ter solidity. The two parallel walls run east-west and the space between them is about 4.35m, divided by five casemate rooms (**Fig. 8**), also built of big blocks of hard limestone filled up with rubble and earth. All the partition walls are without doors. We do not yet have an answer as to why there are no doors except for the one in Square 4 (**Fig. 9**).

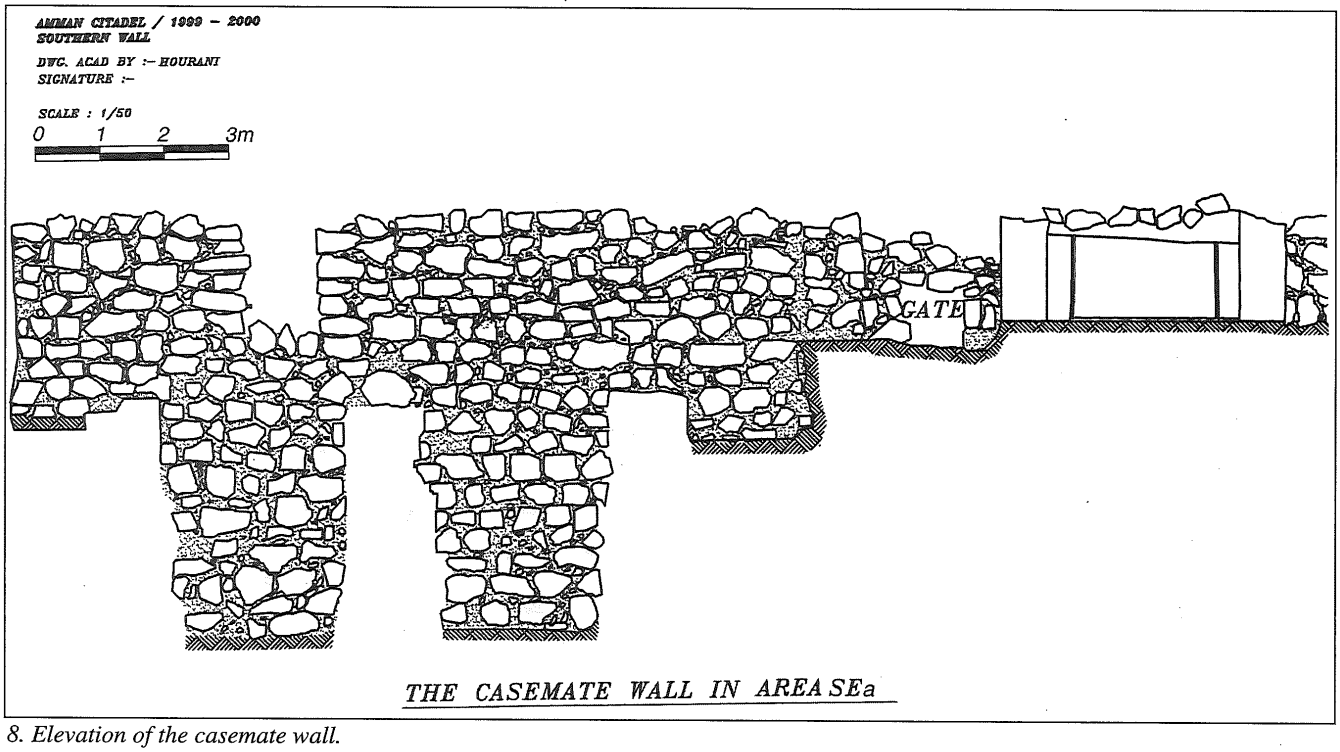
The southern parallel casemate wall (the outer one) has a gate in its upper part at the eastern side (**Fig. 10**). This gate is located about 6.5m higher than the casemate floor level (**Fig. 7**), with no staircase connecting the gate with the floor of the casemate rooms. Maybe wooden stairs or ropes where used to connect the levels. This situation is unusual with no obvious parallels at other sites. The main entrance to the casemate must therefore be sought elsewhere.

At the west part of the outer casemate wall, there is a small room measuring 2.50 x 2.50m (**Fig. 11**). Its small entrance is 1m wide and 1.40m high, both the entrance and the room are coated with a thick layer of white plaster (**Fig. 12**). The deposit inside this room dates to the Hellenistic period, with a large amount of stamped Rhodain jar sherds that were found over the plastered floor were found (**Fig. 13**). One jar was restorable (**Fig. 14**). These remains indicate that the room was used for storage in the Hellenistic period, and the stratified evidence inside the casemate indicates that this structure continued in use during the Hellenistic period.

The Hellenistic modifications are also obvious by the addition of a wall in Square 4, running



7. Top plan of the casemate wall (Area SEa).



8. Elevation of the casemate wall.

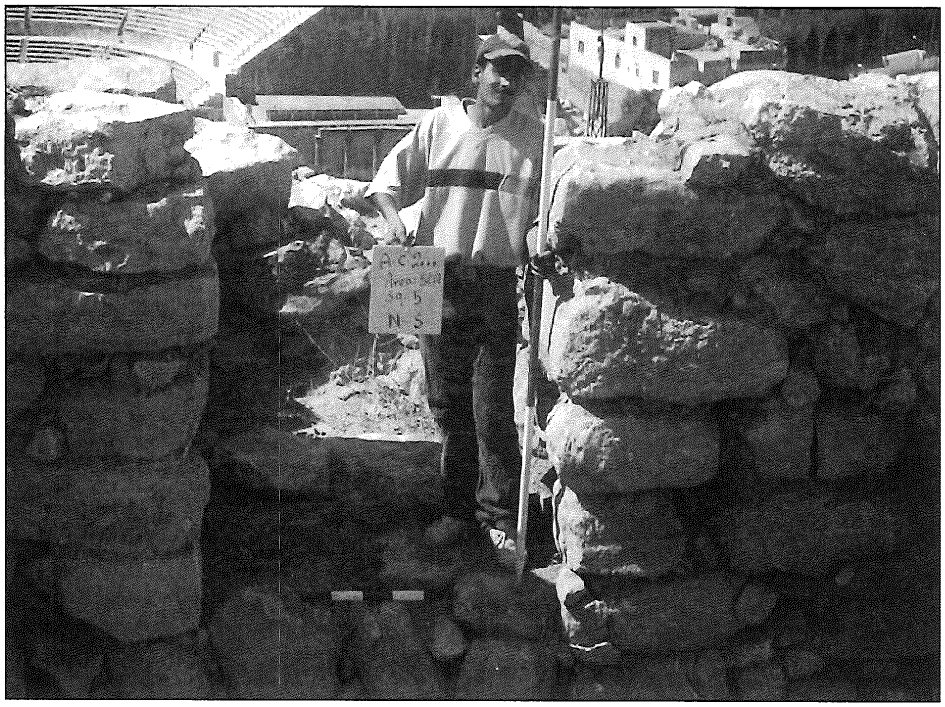


9. Gate for a casemate room, Area SEa, Sq. 4.

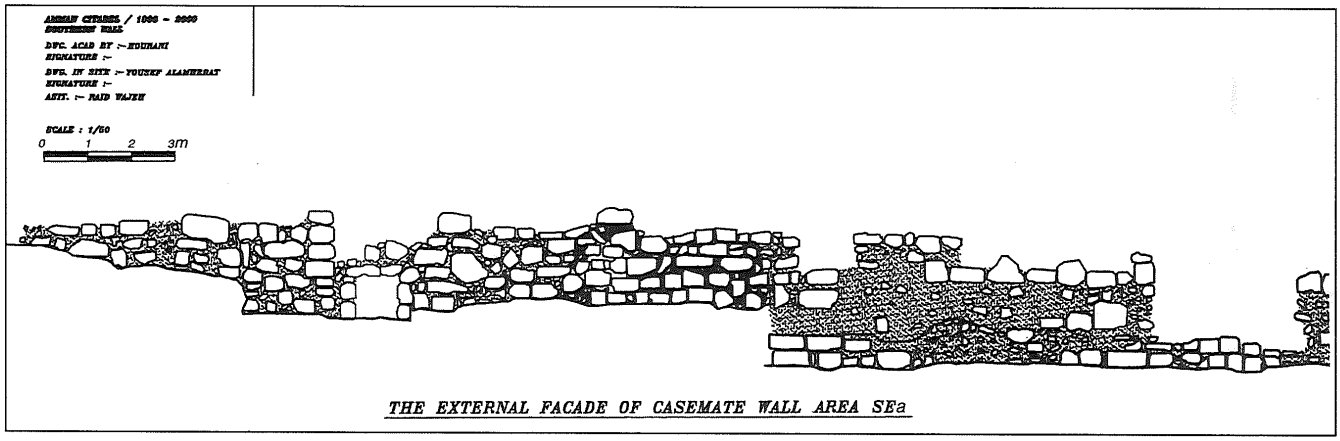
north-south over the Iron Age wall (**Fig. 15**). This wall is probably connected to the Hellenistic wall located in the southeast corner of the Lower Terraces (Area B), which was excavated by Zayadine in 1973 (unpublished report).

These walls were standing during the "Third Syrian War" (221-217 BC). Polybius (*Hist.* V,71,9) relates that Antiochus III the Great launched his troops on the conquest of Coele-Syria, learning that his enemies were concentrated Philadelphia. He besieged the city and installed his siege machines at two sections, maybe to the north and south. The defenders surrendered when a captured prisoner revealed to the besiegers the location of an underground passageway leading to the hidden water supply. They blocked the tunnel with "wood, stones and all such kind of things".

The deposits above a Hellenistic floor inside the parallel walls were formed of hard mud with spots of plaster covering it in some parts. It contains a large quantity of body sherds and inscribed Rhodain jar handles dating to the third-second centuries BC. A black decorated lamp (**Fig. 16**), is similar to one dated by Lapp to 200 BC (Lapp 1961),



10. The upper gate of the casemate.



11. Elevation of the outer façade of the casemate wall.

was found along with other lamp fragments, as well as sherds from plates and bowls of black and red colors (**Fig. 17**). Two bronze coin fragments were retrieved in a dark soil in a bad state of preservation, but we are able to identify the Ptolemaic eagle on the reverse (**Fig. 18**).

Under the previously mentioned floor, the Iron Age deposit is almost devoid of artifacts. This supports the interpretation of these layers as deliberate fill, which when removed uncovered the Iron Age floor of the casemate rooms, consisting of mud with pebbles. This deposit contained a few fragments of clay figurines, pointed marked jar handle, and a few plain and painted sherds belonging to the Iron II (**Fig. 19**).

The excellent state of these walls — and in the absence of any evidence for fire, military damage or repairs — negates the biblical story (*IISam.* 8.27.17) that King David destroyed the city walls during the siege of Rabbath Ammon.

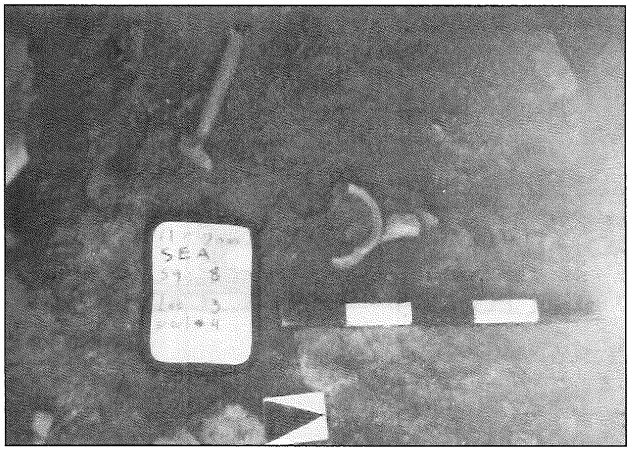
Mention should be made of another important structure that may be related to the casemate wall and refers to the Iron II period: an Ammonite palace or administrative building located about 30m from the casemate (Zayadine 1992). In 1968 and 1972/3, Zayadine also excavated parts of another Iron Age and a Hellenistic city wall at the southeastern corner of the Lower Terrace (Zayadine 1973; 1977-8).

In 1969, Dornemann identified in Area III at the outer side of the northern temple platform two Iron Age walls (E and F), set against the Middle Bronze Age glacis and intersecting at an angle that indicates a gateway or casemate fort, or the junction of the city wall (Dornemann 1983).

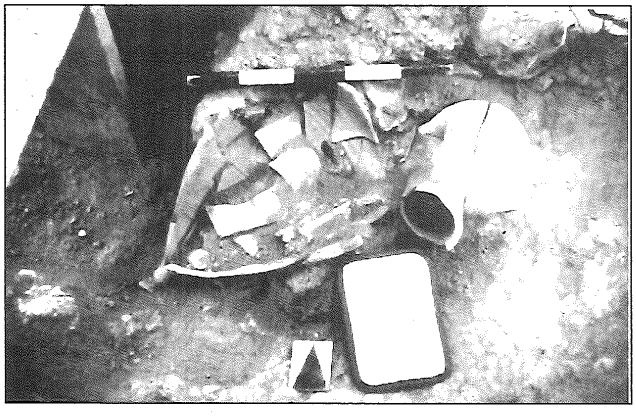
If these previously excavated walls were linked



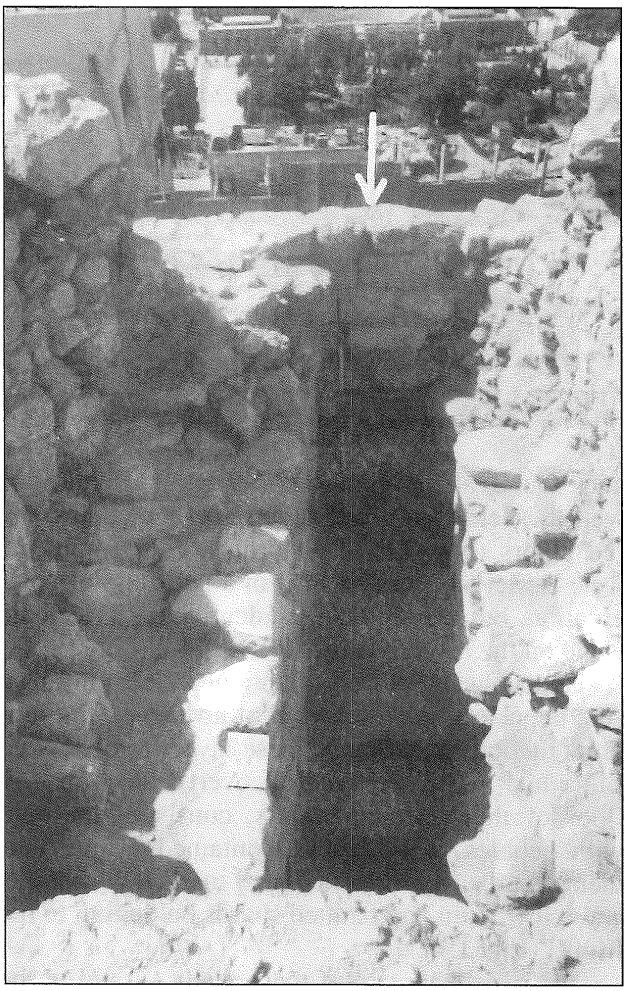
12. The small plastered entrance in Sq. 8.



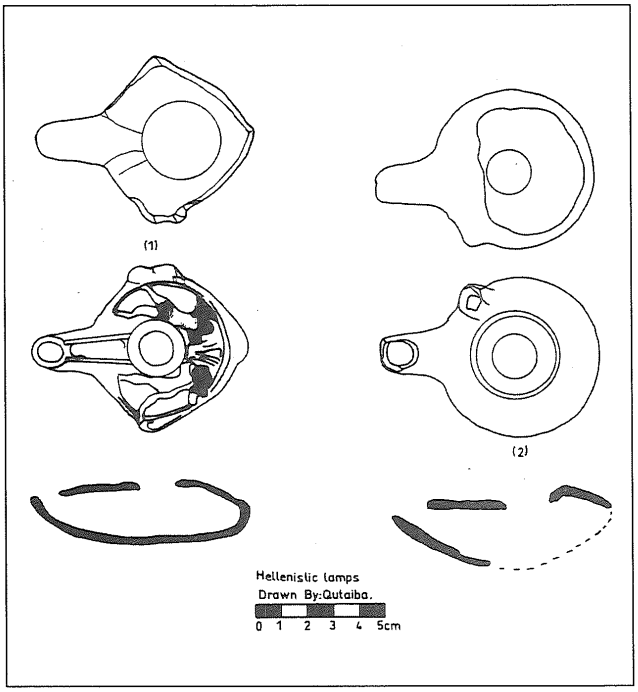
13. Hellenistic pottery sherds.



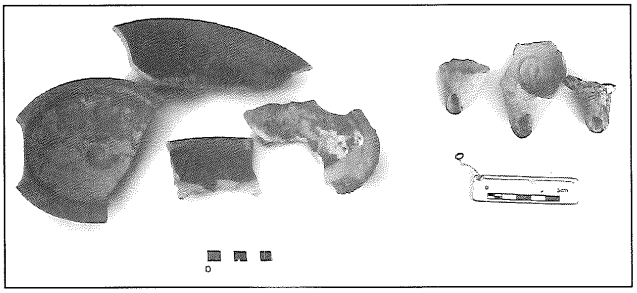
14. A broken Hellenistic Rhodain stamped jar in the small storeroom, Sq. 8.



15. Hellenistic wall based over an Iron Age II wall (Area SEa, Sq. 4).



16. Hellenistic period lamps. The one to the left is black ware decorated on two side with what could be a winged Eros.



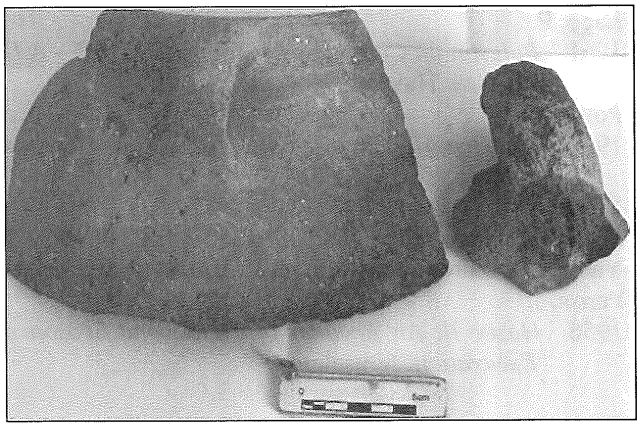
17. Fragments of plates and lamps from the Hellenistic period.



18. Hellenistic coin found over the floor.

to the casemate discovered in our excavations, then this proves that the Ammonite city was well fortified and surrounded by walls.

The existence of the Ammonite palace or administration building inside the casemate enables us to suggest that the Lower Terrace was a residential and administrational area in the Ammonite period. This discovery is very important for the history of this period, giving additional information about the Ammonite culture. It would be rewarding to continue the work in order to identify the other parts of the casemate wall and the city gate, in order to have a better understanding of the Ammonite city plan.



19. Fragment of a cooking pot dated to the Iron Age II, and marked jar handle.

S. Mansour
Department of Antiquities
Amman -Jordan

Bibliography

Aharoni, Y. (ed.)
1973 *Beer-Sheba 1: Excavations at Beer Sheba, 1969-1971 Seasons*. Tel Aviv.

Chadwick, R., Davieau, P.M. and Steiner, M.
2000 Preliminary Report of Excavations at Khirbat al-Mudayna on Wadi ath-Thamad (1996-1999). *ADAJ* 44: 257-270.

Dornemann, R.H.
1983 *The Archaeology of the Trans Jordan in the Bronze and Iron Ages*. Milwaukee.

Geraty, L.T., Herr, L. and Labianca, Ø
1987 The Madaba Plains Project: A Preliminary Report on the First Season at Tell el-'Umeiri and Vicinity. *ADAJ* 31: 187-199.

Glueck, N.N.
1977 Tell el-Kheleifeh. Pp. 713 -717 in M. Avi Yonah and E. Stern (eds.), *Encyclopedia of Archaeological Excavations in the Holy Land*. Oxford.

Hendawi, A.N.
1999 *The Edomite Fortresses in Jordan during the Iron Age*. Unpublished MA thesis, Yarmouk University, Irbid.

Herzog, Z.
1992a Settlement and Fortification Planning in the Iron Age. In A. Kempinski and R. Reich (eds.), *The Architecture of Ancient Israel: from the Prehistoric to the Persian Periods*. Jerusalem.
1992b Cities. In *The Anchor Bible Dictionary* :1.

Lapp, P.
1961 *Palestinian Ceramic Chronology 200 B.C. - A.D. 70*. New Haven.
Polybius
1923 *The Histories*. Trans. W.R. Paton. Loeb Classical Library.
Yadin, Y.
1970 Megiddo of the King of Israel. *BA* 33: 66 -96.
Yadin,Y., Aharoni, Y., Amiran, R., Dunayevsky, D. and Perrot, I.
1956 *Hazor II. An Account of the Second Season of Excavation*. Jerusalem.
Zayadine, F.
1973 Recent Excavations on the Citadel of Amman. *ADAJ* 18: 17-35.
1977-8 Excavations on the Upper Citadel of Amman, Area A (1975 and 1977). *ADAJ* 22: 20-56.
1992 Trois campagnes de fouilles à Amman (1988-1991). *RB* 1 (Janvier): 214-260.
Zayadine, F., Humbert, J.-B. and Najjar, M.
1989 The 1989 Excavations on the Citadel of Amman - Lower Terrace, Area A. *ADAJ* 33: 357-363.

PRELIMINARY REPORT ON THE WĀDĪ ASH-SHKĀFIYA SURVEY 2001

Friedbert Ninow

Introduction

The area of the central Moabite plateau (Arḍ al-Karak أرض الكرك) has seen a number of archaeological reconnaissance-surveys during the past decades. Among the most comprehensive was the "Archaeological Survey of the Kerak Plateau" in 1978-1982 under the direction of J. Maxwell Miller and Jack M. Pinkerton (see Kautz 1981; Miller 1991). This survey focused on the plateau area from the southern rim of Wādī al-Mūjib (وادي الموجب) to the northern rim of Wādī al-Ḥasā (وادي الحسا), from the edge of the Dead Sea escarpment in the west to Wādī an-Nukhaylah (وادي النخـيلة) in the eastern desert. While concentrating on the plateau itself, Miller did not investigate the western slopes (except for a short visit to Wādī Ibn Ḥammād وادي إبن حمّاد). In 1983 Udo Worschech began a systematic survey of Wādī Ibn Ḥammād and expanded the scope of his investigations to the entire region of the escarpment between Wādī al-Mūjib and the al-Karak region (Worschech 1985; see also 1990). This led him to begin excavations at Khirbat al-Bālū' (خـربة البالوع) in 1986 (see Worschech, Rosenthal and Zayadine 1986; Worschech 1989; 1992; Worschech and Ninow 1992; 1999). While all these investigations have been focusing on the Moabite plateau or the slopes to the Dead Sea, the Wādī al-Mūjib area has been left out.

Recently, an archaeological survey has been conducted in the area where the bridge along the King's Highway crosses the wadi. The Ministry of Water and Irrigation is building a new dam at this point. Since the planned reservoir will cover an estimated area of six square kilometers, it became necessary to assess all the archaeological sites which will be destroyed due to the dam construction (Abu Shmais and Waheeb 1999). Except for this survey no other archaeological investigation of this area has been conducted in recent years.

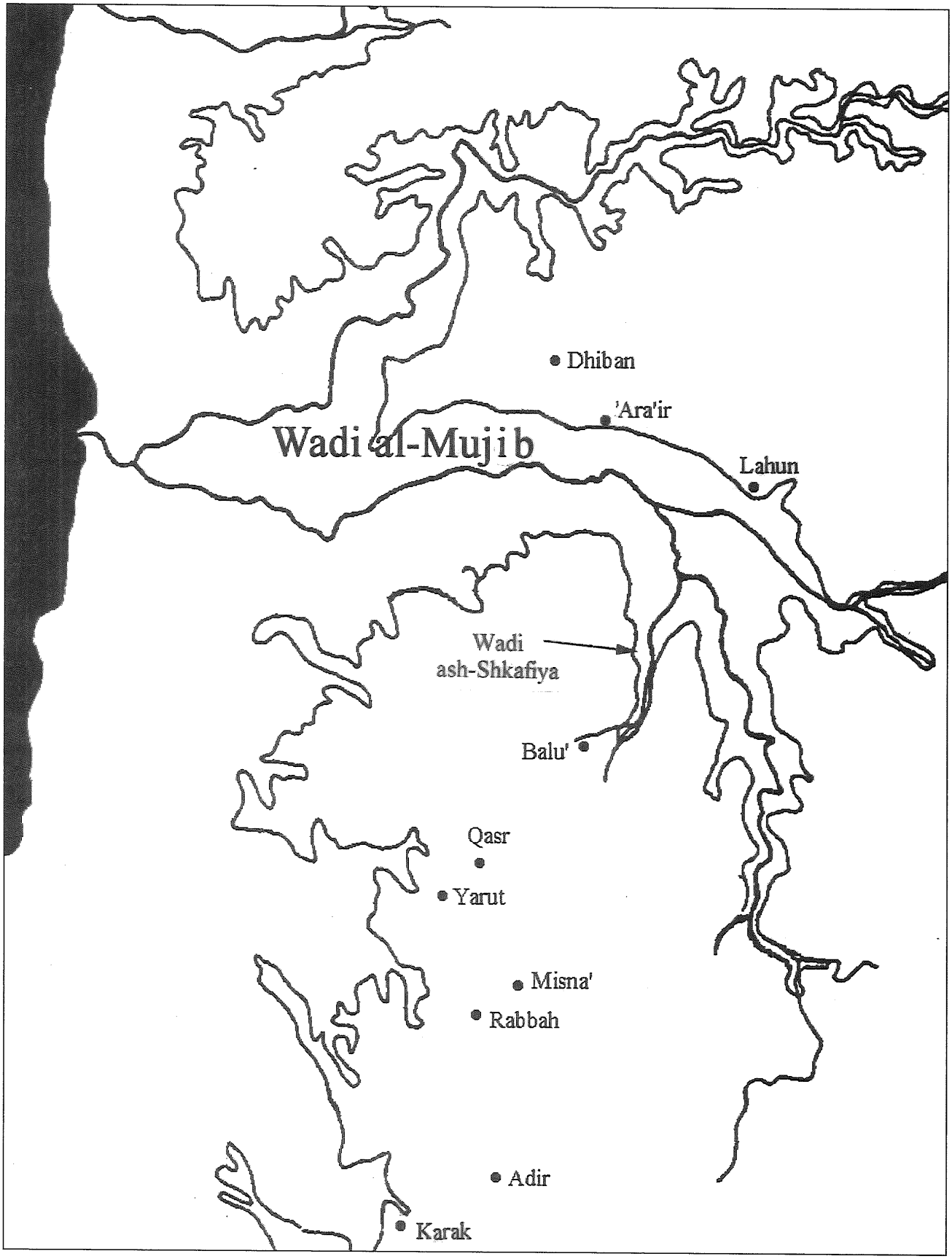
Ancient travelers who wanted to cross Wādī al-Mūjib with its various sub-wadi systems on the way from the northern Dhībān plateau (ذيبان) to the central Moabite plateau (or vice versa) had to find their way either on narrow paths winding up and down the deep slopes of the wadi or follow one of the tributary wadis that led upwards until they finally reached the plateau. If one considers the geomorphic picture of the Wādī al-Mūjib system and its tributaries it becomes clear that one of the major routes reaching the Moabite plateau is leading through Wādī ash-Shkāfiya (وادي الشكافية/ إشكافية). Near the plateau Wādī ash-Shkāfiya bifurcates into Wādī Abū al-Kibāsh (وادي أبو الكبـــاش, southward) and Wādī al-Bālū' (وادي البـالوع, westward). Adding to the importance of this tributary wadi is the fact that this possible ascent is guarded by the major Iron Age site of Khirbat al-Bālū' on the edge of the Moabite plateau (see **Fig. 1**). Since previous surveys have bypassed these wadis, this research has been investigating the archaeological remains of Wādī ash-Shkāfiya.

This first season of the reconnaissance survey was carried out in August 2001. The project was funded by the Deutsche Forschungsgemeinschaft (Bonn, Germany) and the Theologische Hochschule Friedensau (Friedensau, Germany). The members of the survey team were Bernina Ninow, Wernfried Rieckmann, and Friedbert Ninow. The representative of the Department of Antiquities was Ashraf Nayel al-Rawashdeh of Mu'ta.

Catalogue of Sites

During the 2001 survey, more than 50 different sites were located. Besides a couple of larger sites a great number of smaller sites (cairns, wall lines, water reservoir, etc.) were discovered. The survey started out in the area where Wādī ash-Shkāfiya. enters into Wādī al-Mūjib and followed Wādī ash-Shkāfiya in a southerly direction towards Khirbat al-Bālū'. The following catalogue of sites is a selection and represents the various kinds of sites that were discovered. The position of each site has been registered by Global Positioning System (GPS).

Site #1 - Khirbah
Position: N 31 24' 55.7; E 35 50' 01.9
Due to heavy agricultural activity at the mouth of Wādī ash-Shkāfiya, an ancient site has been bulldozed in order to create a field. In the slopes of this newly created field one finds remains of walls and large quantities of pottery fragments. A modern



1. Wādī al-Mūjib with Wādī ash-Shkāfiya.

rough road that leads eastward passes the site.
Pottery: Iron.

Site #3 - Khirbah
Position: N 31 24' 49.0; E 35 49' 28.0
The agricultural areas — which the local farmers call "al-Ma'mariyah المعمرية" — stretch from the actual bed of Wādī al-Mūjib southward up to the slopes that are cut by Wādī ash-Shkāfiya. Behind a water channel that forms the limit of the plantation an ancient site stretches out on an area of 300 x 50m. No name could be associated with this site. It is covered with several wall lines; some remains have the character of fortifications. This site probably represents a larger Roman fortification, which guarded the entrance of Wādī ash-Shkāfiya. It is, however, not comparable to the Roman fort at al-Lajjūn (اللجون).
Pottery: mostly Roman, some Iron sherds.

Site #4 - Cairn
Position: N 31 24' 56.9; E 35 49' 21.4
Probable tomb installation in the form of three stone circles partly consisting of massive blocks. A large stone stands in the center of the inner circle.
No pottery.

Site #8 - Dolmen
Position: N 31 24' 53.0; E 35 49' 17.1
The remains of a dolmen that is no longer intact. Due to possible earthquake activity the headstone of the dolmen has collapsed.
No pottery.

Site #9 - Khirbat al-Ma'mariyah (خربة المعمرية)
Position: N 31 24' 41-46; E 35 49' 24-17
The site of Khirbat al-Ma'mariyah stretches from the summit plateau of Jabal al-Ma'mariyah (جبل المعمرية) downward along the eastern slopes. The massive city walls are already visible from a distance. The site has the shape of a gigantic triangle. The top of the triangle forms a citadel (Position: N 31 24' 46.8; E 35 49' 16.0). The city wall consists of a massive casemate wall with a width of almost 5m. The outer wall alone has a width of 1.2m. Whereas the southern city wall is still almost complete, some parts of the northern wall — especially in the lower part of the city — have disappeared. Both sides of the city wall have a length of about 300m. While the citadel and most parts of the upper city are situated on a slightly sloping plateau, the remaining area of the city spreads out over a steep descent. Upper city and lower city are separated by special fortifications. At both sides of the outer city walls semicircular installations extend at that point. There was probably a clear line within the city that separated both parts of the city. The eastern city wall has almost completely disappeared due to erosion. The difference in elevation between the eastern city wall at the bottom of the city and the citadel on top of the plateau amounts to ca. 80m. The citadel dominates the highest point of Khirbat al-Ma'mariyah. It has a width of ca. 14m and a length of ca. 24m. Massive walls of up to 1.6m underline the defensive character of this fortification. The northern casemate is integrated into the citadel and runs parallel to it. The entrance appears to be at the northern side in the area of the casemate wall and leads into a spacious courtyard. There are a couple of smaller rooms in the western part of the citadel. The pottery shows that Khirbat al-Ma'mariyah was mainly occupied during the Iron Age. Due to the massive fortifications and the size of the site, Khirbat al-Ma'mariyah is one of the most important Iron Age sites between Wādī al-Mūjib and Wādī al-Ḥasā. At the point where the northern wall meets the eastern wall the remains of a massive tower could be located. In this area predominantly Roman pottery was found. The approach to Khirbat al-Ma'mariyah leads through a western pathway winding its way up the slopes of Jabal al-Ma'mariyah, surrounding the site and leading up to a saddle from which a small path leads to a gate situated in the southern city wall near the citadel. A second ascent approaches the city from the east leading through the steep slope directly beneath Khirbat al-Ma'mariyah.
Pottery: some Late Bronze, Iron, Roman, some Islamic.

Site #11 - Tower
Position: N 31 24' 36.7; E 35 49' 18.3
A passage leads from Khirbat al-Ma'mariyah in a southerly direction down to Wādī ash-Shkāfiya. On a small elevation overlooking the wadi are the remains of a round tower. The inner room has a diameter of 5.5m; the walls have a thickness of 1.2m. Just a few pieces of pottery could be found. This fortification probably guarded the access to the water of Wādī ash-Shkāfiya or a well nearby.
Pottery: Iron.

Site #13 - Rock Drawings
Position: N 31 24' 14.8; E 35 50' 11.3
Thamudic rock drawings, predominantly ibex; some Thamudic letters.
No pottery.

Site #14 - Cairn + Tower
Position: N 31 24' 28.5; E 35 49' 33.6

Two stone circles formed by massive blocks. The diameter of the outer circle is ca. 7m. The inner space of the circles is separated by a small wall of huge stones forming two inner rooms. At one side of the cairn a large wall extends. It appears that one of the inner rooms had been reused as a tomb during the Iron Age. This tomb has been opened recently. Various Iron Age pottery fragments and bone fragments are scattered throughout the immediate vicinity of this installation. A short distance further down the slope are the remains of a tower (3.2 x 4.0m) with scattered Iron Age pottery. The tower is situated just opposite of Khirbat al-Ma'mariyah.
Pottery: Iron.

Site #16 - Tower
Position: N 31 24' 33.2; E 35 49' 28.0
Remains of a massive tower (5.0 x 5.0m); mostly Nabataean-Roman pottery with some Iron Age (could have originated from a possible tomb underneath the tower). Nearby are the remains of a small water collection basin (2.0 x 1.5m) and a couple of water channels leading to this basin.
Pottery: some Iron; Nabataean-Roman.

Site #17 - Tower
Position: N 31 24' 27.5; E 35 49' 27.5
Remains of a Roman watch-tower.
Pottery: Nabataean-Roman.

Site #18 - Dam
Position: N 31 24' 26.6; E 35 49' 28.3
Remains of a possible dam that closed off a small wadi on the eastern slope of Wādī ash-Shkāfiya. The wall line of the dam can be traced over 25m. This water collection system is probably connected with Site #20 (see below).
No pottery.

Site #20 - Khirbat Abū as-Samin (خربة أبو السمن)
Position: N 31 24' 17.0; E 35 49' 28.0
Remains of a huge Nabataean-Roman fort. The fort is surrounded by a fortified wall on all sides (35 x 35m).Within the fort several wall lines and structures can be identified. Most of the walls consist of black basalt stones. Among the predominantly Nabataean-Roman pottery, some Iron Age sherds were found (among those we found a piece of painted Moabite ware). The fort is situated almost at the bottom of Wādī ash-Shkāfiya. Nearby is a well that springs up directly within the actual river bed of Wādī ash-Shkāfiya.
Pottery: Iron, Nabataean-Roman.

Site #24 - Qaṣr ar-Rahā (قصر الرها)
Position: N 31 24' 08.7; E 35 49' 19.3
At this point Wādī ash-Shkāfiya forms a natural loop creating an almost circular plain in the middle of the wadi. The plain is used today for agricultural purposes. At the northern edge of this loop rise the remains of a *qaṣr* with massive walls. The structure reminds one of the *qaṣr* at Khirbat al-Bālū'. The size of the *qaṣr* is 16 x 23m. At some places the walls reach up to 2m, built of massive basalt blocks. Various rooms and wall lines can be identified in the interior of the *qaṣr*. It appears as if this fortification had been surrounded by a protective wall. During the course of various settlement periods the *qaṣr* had experienced various building and rebuilding phases.
Pottery: Iron, Nabataean-Roman.

Site #25 - Fortification
Position: N 31 23' 11.9; E 35 48' 20.5
At the edge of the al-Karak plateau, where a modern rough road leads down to Wādī ash-Shkāfiya, a fortification is found that guarded a passage from the wadi up to the plateau. This ascent is still clearly visible from the edge of the plateau winding down through a field of basalt. Further down the slope the passage disappears and is no longer traceable.
Pottery: Iron, Roman.

Site #28 - Inscription
Position: N 31 22' 53.4; E 35 48' 27.6
Two lines of a Thamudic inscription.
No pottery.

Site #29 - Two Mills
Position: First mill N 31 23' 48.9; E 35 49' 05.4.
Second mill N 31 23' 52.8; E 35 49' 05.9
A little further to the south of Qaṣr ar-Rahā, another area of cultivated land stretches out in the bottom of Wādī ash-Shkāfiya. Among vineyards and fig trees remains of two ancient mills are located. They are of a similar type of mill to that already known from the mill remains in the Wādī al-Mūjib area. The ones in Wādī ash-Shkāfiya, however, are in a much better condition.
No pottery.

Site #32 - Cairns
Position: N 31 22' 34.2; E 35 48' 41.3
No pottery.

Site #34 - Tower + Cairn
Position: N 31 22' 33.2; E 35 48' 34.9
Roman watchtower (3.0 x 3.0m.) that is situated at

the edge of the plateau. It guards another passage leading from the wadi up to the plateau. This ascent is also traceable over a good distance. Roman Pottery can be found in the immediate context of the watchtower and the ascent.
Pottery: Roman.

Site #36 - Field of Cairns
Position: N 31 22' 27.7; E 35 48' 12.3
At the edge of the plateau there is a huge area covered with cairns. These cairns are made of black basalt stones. Some of the cairns have a megalithic character. There are about 50 cairns, possibly far more.
No pottery.

Site #37 - Fortification with Passageway
Position: N 31 22' 18.6; E 35 48' 39.8
At this point the wadi drops due to a natural basalt barrier. At the northwestern edge of this barrier the remains of a fortification and a passageway that leads further down into the wadi are visible. No pottery that can be clearly identified could be found.
Pottery: Iron?

Site #38 - Khirbat al-Mishshadah (خـربة المشّـده)
Position: N 31 22' 08.9; E 35 48' 33.0
Further to the south of the mills the remains of a fort can be identified. It is situated at the edge of a geological ridge that was formed by the wadi. Since the fort was built right at the edge, parts of the fort have been eroded away by running water. The remaining structures run parallel to the edge of the ridge.
Pottery: Iron, Nabataean-Roman.

Site #39 - Fortification
Position: N 31 21' 54.2; E 35 48' 24.1
In the area where Wādī al-Bālū' and Wādī Abū al-Kibāsh meet to form Wādī ash-Shkāfiya, a Roman fortification can be found. From here one has a good view at the area between Wādī al-Bālū' and Wādī Abū al-Kibāsh that leads up to Khirbat al-Bālū'. Thus this fortification occupies an important strategic position in regard to the main ascent up to the Moabite plateau.
Pottery: Nabataean-Roman.

Site #40 - Rock Drawing
Position: N 31 21' 37.4; E 35 47' 54.2
In the lower part of the area between Wādī al-Bālū' and Wādī Abū al-Kibāsh there are a number of Thamudic rock drawings. The predominant motifs are ibexes, but there are also lizards and oxen.
No pottery.

Site #41 - Inscription
Position: N 31 21' 46.6; E 35 48' 01.1
One line of a Thamudic inscription; various ibexes.
No pottery.

Site #42 - Rock Drawing
Position: N 31 21' 46.7; E 35 48' 02.7
Thamudic rock drawing; a bird, snake and human figure.
No pottery.

Site #43 - Fort
Position: N 31 23' 58.7; E 35 49' 50.8
East of Wādī ash-Shkāfiya and Wādī Abū al-Kibāsh a plateau stretches out which is called Khashm as-Sanīna (خشم السنينه). From the northern tip of this plateau an old passage leads down into Wādī al-Mūjib which is called Darb as-Sanīna (درب السنينه). About 130m below the point where this passage descends into the wadi a small Roman fort is situated. The outer walls have a length of about 25m. Various wall lines can be identified within the fort.
Pottery: Roman.

Site #47 - Khirbah
Position: N 31 22' 37.5; E 35 49' 16.0
At the edge of the Khashm as-Sanīna plateau there are the remains of a larger Roman settlement (ca. 50 x 100m). Several wall lines and installations can be identified.
Pottery: Roman.

Summary

This survey shows that the various wadis that lead into Wādī al-Mūjib were widely frequented during ancient times. Wādī ash-Shkāfiya, in particular, has a number of strong fortifications indicating that this wadi served as one of the major routes leading up to the Arḍ al-Karak plateau. A number of important sites could be identified and studied during this survey. Khirbat al-Ma'mariyah (Site #9) and Qaṣr ar-Rahā (Site #24) are particularly essential for the understanding of the occupational history of the plateau and the various routes that were accessing the Arḍ al-Karak plateau in ancient times. While Qaṣr ar-Rahā seems to have been occupied and used over quite some time (Iron - Roman), Khirbat al-Ma'mariyah stands out as a major Iron Age site that played a major role in guarding the ascent to the Moabite plateau from the north. As a tributary to Wādī al-Mūjib, Wādī ash-Shkāfiya seems to have been the main route con-

necting the northern Dhībān plateau with the southern Moabite plateau during the Iron Age. During later times the Romans used a new route that ran directly through Wādī al-Mūjib. However, the alternative access via the route through Wādī ash-Shkāfiya obviously remained an option for them since the wadi system was guarded by a chain of forts and watchtowers. Various ascents branched off the main route through Wādī ash-Shkāfiya and reached the plateau at various points that were also protected by fortifications. From there routes extended to the *Via Nova Trajana* which intersected the Moabite plateau further to the west.

Acknowledgments

I would like to thank Dr. Fawwaz al-Khraysheh, Director-General of the Department of Antiquities of Jordan, and his staff for supporting this project and for providing necessary assistance. This project received considerable help and assistance from our Antiquities Representative, Ashraf Nayel al-Rawashdeh, who although just married, nevertheless followed us into the desert. Special thanks to him.

F. Ninow
Theologische Hochschule Friedensau
An der Ihle 24b
39291 Friedensau
Germany

Bibliography

Abu Shmais, A. and Waheeb, M.
1999 Wadi al-Mujib Archaeological Survey. *ADAJ* 43: 545-547.

Kautz, J.R.
1981 Tracking the Ancient Moabites. *BA* 44: 27-35.

Miller, J.M. (ed.)
1991 *Archaeological Survey of the Kerak Plateau.* American Schools of Oriental Research Archaeological Reports 1. Atlanta: Scholars.

Worschech, U.
1985 *Northwest Ard el-Kerak 1983 and 1984: A Preliminary Report.* Biblische Notizen Beiheft 2. München: M. Görg.
1989 Preliminary Report on the Second Campaign at the Ancient Site of el-Balu' in 1987. *ADAJ* 33: 111-121.
1990 *Die Beziehungen Moabs zu Israel und Ägypten in der Eisenzeit.* Ägypten und Altes Testament 18. Wiesbaden: Otto Harrassowitz.
1992 El-Balu': A Moabite City in Central Jordan. Pp. 9-17 in S. Kerner (ed.), *The Near East in Antiquity: German Contributions to the Archaeology of Jordan, Palestine, Syria, Lebanon and Egypt,* Bd. III. Amman: Goethe-Institut, German Protestant Institute for Archaeology, Al Kutba.

Worschech, U. and Ninow, F.
1992 Preliminary Report on the Third Campaign at the Ancient Site of el-Balu (1991). *ADAJ* 36: 167-174.
1994 Preliminary Report on the Third Campaign at the Ancient Site of el-Balu in 1991. *ADAJ* 38: 195-203.
1999 Preliminary Report on the Excavation at al-Balu' and a First Sounding at al-Mina in 1997. *ADAJ* 43: 169-173.

Worschech, U., Rosenthal, U. and Zayadine, F.
1986 The Fourth Survey Season in the North-West Ard el-Kerak, and Soundings at Balu' 1986. *ADAJ* 30: 285-31

TALL ZAR'A IN WĀDĪ AL-'ARAB: THE "GADARA REGION PROJECT"

Dieter Vieweger
With contributions by Jens Eichner and Patrick Leiverkus

Introduction

The ruins of the Decapolis city of Gadara (Umm Qays أم قيس) are fascinating by their archaeological relevance as well as their extraordinary scenic location. The city is majestically sited on the northeasternmost mountain spur of the Jordanian Plateau, high above the Sea of Galilee (بحيرة طبريا), jutting out into the Jordan Valley. If one looks to the north, the hot springs of "Hammat Gader" (al-Ḥammah as-Sūriyya الحمّة السورية) in the Yarmūk Valley (وادي اليرموك) can be spotted. To the west lies the arable land of the nearby village, extending as far as Jabal aṭ-Ṭūr (جبل الطور, Mount Tabor) in the Galilee (al-Jalīl الجليل). Looking to the south, one discovers an unusually fertile valley: Wādī al-'Arab (وادي العرب). Nevertheless, its relevance for the antique city of Gadara and its pre- and post-classical development has hardly been paid any attention to until now (Hoffmann 1999). The wadi and the trade route running through it are dominated by a remarkable settlement — Tall Zar'a (تل زرعة) (**Fig. 1**).

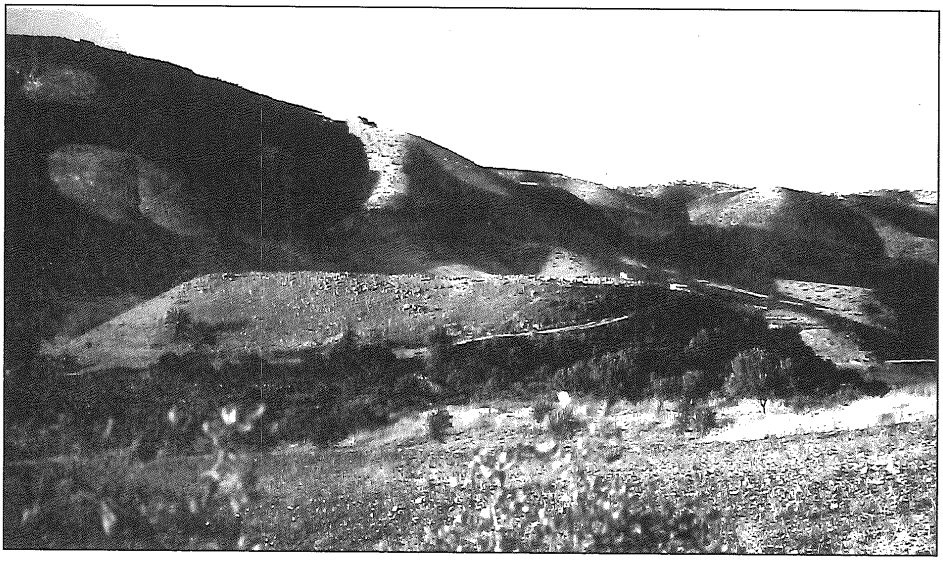
For the next ten years, an integrated study of the Wādī al-'Arab and the urban centers (Tall Zar'a, Gadara) will be the main research work of the Biblical-Archaeological Institute Wuppertal. The regionally oriented formulation of questions, taking into account the interplay of various factors within a region — and thereby questions relevant to the cultural development of that region covering several millennia — leads to an archaeology of a landscape.

The exploration, excavation, and conservation of the antiquities found in Tall Zar'a will be focal points of the archaeological project. The excavation of Tall Zar'a will be realized in a close and trusting cooperation with Dr. Karel J.H. Vriezen (University of Utrecht/Netherlands).

The Area

Wādī al-'Arab (32°35'N, 35°40'E) connects the Jordan Valley — and via Marj Banī 'Āmir (مرج بني عامر) also the Mediterranean coast — with the East Jordanian uplands. Following the wadi course, the tremendous ascent from the trough of the Jordan Valley (about 290m below sea level) up to the modern industrial city of Irbid (إربد, at about 560m above sea level; the surrounding chain of hills to the west near Bayt Rās بيت راس reaches about 612m above sea level) can be overcome without any inconveniently steep and narrow passages. Since nothing similar can be said about the Yarmūk Valley lying to the north, the outstanding geopolitical significance of the wadi can be understood, the more so as one can continue one's journey from the Irbid-Ramthā (الرمثا) basin directly to Damascus (northward), Baghdad (eastward) or 'Ammān (southward).

Together with its tributaries, Wādī al-'Arab has



1. South view of Tall Zar'a, on the mountain spur is ancient Gadara (all photos: Dieter Vieweger).

its source in the highland west of Irbid and drains into the Jordan. In the wadi itself, there are numerous springs, some of them thermal, in the western lowlands (**Fig. 2**). Annually about 28.8mm^3 of water flow/flowed through the wadi (Ahmad 1989: 273ff.). The ruins of former water mills (Steuernagel 1926: A 459.466f.; McQuitty and Gardiner, in prep.), channels hacked into the rock (**Fig. 3**) and some short watercourses overgrown with reeds still give an impression of the erstwhile abundance of water in this region. Today modern pump plants have drained the wadi almost completely. The peasants in the vicinity are taking what remains of the water, using power pumps, in order to irrigate their newly laid-out vegetable gardens and olive orchards.

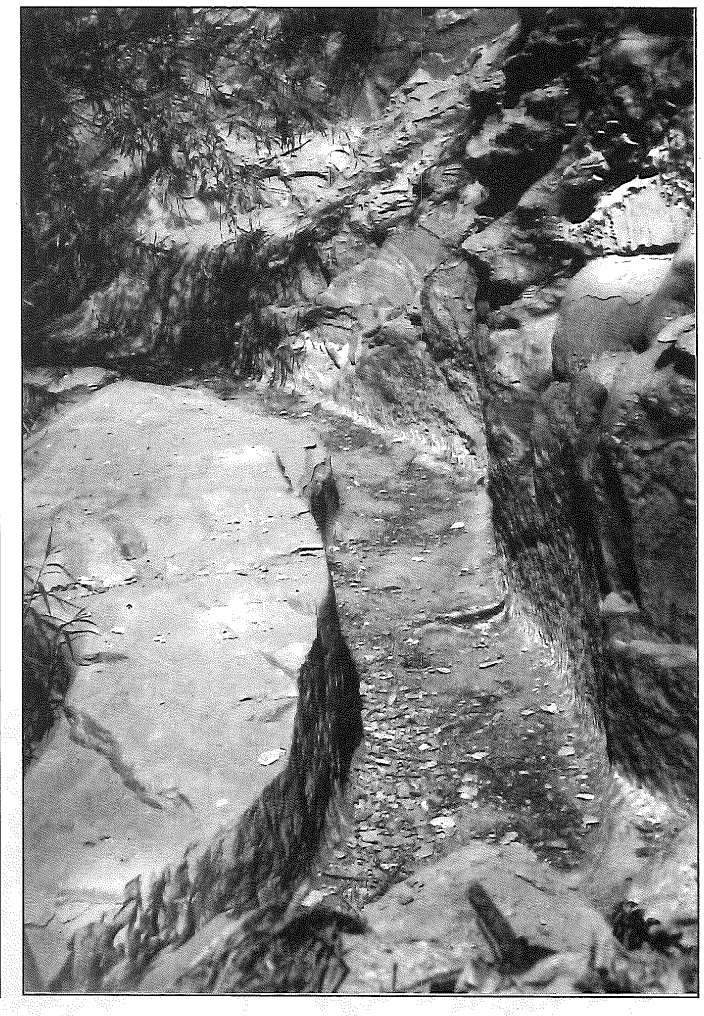
The modern dam in the lower part of the wadi was constructed in 1987. It has a capacity of up to 17.1 million cubic meters of water, serving the irrigation of agricultural ground in the lower Wādī al-'Arab, as well as fishing. Since it was put into operation, not only does the rainwater of the wadi-basin run into the reservoir, but during the rainy season additional water is pumped into it from the King Abdullah Channel.

In the wadi there is extensive grain agriculture. Due to the subtropical conditions (under plastic sheeting) green vegetables can be grown here even during the winter months, allowing for several harvests a year. In the lower wadi tropical and subtropical fruits can also be grown. The upper wadi, however, is quite rocky and therefore suited mainly for pasture.

Plants encountered in Wādī al-'Arab are the common reed *(Phragmites communis)*, oleander *(Nerium oleander)*, and tamarisks *(Tamarix aphylla)*. Many species of water birds visit the area in autumn and spring: the cattle egret *(Bubulcus ibis)*, the little egret *(Egretta garzetta)*, the great white egret *(Casmerodius albus)*, and the heron *(Ardea cinerea)*, as well as the teal *(Anas crecca)*, the coot *(Fulica atra)*, the redshank *(Tringa totanus)*, the marsh sandpiper *(Tringa stagnatilis)*, the greenshank *(Tringa nebularia)*, the pied kingfisher *(Ceryle rudis)*, the Smyrna kingfisher *(Halcyon smyrnensis)*, and the kingfisher *(Alcedo atthis)*. Besides, the water frog *(Rana ridibunda)* and various spe-



2. A spring in Wādī al-'Arab.



3. Channel in Wādī al-'Arab.

cies of perch (sp. *Tilapia zilli*) also live here.[1]

This idyllic view gives an impression, which will probably not last much longer though, of how fertile and green the whole lower wadi once used to be before modern power pumps started to supply water to the nearby industrial city of Irbid.

With 45-75% humidity, the average temperature in the wadi varies from 15°C in winter to 33°C in summer (Hanbury-Tenison 1984a: 386). Annual precipitation is about 380mm and occurs mainly in the period from the end of December until mid-February.

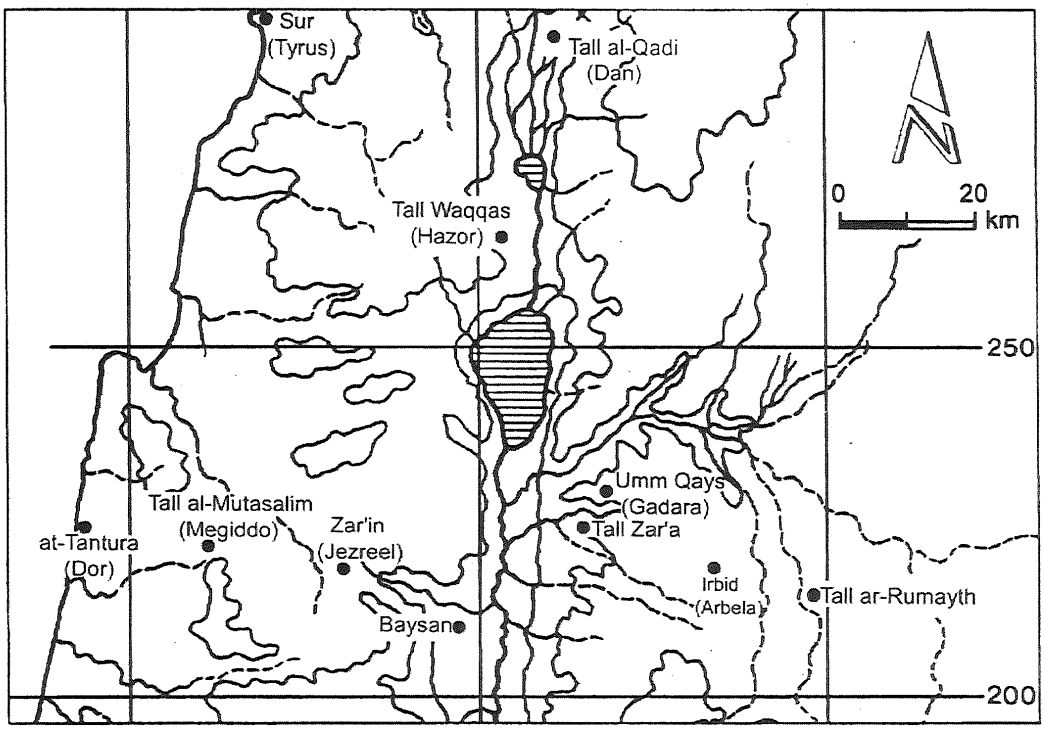
Tall Zar'a تل زرعة (Fig. 4)

Following the main modern Jordanian traffic route that runs south of the town of North Shūna (الشونة الشمالية) and ascends from 190m below sea level to the East-Jordanian uplands, branching off from the Jordan Valley into Wādī al-'Arab and leading up to the plateau via Wādī Abū Ṣāfī (وادي ابو صافي), Wādī Zaḥar (وادي زحر) and Wādī al-'Amūd (وادي العمود), one reaches a small settlement (at about sea level) after only a few kilometers. After driving about another 2km further northeast across some rough terrain, one reaches Tall Zar'a (2119.2252; plateau 160x160m; **Fig. 5**). After leaving the village and turning off from the main traffic route, the *tall* can be seen towering majestically over the reservoir (**Fig. 6**).

As the only notable elevation in the lower Wādī al-'Arab, Tall Zar'a dominates the latter. Not only are Gadara/Umm Qays and its sanctuary *extra muros* within eyesight, but to the west the narrow entrance to the wadi can also be overlooked, as well as the potential crop fields in its western and central parts. Likewise, the terraced slopes on the mountain spur (tillable during the rainy season) are within view toward the east as well as the hillside of the wadi forming a wide semicircle from the east to the south and west (suitable for breeding small livestock).

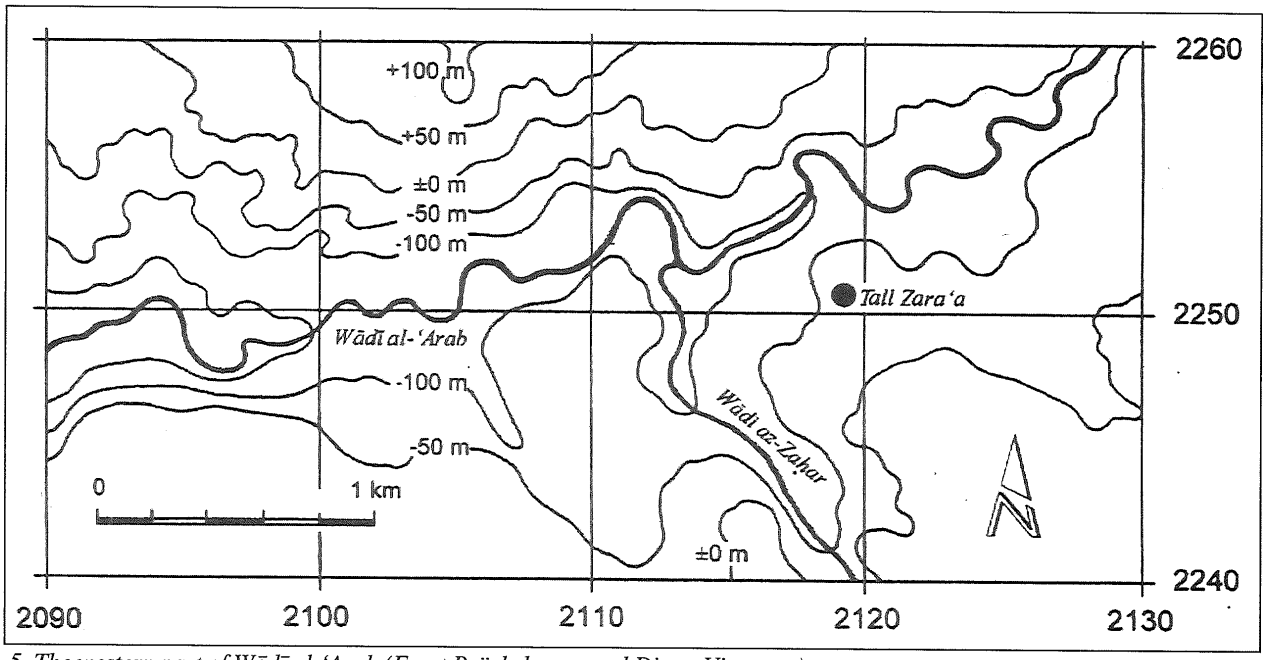
Therefore it is not surprising that in the Early Bronze Age the *tall* was already used for a hilltop settlement and served this purpose repeatedly well into the Middle Ages. Its geological, agricultural and geostrategic advantages (to the north and east the hill is protected by sheer rock faces, to the east and south it obviously overtops the surrounding area by about 22-25m; see **Figs. 1 and 7**) are not to be overlooked.

On the south side there is a modern approach to the plateau (**Fig. 8**). Because of the fact that this path was dug deeply into the *tall* by a bulldozer, it cuts through a recent water reservoir with a plastered interior and, on the inclined lower stretch of the path, through a building constructed with *spolia*, as well as through old wall courses halfway up and on the upper stretch. This approach does thus

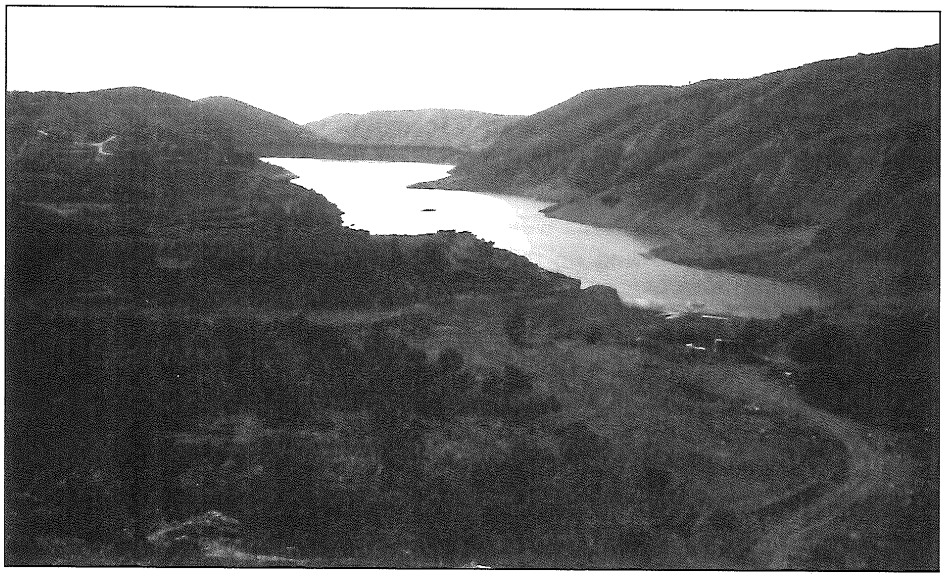


4. The geographic location of Tall Zar'a (by Ernst Brückelmann/Jens Eichner/Dieter Vieweger).

1. Source: MMRAE (Ministry of Municipal and Rural Affairs and the Environment), National Environment Strategy for Jordan. A Resource Book of Information and Guidelines for Action. IUCN-The World Conservation Union. Gland (Switzerland) 1991, Pp. 226ff.; Ahmad 1989: 273ff. and http:www.wetlands.agro.nlWetland_Inventory/MiddleEast Dir/Doc_chapters/JORDAN.doc.



5. The western part of Wādī al-'Arab (Ernst Brückelmann and Dieter Vieweger).



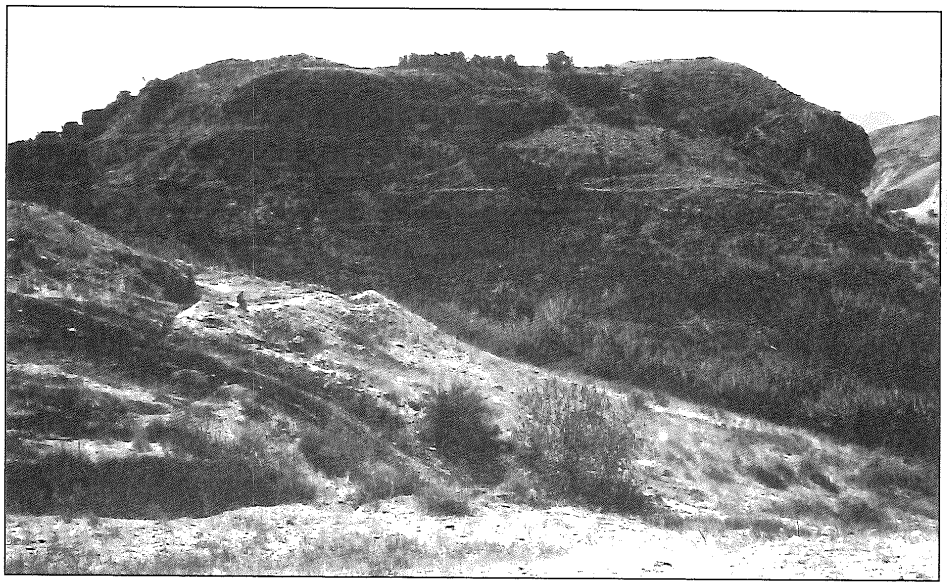
6. Looking westward from Tall Zar'a into Wādī al-'Arab.

not correspond to the topographical conditions of the *tall*.

The south flank of Tall Zar'a offers the best opportunity to comfortably overcome the 25m difference in height, via a 150m long track. The terrace-like edge, which gradually leads from the southwest bottom of the *tall* up to the more spacious plateau in the northeast and now carries irrigation pipes, obviously worked to the advantage of the previously existing old track. Unfortunately, in recent times this track was dug to a depth of more than 50cm for almost its entire length, when irrigation pipes were laid from the well to the nearby olive orchards. As a result, it was badly churned up.

The prominent rocky ledge in the southeast, where the old track reaches the plateau, offers plenty of space for an unproblematic hairpin turn to the west, opening the way to the center of the *tall*. On the *tall*-oriented bank of the upper stretch of the track there is a huge pile of cultural deposits, into which a hole of 4.5m depth was dug by robbers (though it reached neither the natural rock nor any undisturbed layers). The lower layers yielded Iron and Bronze Age sherds. The former building at this place may have served for the protection of the gate construction.

The ledge also used to contain the natural drain of the artesian well of the *tall*. Traces of sinter can be observed here following the erstwhile flow of the water. There are even combinations of stalactites and stalagmites which can be admired in a



7. Tall Zar'a from the east.



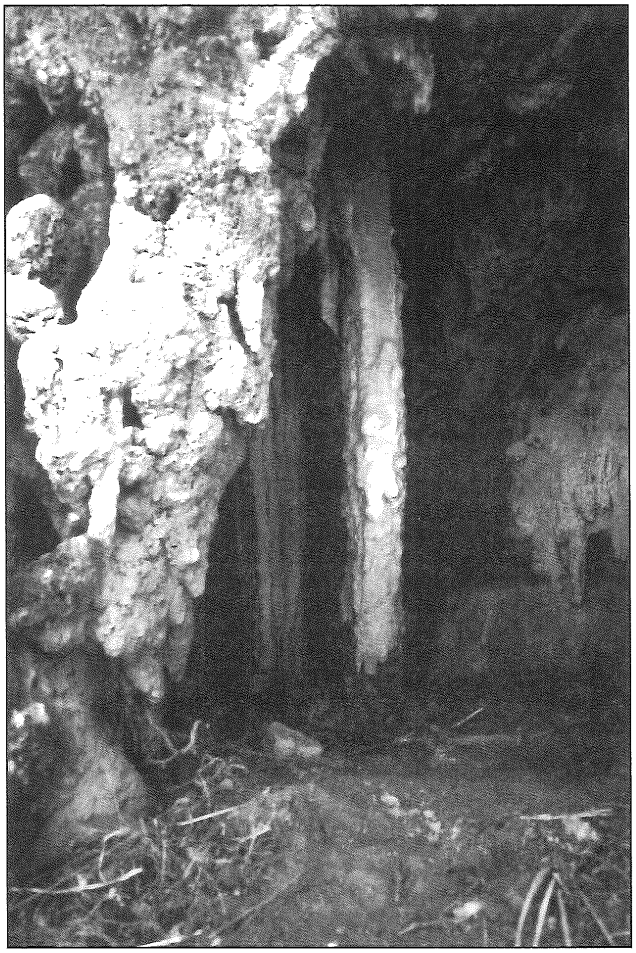
8. The bulldozer-made approach on the southern side of Tall Zar'a.

small stalactite cave halfway up the rock face (**Fig. 9**). They are witness to a substantial flow of water over long periods.

The plateau of Tall Zar'a is characteristically determined by a hollow in the central section (i.e., a well) and by the aforementioned slightly sloping access route in the southeast (formerly serving the natural drainage of spring water, **Fig. 10**). Cultural deposits 4 to 6m deep have formed a broad, slightly undulating band that seems to encircle the center of the plateau. Obviously these deposits — produced by human settlement activity — could accumulate much faster and more unchecked here than in the vicinity of the well where the continuous movement of water, including flooding, has to be considered.

About one third of the plateau surface is used for agriculture. In classical times the southwestern part of the plateau had no doubt a distinctive function. Littered with ashlars that had been worked and reworked many times and Roman-Byzantine potsherds, it repeatedly became an objective for unsuccessful treasure seekers. The discovery of a pedestal (**Fig. 11**) as well as some basalt pillar fragments apparently heightened their frenzy. Noteworthy is a square aperture carefully framed with four trimmed stones which leads into a big cistern with a domed vault of trimmed ashlars (**Fig. 12**). The cistern, measuring 6x10.5m in width and maximally 5.75m in depth, was originally covered with a double layer of plaster about 8cm thick. From the start it was laid out to contain construction elements allowing for future extensions by corbeling. The floor of the cistern shows a secon-

dary partitioning by walls and evidently served temporarily as a shelter or storage facility.



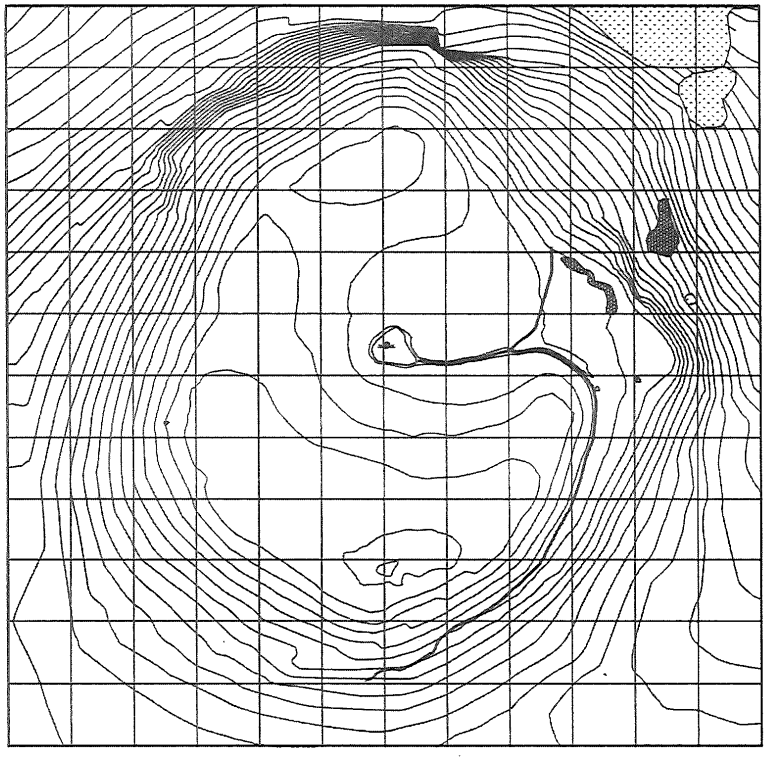
9. Stalactite cavern on the eastern side.

The northern terrace of the *tall*, which is surrounded by Wādī al-'Arab forming a wide curve, may have once served as a kind of lower city or accommodated a settlement, connected, in whatever way, to Tall Zar'a. A house built with *spolia*, ruins of a house in the center of the terrace and additional outlines of (probably recent) houses in the south suggest this possibility. But not too long ago the terrace was extensively leveled by bulldozers to create space for a new olive orchard. As a result the cultural layers were thoroughly disturbed and mostly destroyed to piles of displaced stones and earth covered with predominantly Roman-Byzantine sherds.

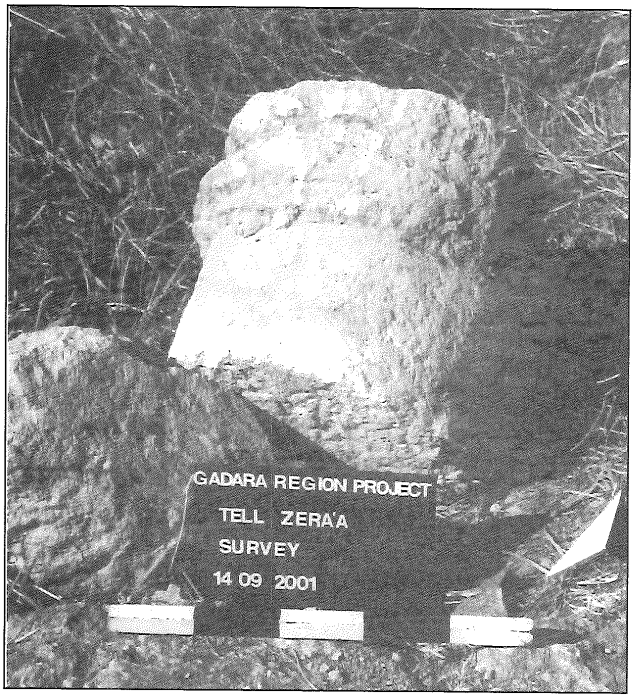
Previous Research

The first archaeologist to recognize the archaeological importance of Wādī al-'Arab was Gottlieb Schumacher (1890: 142f.). Carl Steuernagel (1926: A 464-467) comprehensively wrote about it in the *Zeitschrift des Deutschen Palästina-Vereins*. Subsequently, this information was taken up by Felix Abél (1967: 35f.). Nelson Glueck (1951: 182) visited the wadi in 1942. On that occasion he also reported on the "singularly imposing and completely isolated hill of Tall Zera'ah ...".

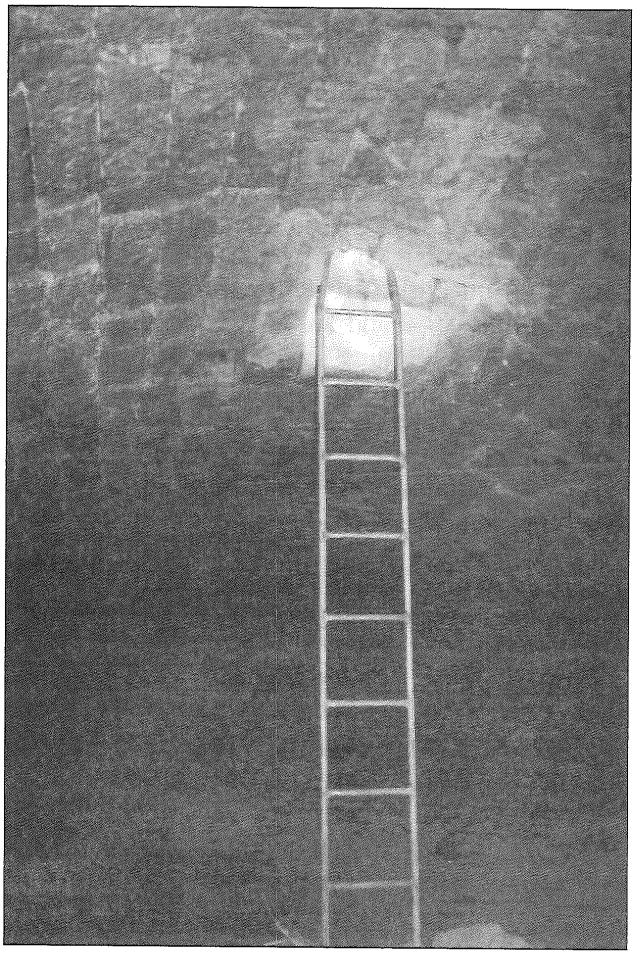
To the north, Wādī al-'Arab adjoins the survey area explored by the Deutsches Archäologisches Institut Berlin ("Gadara/Umm Qais-Survey"; Nadine Riedl). The Jordan Valley to the west (e.g., de Contenson 1960: 12-98; Mellaart 1962: 126-158; Ibrahim *et al.* 1975: 41-66) and the area around Irbid facing east ("Beit Ras Survey") have also been



10. Map of Tall Zar'a (each square is 20 x 20m).



11. Pedestal.



12. Cistern.

investigated (e.g., Lenzen and McQuitty 1988: 270).

In the wadi itself two archaeological explorations have been undertaken until now: The surface inspection, which took place on the 14th and 15th of March 1978, was an archaeological rescue investigation considering the then planning phase of the Wādī al-'Arab dam construction. The project was initiated by the Jordan Valley Authority and the Department of Antiquities of Jordan. The team consisted of John M. Lundquist, Terrence M. Kerestes (University of Michigan), Bryant G. Wood (University of Toronto) and Khair Yassine (University of Jordan). The results were published as a joint project: "An Archaeological Analysis of Three Reservoir Areas in Northern Jordan" (Kerestes *et al.* 1977/78: esp. 129).

In September 1983 the first campaign of the archaeological survey, supervised by Jack Hanbury-Tenison (1984a: 385-424, 494-496), was carried out in Wādī al-'Arab. His team included Alison McQuitty, Mark Hardiner and Nasser Khasawneh. Within 18 days of fieldwork, 25 square kilometers were examined, and 102 archaeologically relevant sites were documented (Hanbury-Tenison 1984a: 389, 398, 403).

Survey

1. Methods and Procedures

For the *tall* survey conducted in autumn 2001, Tall Zar'a was parceled out into 5x5m squares, oriented to the Palestine Grid. The north-south axis was labeled with letters, the east-west axis with numbers. For the purpose of the survey, 16 squares made up *one* survey square of 20x20m. To simplify matters, survey squares were labeled with the name of the southwesternmost 5x5m square. Thus, survey square V 117, for example, identifies all squares on the coordinates V-Y/117-120 **(Fig. 13).**

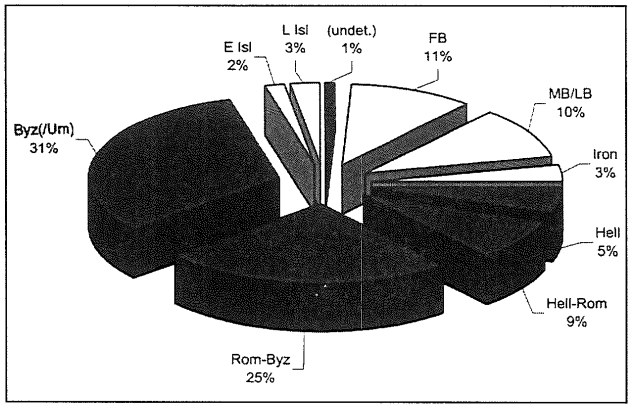
The survey area covered the whole *tall* and all its slopes. In all, 127 survey squares of 20x20m size were searched, i.e., 5.08ha.

To obtain truly comparable survey results measures were taken which ensured a uniform standard for the gathering of sherds: the teams were instructed jointly and formed according to the same criteria (composed in the same way concerning personnel), and a time standard was fixed allowing enough time for the treatment of single survey squares; teams were supposed neither to fall below nor exceed the standard.

For exemplary purposes several survey methods were applied: in addition to the complete gathering of all visible artifacts on the surface, a surface exploration was performed according to the guidelines described by Portugali 1981 (which implied the examination of the *tall* surface to a depth of about one shovel). The focus here was on the ques-

Y 117	Y 116	Y 119	Y 120
X 117	X 116	X 119	X 120
W 117	W 116	W 119	W 120
V 117	V 116	V 119	V 120

13. Survey squares and their denotations.



14. Chronological classification of all pottery found on Tall Zar'a (excluding the Portugali Survey).

tion of whether the Portugali method, apart from a quantitative increase in the amount of artifacts, also allowed an essentially different qualitative prediction. Finally, we tested whether the results of the complete *tall* survey could have been achieved without the substantial amount of energy spent, that is, by using random or directed sampling methods.

2. The Tall Survey

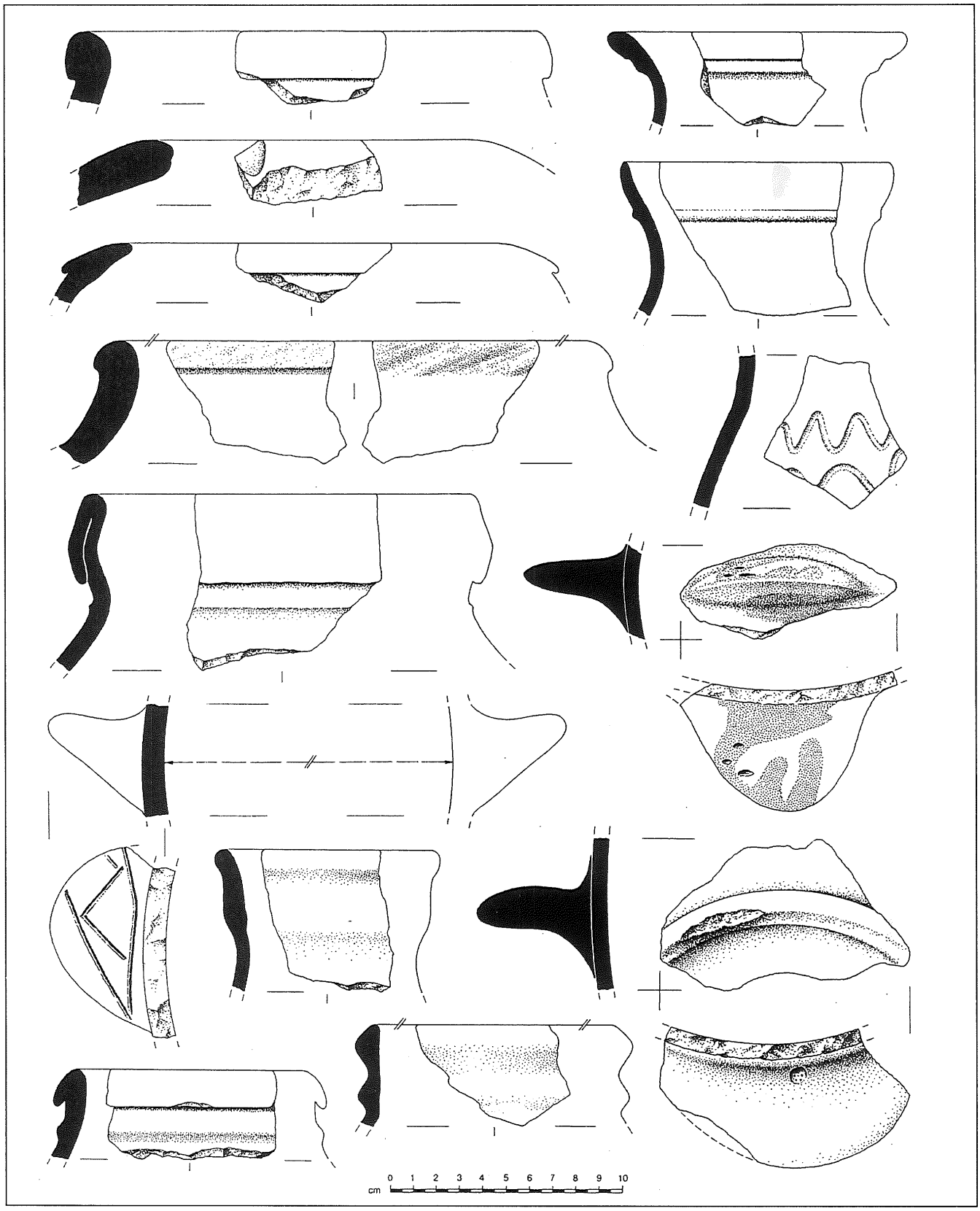
Altogether 24,059 sherds (plus many vestiges of Roman-Byzantine roof tiles) were found and catalogued (**Fig. 14**), 22,318 of these in the course of the surface inspection of Tall Zar'a and another 1,741 during the survey based on the Portugali method (15 squares of 5x5m each). Out of the total number of sherds 2,847 were diagnostics. All sherds were evaluated both qualitatively and quantitatively. We examined and described 48 different wares and classified them into 9 chronological groups (**Figs. 15-21**).

First of all the chronological classification of the pottery gathered substantiates a long period of settlement activity on Tall Zar'a, which reaches from the Early Bronze Age well into the Ottoman period (**Table 1**). However, the sherds were not distributed evenly over the *tall*. The different quantities of sherds found in the various zones of the *tall* (to begin with, a distinction was made between the plateau and the slopes) demanded thorough evaluation.

In order to enable a comparison of the above listed quantities of sherds found in zones of different sizes, the following diagram (**Fig. 22**) shows the percentage distribution of the chronologically classified pottery in every single zone. The obvious difference between the finds from the plateau and those from the slopes is conspicuous. On the plateau finds of later periods dominate. Particularly Hellenistic to Byzantine (79%) and, at a lower level, Islamic (7%) pottery was found here in considerable numbers. Yet within the latter group of wares only Middle and Late Islamic pottery differentiate significantly (5% on the plateau against 1-2% on the slopes). On the plateau the prehistoric periods (from Early Bronze to Iron Age) reach a quota of only 14% and are thus underrepresented. This appears to be quite plausible considering the huge amount of cultural deposits measuring 5-6m in depth, as will be shown below. These quantitative differences do not necessarily reflect the intensity of settlement activities during the epochs they represent.

***Table 1:** Chronological classification of pottery found on Tall Zar'a (excluding the Portugali survey).*

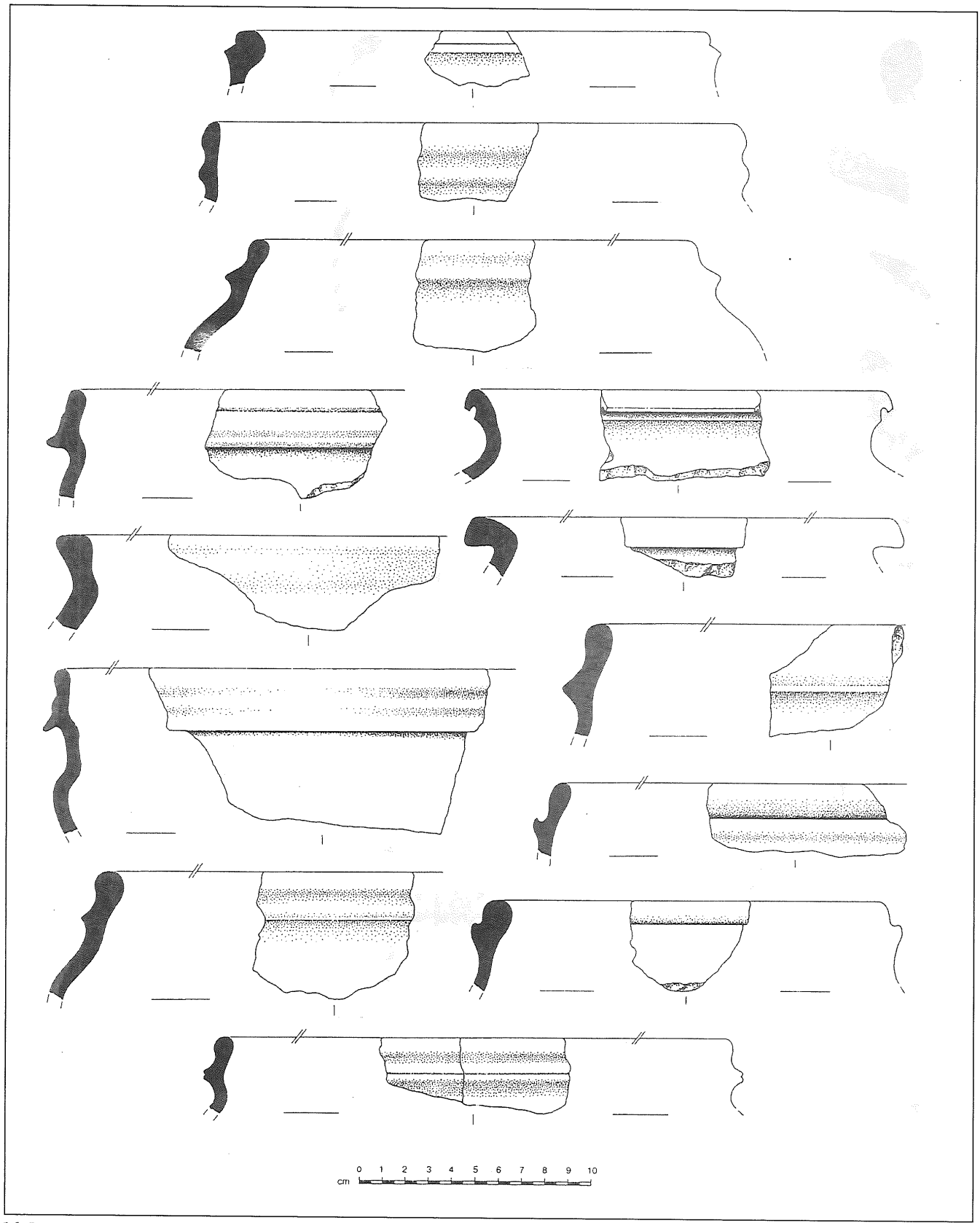
	East	South	West	North	Plateau	Σ
Undetermined (undet.)	68	17	26	48	32	191
Early Bronze Age (EB)	394	671	675	405	214	2359
Middle/Late Bronze Age (MB/LB)	308	197	355	717	695	2272
Iron Age (Iron)	198	124	152	210	74	758
Hellenistic Period (Hell)	147	124	191	311	419	1192
Hellenistic-Roman Period (Hell-Rom)	298	342	429	351	508	1928
Roman-Byzantine Period (Rom-Byz)	524	656	990	1327	2044	5541
Byzantine(-Umayyad) Period (Byz[/Um])	621	1507	1167	1529	2301	7125
Early Islamic (E Isl)	59	64	61	83	107	374
Late Islamic (L Isl)	38	94	94	41	311	578
Total result	2655	3796	4140	5022	6705	22318



15. Early Bronze Age wares.

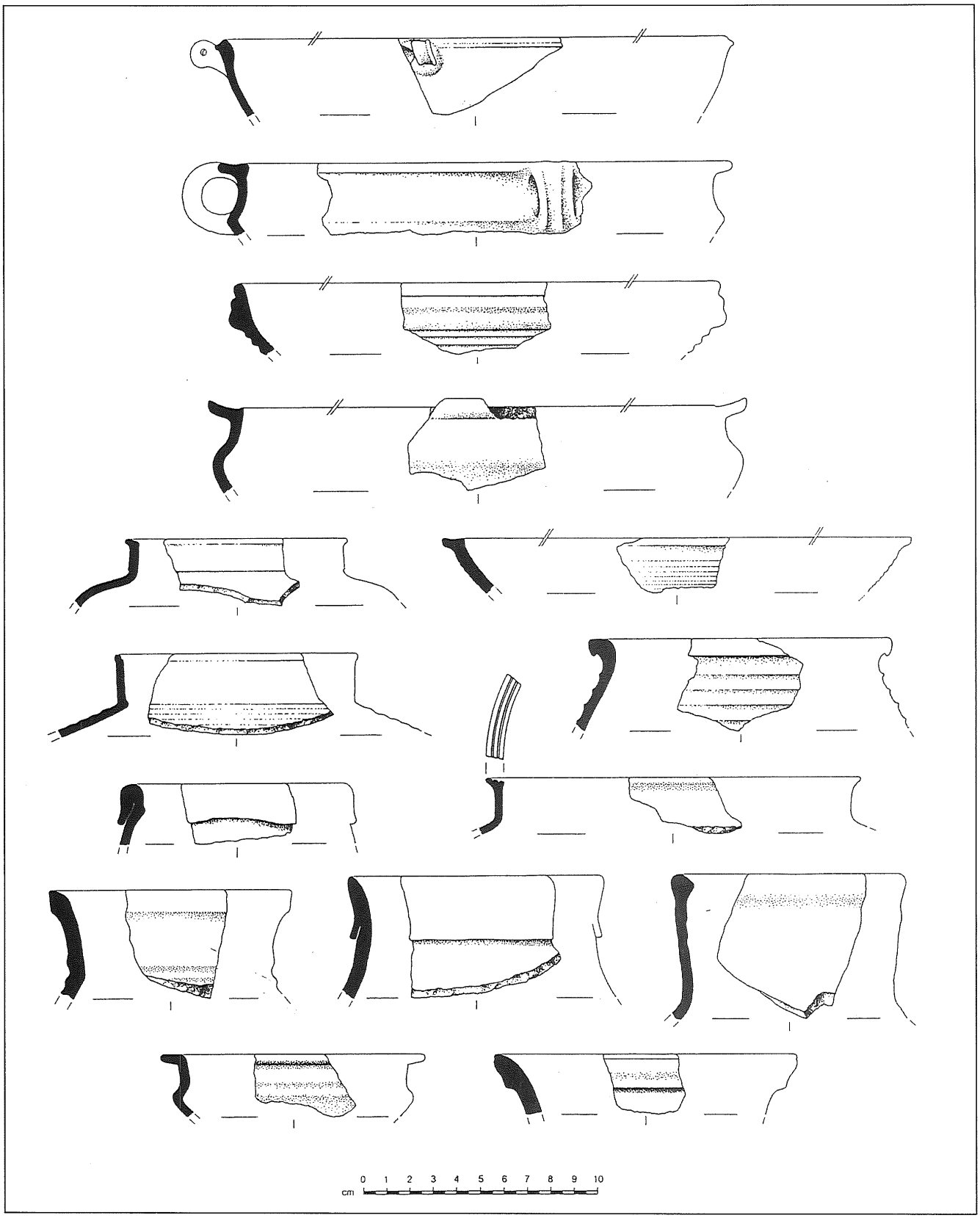
The vast majority[2] of the prehistoric sherds (Early Bronze till Iron Age) were found on the slopes of the *tall* (from 28% on the north up to 34% on the east side) where, along its extensive

2. On the slopes of Tall Zar'a, we found ten times as many Early Bronze Age sherds and nine times as many Iron Age sherds as on the plateau. Concerning the finds from other periods, this proportion averages about 2:1 (slopes:plateau).



16. Iron Age wares.

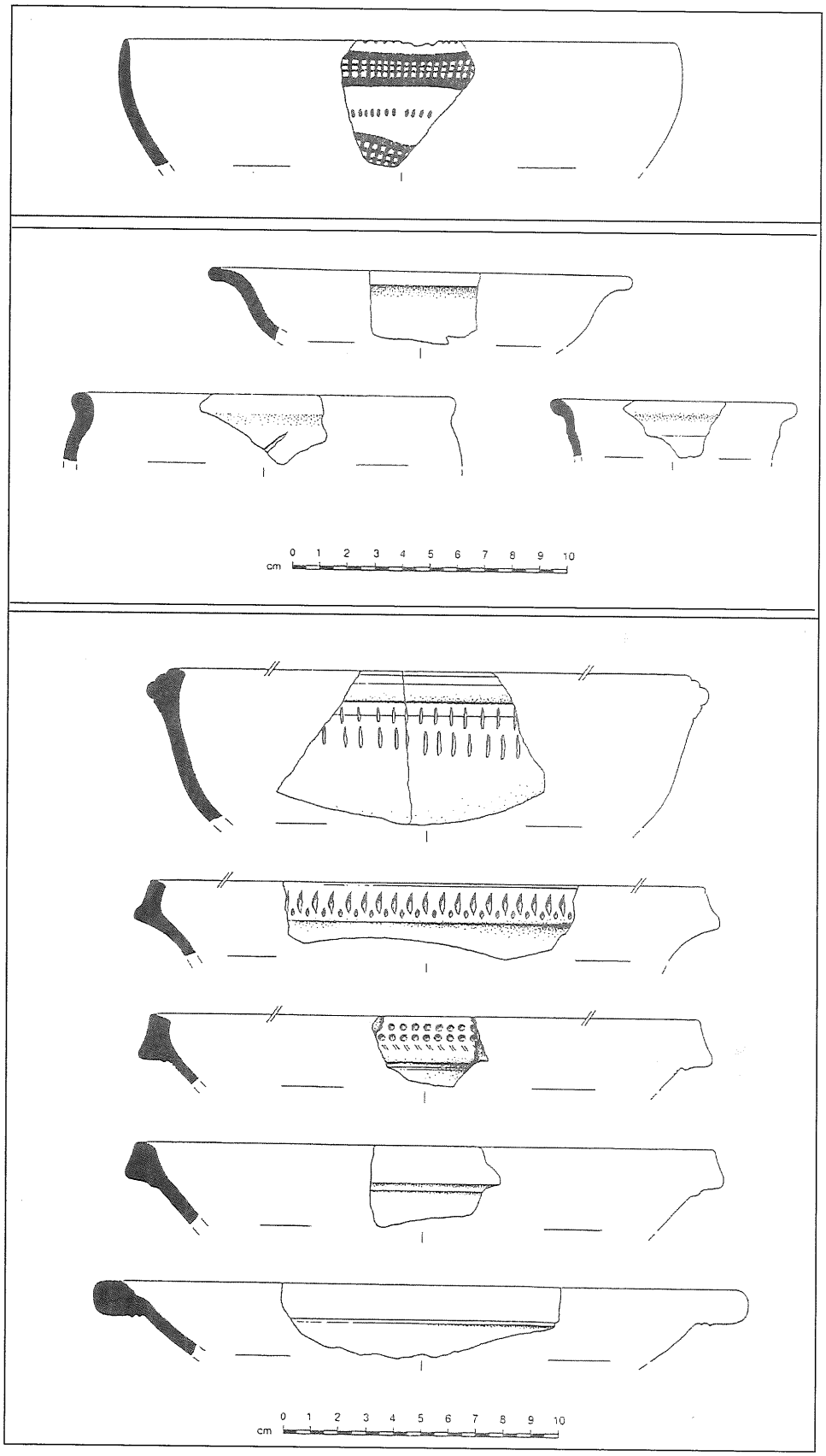
edges, the prehistoric layers were not covered by later strata as much as on the plateau. Whereas Iron Age sherds were collected in almost comparable quantities on all slopes of the *tall*, Early Bronze sherds were concentrated on the east, south and west slopes (15-18% against only 8% on the north



17. Fine red wares.

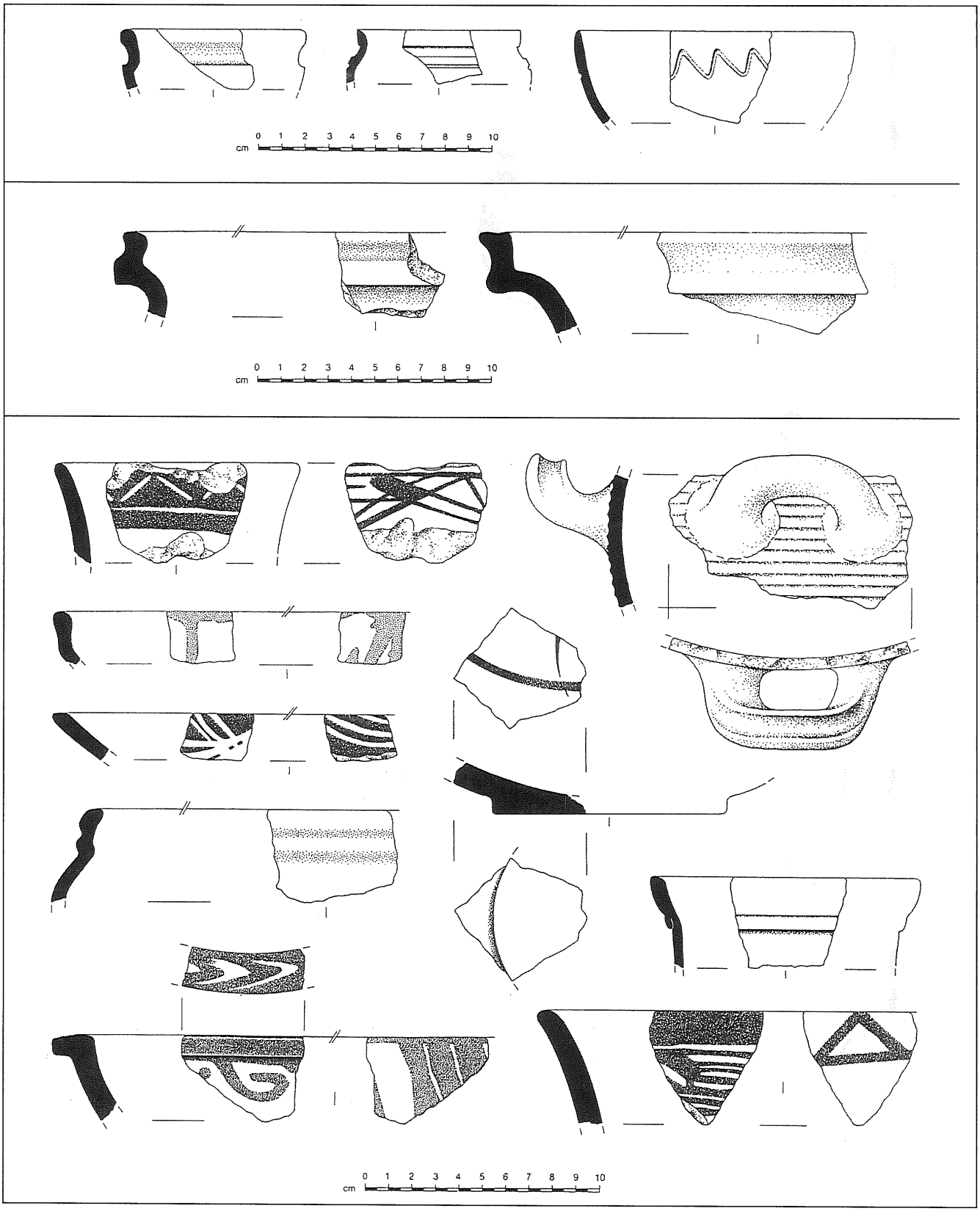
slope). Middle and Late Bronze finds occurred most frequently on the east and north slopes (12 and 14%, respectively).

As expected, the average amount of finds per survey square on the plateau was high, namely 203 sherds per survey square; yet this amount was also found on the rocky northern slope that descends steeply to Wādī al-'Arab. Along its edges and at



18. White Slip Ware (Cyprus/import) (top); fine wares (centre); Late Roman C/African Red Slip (bottom).

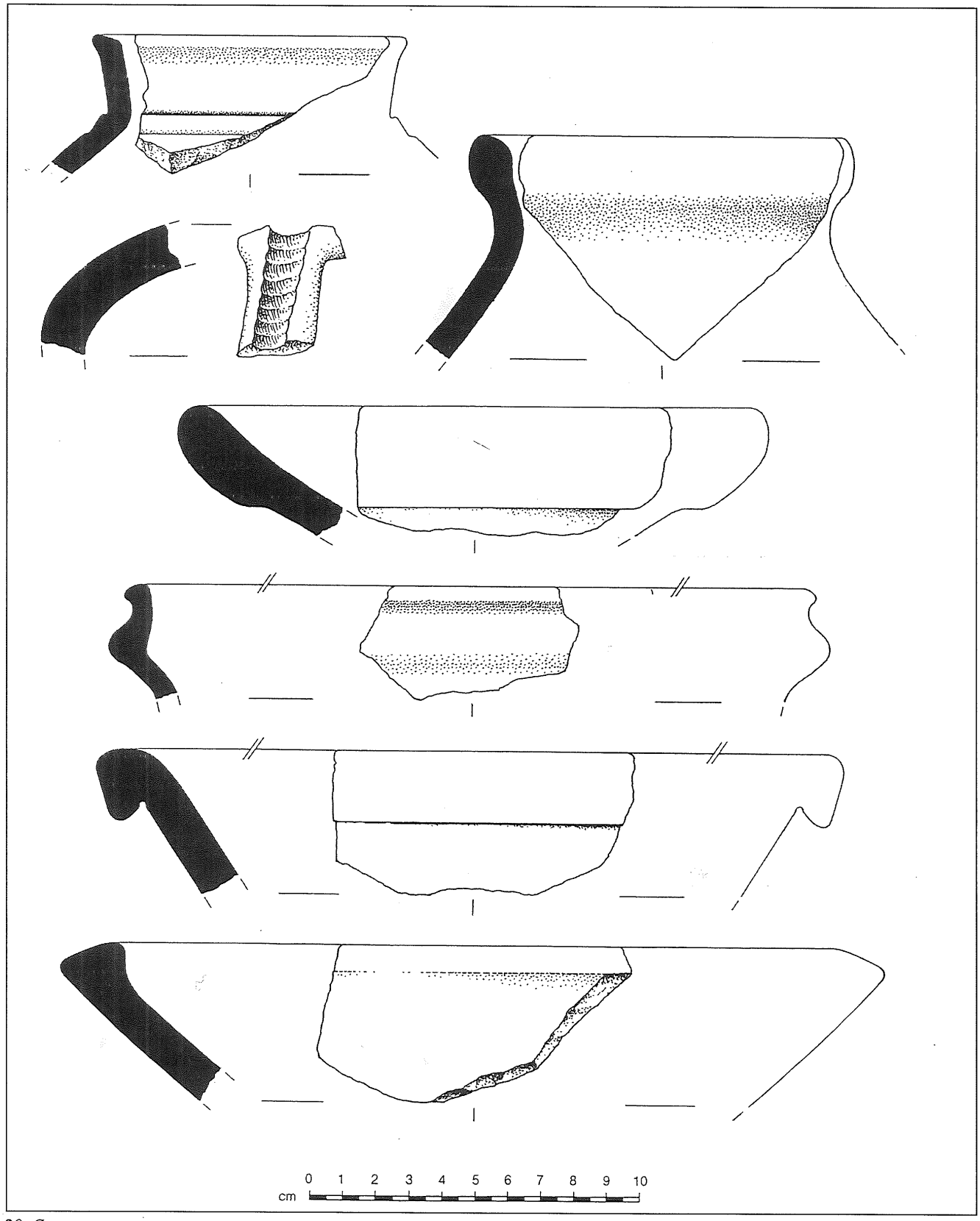
the bottom artifacts were found in large amounts (201 per square). Even more pottery was found on the west slope (207 per square). The many terrace-like edges of the slope with its height of 25m and covered with cultural remains, and some of the animal burrows practically guaranteed good finds. By



19. Terracotta wares (top); Gadara Ware (centre); Islamic wares (bottom).

contrast, the south slope (127 per square), because it is better protected against cracks by antique walls, and the east slope (140 per square), because it is dominated by boulders, produced a lower average result.

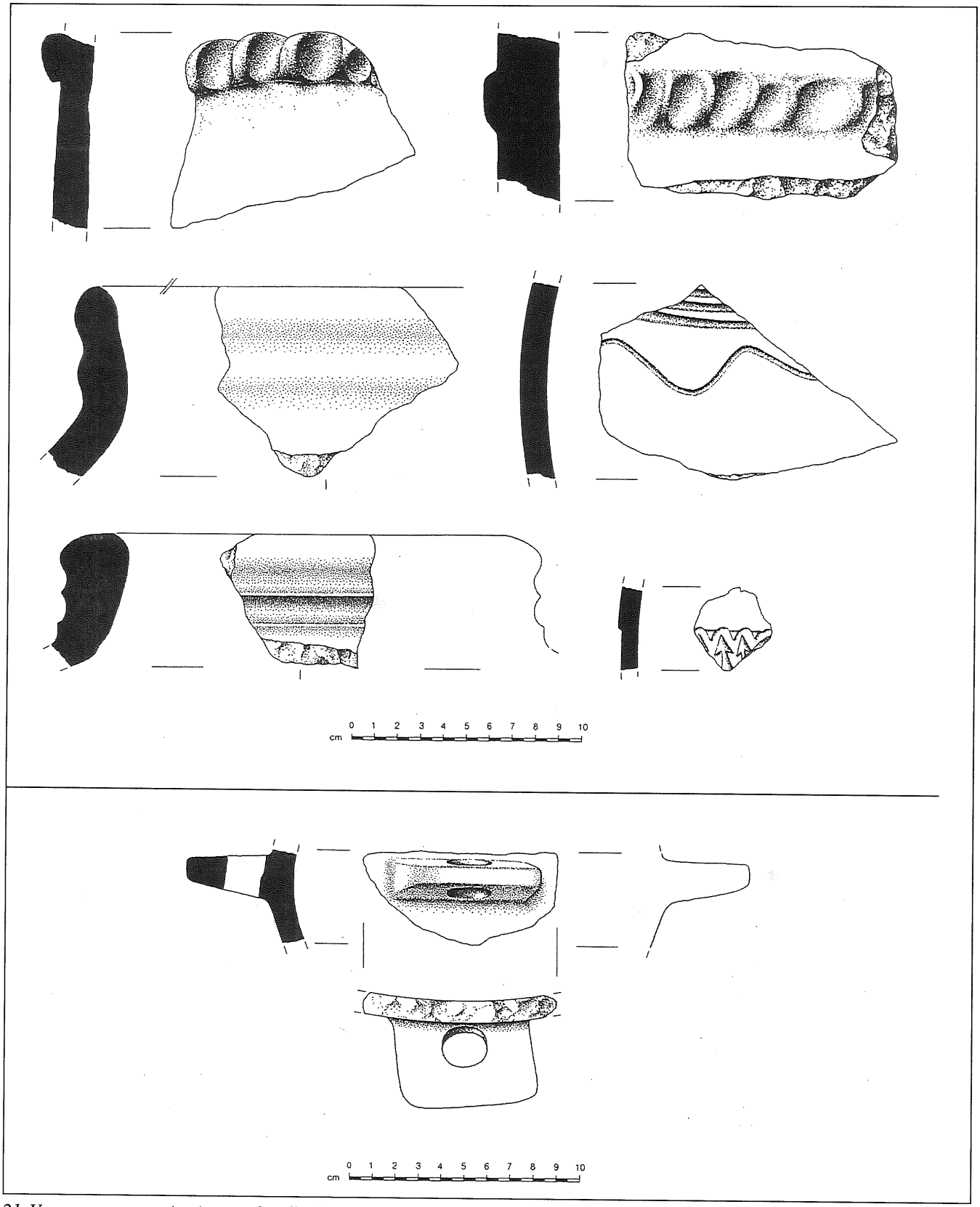
The following beam diagrams (**Fig. 23**) illustrate the quantitative data in a more detailed way. The x-values of the diagrams represent the average



20. Coarse wares.

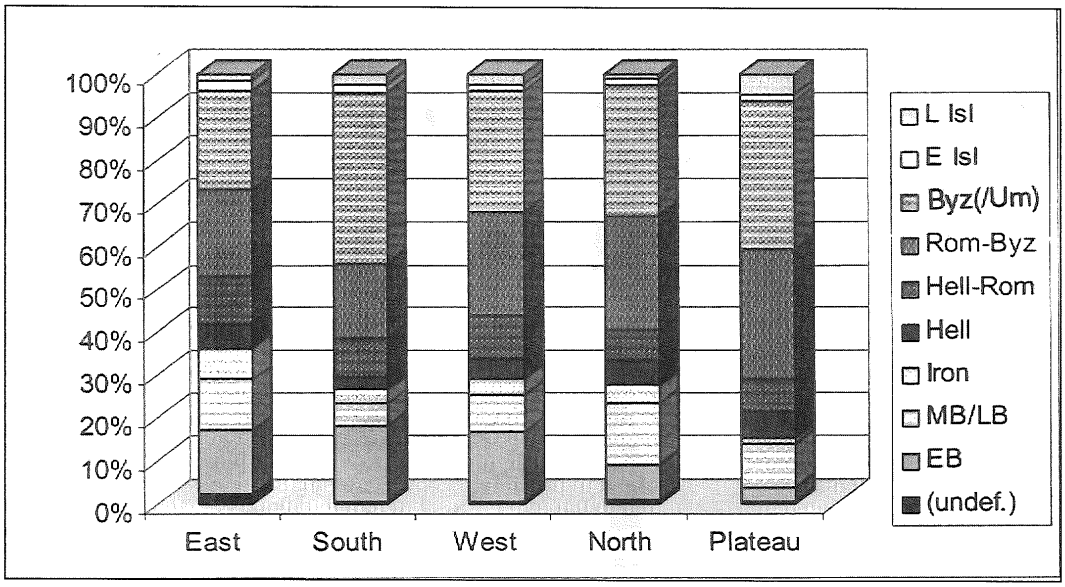
number of finds per square (20x20m). When comparing the figures, the abundance of Rom-Byz (on average 62 finds per survey square) and Byz[/Um] pottery (70 per square) on the plateau is conspicuous.

As regards the finds on the east, south and west slopes, the distribution graphs of the chronological classification are quite similar, whereas the flat pla-

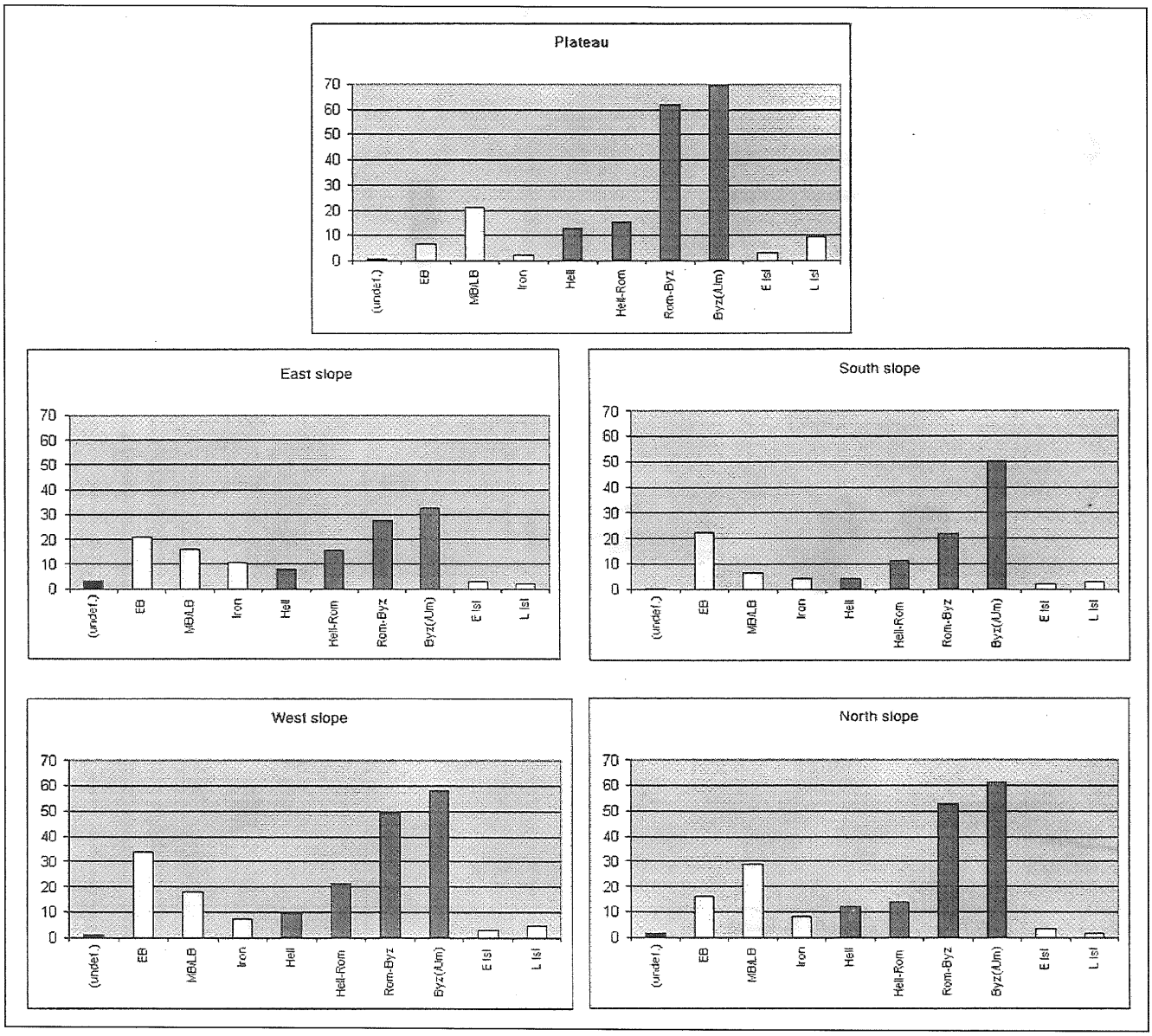


21. Very coarse wares (top); stone handle (bottom).

teau and the steeply descending slope to the north show similarities in spite of their differences. It is difficult to interpret this aspect, but perhaps it can be related to the fact that there was a settlement in the northern part of the plateau in Roman-Byzantine times (directly below the north slope and above the bend of Wādī al-'Arab which proceeds north of this place).



22. Percentile distribution of the chronologically classified pottery on Tall Zar'a (excluding the Portugali survey).



23.a-e. Average amount of finds per survey square on Tall Zar'a (excluding the Portugali survey).

It has already been mentioned above and could be confirmed that prehistoric artifacts were found, and above the bend of Wādī al-'Arab which proceeds north of this place).

It has already been mentioned above and could be confirmed that prehistoric artifacts were found, especially on the east, west and north slopes. Nevertheless, the even distribution of Early Bronze pottery over the whole west half and the northeastern slope of the *tall* is remarkable. Compared to an average of 20 sherds per survey square, 35-94 were found here. Two survey squares (Z113 and R109) turned up 80, survey square AM109 even 94 Early Bronze Age sherds. Only few, though especially remarkable ceramic concentrations were located between the north plateau and the north slope; in all, 38 sherds in survey square AQ133, 68 in AU137 and, surprisingly, 158 in AM141 — by far the highest density of Early Bronze (and thus prehistoric) pottery — could be identified. The topographical shape of the *tall* does not clearly explain this peculiarity.

The Iron Age ceramics, which were less well attested in terms of quantity (on average 6.56 finds per square), were found to be concentrated mostly on the northwest slopes (15-29 finds per square) and, to a lesser extent, in the northeast (up to 25 finds per square) and southeast (up to 19 finds per square). With 59 sherds, the robbed grave in survey square AM145 obviously yielded the highest density of Iron Age pottery.

In contrast to what we expected, Roman-Byzantine sherds, which were found in great numbers throughout, did not show a quantitative concentration in the southwestern and southern areas of the plateau where, characteristically, the corresponding architecture dominates (see above; just two survey squares, Z121 and R125, yielded 210 sherds each). Instead, the ceramic finds of the Roman-Byzantine era were concentrated in the central west (nearly constantly more than 200, even up to 550 finds per square), northwest (up to 460 finds per square) and northeast areas of the plateau (up to 320 finds per square) and the upper slopes of the *tall* adjoining these areas.

The Islamic sherds showed a high concentration on the plateau, in particular in the vicinity of the well, though in different ways. Whereas the Early Islamic finds occurred mainly near the well and especially in the northeastern corner of the plateau, the Middle and Late Islamic ceramic finds covered the area extending from the well and its immediate surroundings to the south. However, in spite of the especially on the east, west and north slopes. Nevertheless, the even distribution of Early Bronze pottery over the whole west half and the northeastern slope of the *tall* is remarkable. Compared to an conspicuity of the mostly painted or glazed artifacts, the quantity of the sherds found is quite limited. Hence one could infer that in Islamic times only certain sections of the plateau were used for settlement purposes. Only excavations can prove or disprove the validity of such conclusions, though. At any rate, early in the 20th century, Steuernagel (1926: A 465) reported that the hill was "now at least partially inhabited again".

3. Comparison of Various Survey Methods

The general arrangement was that surveys should always be conducted by persons who were thoroughly instructed in advance and who would always operate as a two-person team. They had to accomplish the search of 400 square meters (one survey square) in one hour, completing 7 survey squares a day. The geographic achievement profile (i.e., the proportion of steep slopes – inclined surfaces – level surfaces) was planned in advance in such a way that it was comparable from day to day. Extra work per day and premature changing from one survey square to another were considered undesirable as were delays. These measures were intended to maintain the same standard of collecting from the first to the last square and to prevent an increase in the error rate by different subjective "concepts" of gathering methods, speed, topographically caused problems or other, personal aspects.

The following survey methods were adopted:

a) the complete *tall* survey; area: 127 squares of 20x20m (expenditure of work: 18 workdays for 2 persons);

b1-4) four surveys based on different[3] random samples of survey squares; area: 15 squares of 20x20m per person (expenditure of work: 2 workdays each for 2 persons);

c1-2) c1) a survey based on a directed sample of survey squares I[4] (condition: 3 squares per slope and 3 squares on top of the plateau); c2) a survey based on a directed sample of survey squares II (without any preconditions concerning the location on the *tall*); area: each 15 squares of 20x20m per person (expenditure of

3. Three times we chose a random sample of Tall Zar'a as a whole. Once (b4) we chose a random sample of three squares from each of the five main areas of the *tall.*

4. After a thorough inspection of Tall Zar'a, but before the survey was started, two archaeologists independently selected 15 squares each. They had to select those squares which were representative of the five main areas of the *tall.*

work: 2 workdays each for 2 persons);

d) a survey based on the methodological guidelines of Portugali (1981). Because a complete exploration of the *tall* according to these guidelines appeared to be unworkable, the method described under c1) was chosen as a basis for the selection of the "Portugali squares" (a survey based on a directed sample without any preconditions concerning the location on the *tall*); area: 15 squares of 5x5m (expenditure of work: 4 workdays for 2 persons — estimated expenditure of work for a complete survey: 135.5 workdays for 2 persons).

Leaving the usual subjective distortions aside, the complete gathering of sherds guarantees the most representative view of the facts which can be brought about by a survey. Considering this, the expenditure of 18 workdays appears to be justifiable. It allows not only for an overall evaluation of the complete *tall*, but also of single — even small — areas in a representative way. To work out an excavation strategy, reliable data about smaller and bigger *tall* areas are needed, for example about areas with an extremely, or at least extraordinarily high or low concentration of sherds of a specific ware or period. Therefore, an inclusive *tall* survey seems to be an unalterable precondition for the excavation of a multi-phased *tall* with massive cultural layers.

As will be shown below, the random selection of about 10% of the total survey area has produced a surprisingly rich database for a reliable estimation of the total amount of finds, of their chronological distribution and the proportional relations

Table 2: Sequence of deviations.

Formula (deviation): $\|\chi\text{-}a\|^2=\sum_{i=1}^{n}(\chi_i\text{-}a_i)^2$.

The average deviation with 99% confidence is 2.8%, the maximal deviation is 10%. The average deviation with 95% confidence is 2.4%, the maximal deviation is 8.5%.

%	Tall survey	Random selection				Directed selection	
	a	b_1	b_2	b_3	b_4	c_1	c_2
(undet.)	1	1	0	2	1	1	0
EB	11	13	9	12	11	13	8
MB/LB	10	10	12	8	9	7	8
Iron	3	4	4	4	4	4	3
Hell	5	4	6	6	5	5	6
Hell-Rom	9	10	8	8	9	8	7
Rom-Byz	25	22	26	26	28	26	26
Bys(/Um)	31	32	32	31	29	34	38
E Isl	2	2	1	2	1	1	1
L Isl	3	2	2	2	3	1	3
Difference[i]	0	4.24	4.0	3.16	4.0	5.48	8.37

%	Directed selection	Portugali method
	c_1	d
(undet.)	1	0
EB	13	12
MB/LB	7	3
Iron	4	3
Hell	5	5
Hell-Rom	8	10
Rom-Byz	26	27
Bys(/Um)	34	37
E Isl	1	1
L Isl	1	2
Difference	5.48	9.70

between the represented periods (as far as this can be established in a survey). If, within the scope of extensive geographic explorations, *tulūl* are to be included, this method seems to be recommendable. Especially the expenditure-income ratio (also considering the evaluation of the artifacts) is impressive because of its high efficiency. However, it should be kept in mind that single areas of the *tall* cannot be surveyed comprehensively with this method. The directed selections show only a moderately satisfactory result.

The expenditure of work for conducting a survey according to the Portugali guidelines is enormous. Because of the size of Tall Zar'a, only a sample of squares as a basis of future explorations will undoubtedly be workable. Considering the limited prospects for gaining information in view of the many periods and the long enduring settlement of the *tall*, a survey based on this method appears not to be useful in the present case.

Relating the sample-based surveys to the overall *tall* survey as the point of reference, a clear sequence of several deviations can be established **(Table 2).**

Geoelectric Tomography

Within the scope of the geophysical exploration of the *tall*, geoelectric mapping and two-dimensional as well as three-dimensional tomographic techniques were used in order to:

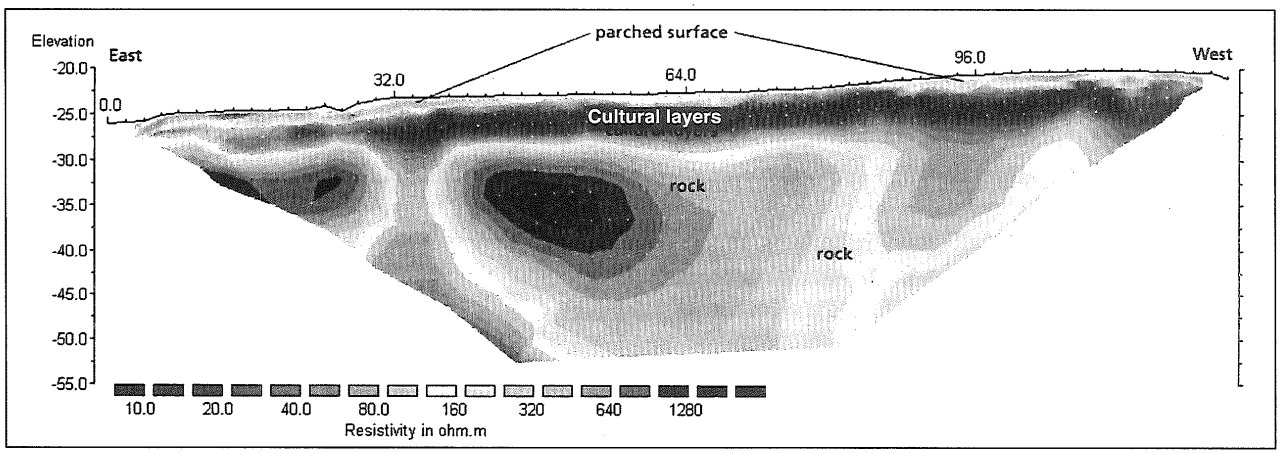
- be able to plan archaeological excavations in advance and to develop exact strategies for the planned excavation;
- acquire knowledge of non-excavated areas; and
- leave undisturbed larger excavation areas for coming generations.

For the purpose of the geophysical exploration a LGM 4-Point Light μC and a Geolog 2000 Geo-Tom were used. On Tall Zar'a more than 50 profiles in various configurations could be measured. Below, two outcomes, which will be published here beforehand, are interpreted:

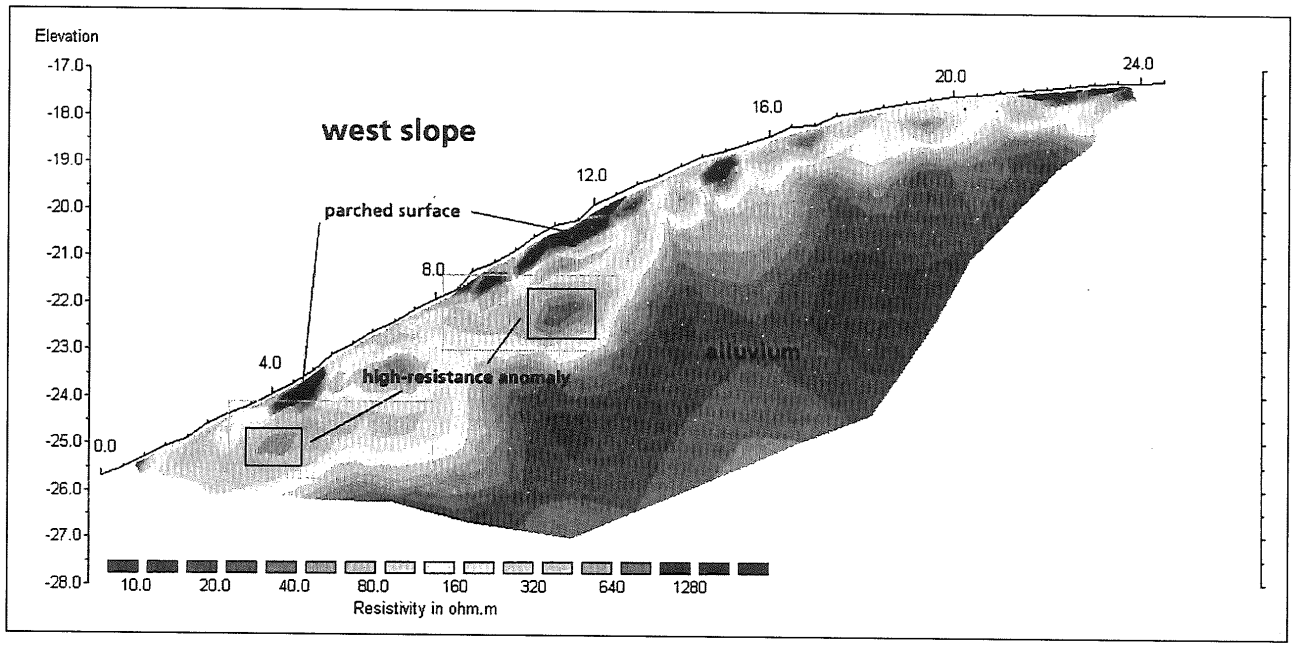
The first measurement **(Fig. 24)** shows a profile (in dipole-dipole configuration) which runs across the *tall* in an east-west direction and yields essentially geological insights. For this 63 electrodes were positioned at a distance of 2m. In the profile shown, a cultural layer of 5-6m in thickness can be recognized, showing a low-ohmic value (up to 100Ω to the max.) below the dried-up surface which, as expected, appears as a high-ohmic anomaly (more than 160Ω). An important observation of our survey confirms the enormous thickness of the cultural layer of Tall Zar'a. The cistern found in the southeast of the *tall*, which has a depth of 5.75m, reaches up to the actual *tall* surface directly above the cistern's round brickwork arch and is built on bedrock.

In the east, bedrock almost reaches up to the surface. Since the *tall* as a whole slopes slightly toward the east, drainage occurred in that direction. Probably the remarkable down-going double-conic (low-ohmic) area at meter 32.0 is connected with the functioning of the artesian well.

On the west slope about 20 parallel placed profiles were plotted and measured with 50 electrodes at 0.5m distance. Here the dipole-dipole configuration was also used in order to ensure a better resolution of the screen process prints. In this way, a location of the walls on the slopes of the *tall* should be possible. On the surface they cannot be localized. In the model illustrated in **Fig. 25,** two high-ohmic anomalies can be traced at meter 4.0 and 11.0, lying up to 2m below the surface. Since these anomalies occur in all 20 parallel profiles, it can be assumed that they are related to the remains of wall structures. Detailed analyses — especially the three-dimensional modeling of measurement values — are currently under way.



24. East-west profile of the Tall Zar'a plateau (Iteration 4, RMS-fault = 24.5).



25. West slope profile (Iteration 4, RMS-fault = 12.9).

Acknowledgments

First the authors would like to express their gratitude to the Department of Antiquities of Jordan, especially its Director General, Dr. Fawwaz al-Khraysheh, for his constant support. We are also extremely thankful for the help of Mr. Wajeh Karasneh, Antiquities Inspector for the Irbid District, and the inspectors Mr. Imad Obeidat (Umm Qays) and Mrs. Lina Khreis (Irbid).

The survey also received strong support from the German Protestant Institute, Amman. We gratefully acknowledge the effective help of its director, Dr. Roland Lamprichs.

It gives us great pleasure to thank the institutions and foundations which provided generous support for our project: the Stiftung Mittelsten Scheid (Wuppertal) and the companies Akzenta and Erfurt-Rauhfaser Wuppertal. Without their donations our work would have been impossible.

The joint planning of investigations in the Umm Qays region and the simultaneous realization of archaeological projects with the Deutsches-Archäologisches Institut Berlin (Dr. Günther Schauerte; Dipl.-Ing. Claudia Bührig) proved to be a success.

We would like to thank all staff members for their hard, valuable and keen work: Jessica Agarwal (Berlin), Adelheid Baker (Bielefeld), Katrin Bastert-Lamprichs ('Ammān), Jens Eichner (Wuppertal), Christian Hartl-Reiter (Schwerin), Ute Koprivc (Remscheid), Patrick Leiverkus (Wuppertal), Dr. Armin Rauen (Wallerfing), Gerhard Reimann (Offenbach) and Till Winzer (Düsseldorf).

D. Vieweger
Biblisch-Archäologisches Institut
Universität Wuppertal
Campus Freudenberg, Haus FC
D-42097 Wuppertal
E-mail: vieweger@uni-wuppertal.de

Bibliography

Abél, F.
1967 *Géographie de la Palestine. II Géographie Politique*. 3rd ed. Paris: Lecoffre.
Ahmad, A.A.
1989 *Jordan Environmental Profile: Status and Abatement*. Amman.
Contenson, H. de
1960 Three Soundings in the Jordan Valley. *ADAJ* 4-5: 12-98.
Glueck, N.
1951 *Explorations in Eastern Palestine IV. AASOR* 25-28. New Haven.
Hanbury-Tenison, J.W.
1984a Wadi Arab Survey 1983. *ADAJ* 28: 385-424, 494-496.
1984b Exploration du Wadi el-Arab: Chronique archéologique. *RB* 91: 230-231.
Hoffmann, A.
1999 Gadara – Stadt und Umland. Pp. 223-236. in E.-L. Schwandner and K. Rheidt (eds.), *Stadt und Umland. Neue Ergebnisse der archäologischen Bau- und Siedlungsforschung*. Mainz: Philipp von Zabern-Verlag.
Ibrahim, M., Sauer, J. and Yassine, K.
1976 The East Jordan Valley Survey 1975. *BASOR* 222: 41-66.
Kerestes, T.M., Ludquist, J.M., Wood, B.G. and Yas-

sine, K.
1977/8 An Archaeological Survey of Three Reservoir Areas in Northern Jordan. *ADAJ* 22: 108-135.
Lenzen, C. and McQuitty, A.M.
1988 The 1984 Survey of the Irbid/Beit Ras Region. *ADAJ* 32: 270.
McQuitty, A. and Gardiner M.
in prep. Water mills in the Wadi Arab.
Mellaart, J.
1962 Preliminary report of the Archaeological Survey in the Yarmouk and Jordan Valley. *ADAJ* 6-7: 126-158.
Portugali, J.
1981 A Field Methodology for Regional Archaeology: The West Jezreel Valley Survey. *Tell Aviv* 31: 170-190.
Schumacher, G.
1890 *Northern 'Ajlun.* London: Richard Bentley.
Steuernagel, C.
1926 Der 'Adschlun (part three). *ZDPV* 49: 1-167 (= A 385-A 551).

THE SURVEY IN THE REGIONS OF 'IRĀQ AL-AMĪR AND WĀDĪ AL-KAFRAYN, 2000

Chang-Ho C. Ji and Jong Keun Lee

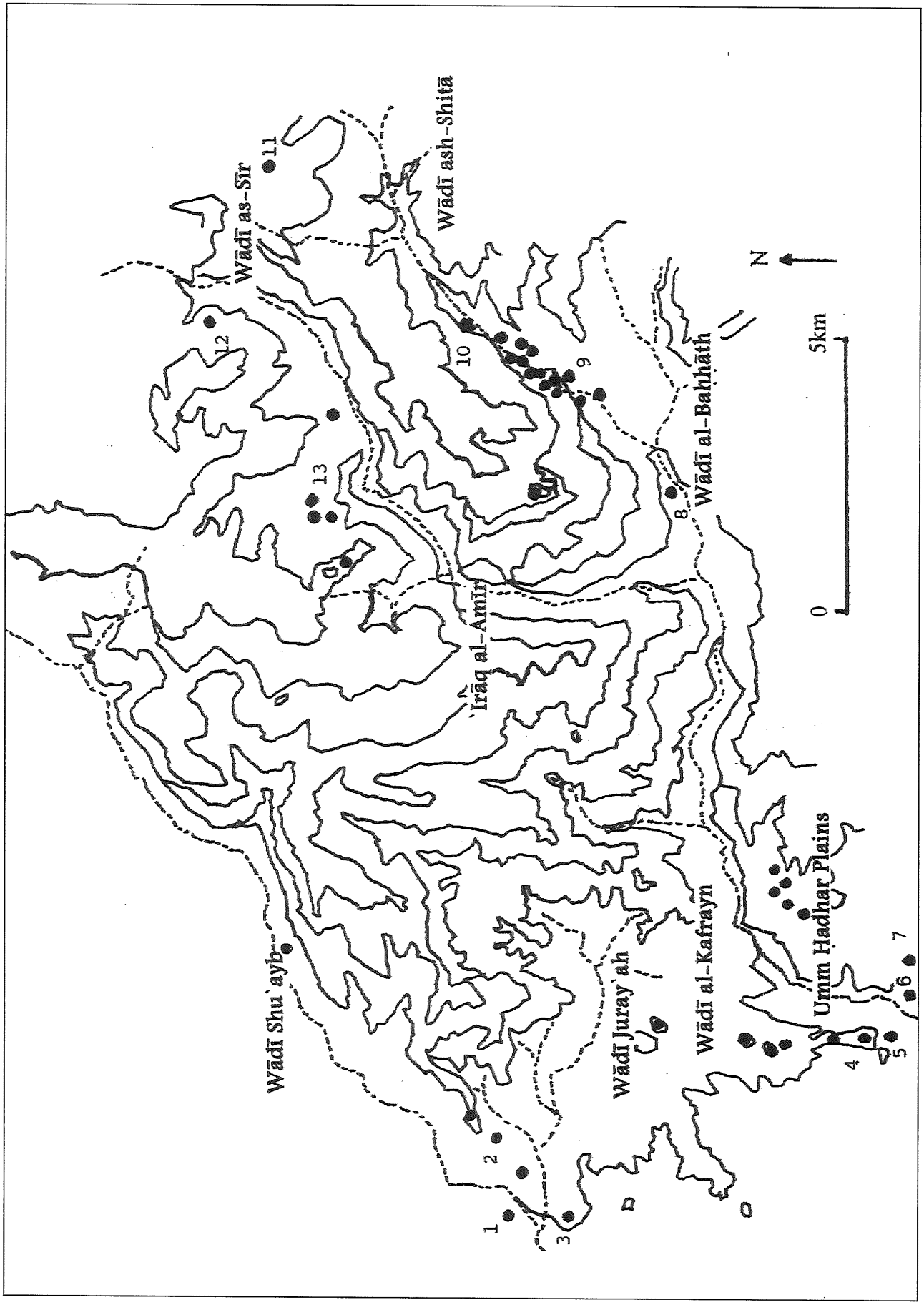
A third season of the survey inthe regions of 'Irāq al-Amīr (عراق الأمير) and Wādī al-Kafrayn (وادي الكفرين) took place in July and August, 2000. In 1996, the first season of the archaeological survey covered the area within 5km radius of 'Irāq al-Amīr focusing on the region along Wādī as-Sīr (وادي السير) (Ji 1998a). In 1998, the survey area was extended westward to the Jordan Valley, covering the area which extends from Wādī al-Kafrayn in the south to the rocky ranges and hills overlooking Wādī Shu'ayb (وادي شعيب) to the north and the west (Ji and Lee 1999). The primary goal of the 2000 survey was to expand our previous work westward and eastward in order to find more archaeological evidence of human activities and thus to understand settlement pattern and history of the 'Irāq al-Amīr region in a broader context. To this end, the 2000 survey first centered on locating new ancient sites in the regions of Wādī ash-Shitā (وادي الشتا), Wādī al-Baḥḥāth (وادي البحاث), the Wādī al-Kafrayn dam, the Wādī Shu'ayb dam, and the modern city of Wādī as-Sīr (see **Fig. 1**). Part of the 2000 survey area, however, was visited and surveyed by various research groups and scholars during the past century, such as Glueck (1939; 1951), Prag (1991), Prag and Barnes (1996), Villeneuve (1988), Waheeb (1997), and Yassine, Ibrahim, and Sauer (1988). Accordingly, a second primary purpose of the 2000 survey was to revisit all the known sites in the survey area to ascertain previous datings and descriptions of each site.

Besides, given the importance of 'Irāq al-Amīr to the history of the Iron II to Roman periods in Jordan, special attention was given to the investigation of the extent and nature of the Iron Age, Hellenistic, and early Roman settlements in the region. Put another way, in addition to the two preceding research goals, the third season of our survey was designed to increase our knowledge, both chronologically and geographically, of 'Irāq al-Amīr's relationship with and relative role to the development of other ancient Iron Age, Hellenistic, and Roman ruins of the vicinity such as Khirbat as-Sīr (خربة السير) and Khirbat Sār (خربة سار) (both in the immediate vicinity of the modern city of Wādī as-Sīr) and outside the vicinity to the sites of Tall Barakāt (تل بركات), Khirbat al-Ḥabbasa (خربة الحبّسه), Tall al-Ḥammām (تل الحمّام), and Tall Bulaybil (تل بليبل), all of which are located near the Jordan Valley.

Along with the 1996 and 1998 surveys, at each archaeological site the 2000 survey team recorded all the visible architectural remains above ground and made sketch maps for them. Off-site features were also investigated and documented as much as possible. A major effort, however, centered on the collection of pottery sherds and artifacts at each site. *The Madaba Plains Project Survey Manual* was adopted continuously as the main guide for these efforts (Herr and Christopherson 1996). For the present report, we proceed in two stages. Part 1 summarizes the results of the 2000 archaeological survey and suggests a chronological distribution of archaeological remains in the region, and in the process, highlights the significance of the 2000 survey for the study of Iron II-Hellenistic history in Jordan. Part 2 presents detailed descriptions of some prominent ancient ruins in the 2000 survey area.

Results of the 2000 Survey

As presented in the previous reports and papers, in 1996 and 1998, a total of 174 sites were visited and studied (Ji 1997; 1998a; Ji and Lee 1999; Loh and Ji 2000). To summarize, of the 174 sites recorded in the previous two surveys, 46 sites contained pottery sherds dated to the Chalcolithic and Early Bronze periods. Early Bronze IV-Middle Bronze I, Late Bronze II, and Iron I sherds came from seven, four, and 11 sites respectively, whereas Iron II-Persian pottery was found at 56 sites, clearly indicating an increase in human activities in the region during the late Iron II-Persian periods. This settlement increase continued into the subsequent Hellenistic and early Roman periods; a variety of Hellenistic and early Roman pottery corpus was collected at 53 sites. During the late Roman period, the number of settlement sites appears to have decreased to 32 sites, yet it increased dramatically again during the Byzantine period, since Byzantine pottery sherds were collected at 110 ancient sites. Finally, Early and Middle Islamic sherds came from 27 and 18 sites respectively.



1. Major archaeological sites in the 2000 'Irāq al-Amīr Survey area: 1. Tall Bulaybil; 2. Kh. Shu'ayb; 3. Tall al-Muṣṭāḥ; 4. Tall Barakāt; 5. Tall aṭ-Ṭāḥūnah; 6. Tall al-Ḥammām; 7. Kh. al-Ḥabbasa; 8. Rujm al-Buḥayra; 9. Kh. al-Baḥḥāth; 10. Kh. ash-Shitā; 11. Kh. Sār; 12. Kh. as-Sīr; 13. Kh. Umm Farwa.

In 2000, a total of 42 archaeological sites were found or visited, and this discovery brings the survey site total to 216. The 2000 archaeological sites were dominated by cities, villages, small watchtower-like structures, and watermills, which accounted for 71.43% of the site total of 42 (see **Table 1**). There were 14 cities or villages in the 2000 survey area. Nine of the 42 sites were classified as circular watchtower-like structures, and the four agricultural feature sites, which included cisterns, dams, terrace walls, and cup-holes, almost equaled the number of farmstead buildings and seasonal camping sites. The survey team also discovered seven watermill sites. Turning to site position, we saw that 33 sites (78.57%) are situated on hills or ridges overlooking their vicinities; in contrast, a plain area contains only one (see **Table 2**). According to the previous surveys, in the 'Irāq al-Amīr region the two most common types of archaeological sites are fortified cities and circular watchtower-like structures located on high hills or ridges. This was also the case in the 2000 survey area. For example, in 2000, we discovered and documented a large number of circular watchtowers (Survey Sites 175-179 and 187-191) on the rocky ridges east and west of the Wādī al-Kafrayn dam, some of which were possibly associated with the forts at Tall Barakāt and Khirbat al-Ḥabbasa (see **Figs. 2-4** and below).

On the other hand, a chronological comparison of the findings of the 2000 survey to those of the previous surveys reveals a degree of correspondence between them in the number of settlements occupied in each period from the Chalcolithic period to the Middle Islamic period (see **Table 3**). Specifically, the regions of Umm Ḥadhar Plains (أم حذر), the southern Jordan Valley, and the modern city of

Table 1: *Frequency table and pie chart for the archaeological sites by type.*

Site Type	N	%
City/Village	41 (14)*	18.98% (33.33%)*
Circular Watchtower	60 (9)	27.78% (21.42%)
Cistern/Cuphole/Dam/Quarry	20 (4)	9.26% (9.52%)
Buildings/Wall Lines	50 (3)	23.15% (7.14%)
Cave/Camp Site/Sherd Scatter	17 (5)	7.87% (11.90%)
Cemetery/Monastery	14 (0)	6.48% (.00%)
Watermill	14 (7)	6.48% (16.67%)
Total	216 (42)	

*( ): The number and proportion of sites that were surveyed in 2000.

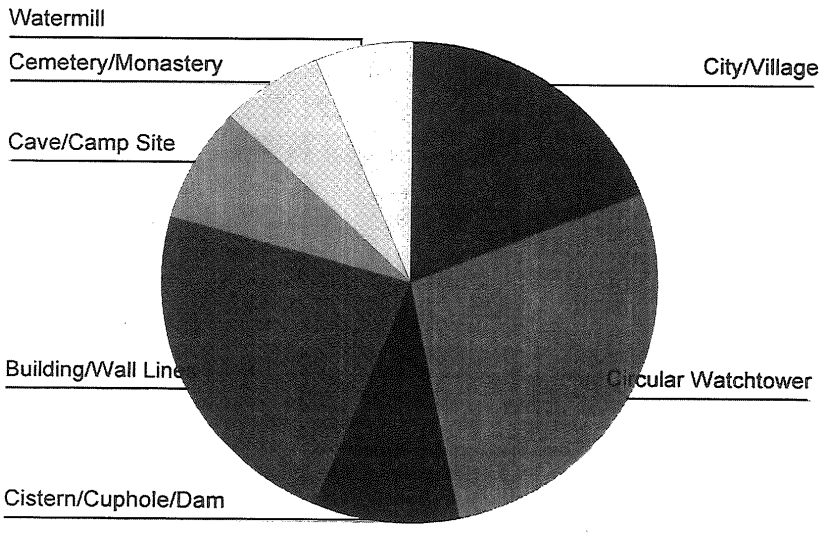


Table 2: Frequency table and pie chart for the archaeological sites by position on slope.

Location Type	N	%
Hilltop/Upper	101 (20)*	46.76% (47.62%)*
Middle/Lower	83 (13)	38.43% (30.95%)
Valley Bottom	30 (8)	13.89% (19.05%)
Plain	2 (1)	.93% (2.38%)
Total	216 (42)	

*( ): The number and proportion of sites that were surveyed in 2000.

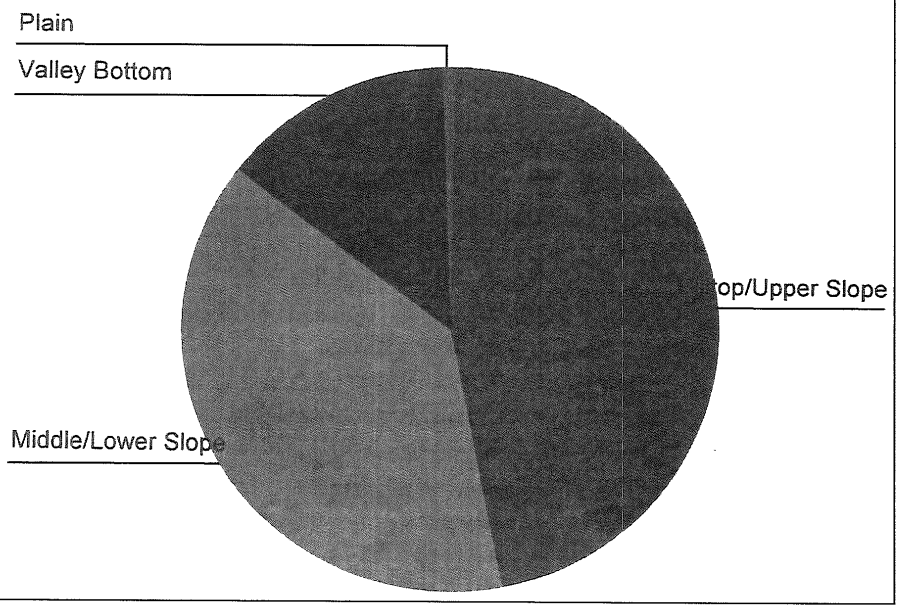


Table 3: Chronological distribution of the archaeological sites in the region of 'Irāq al-Amīr.

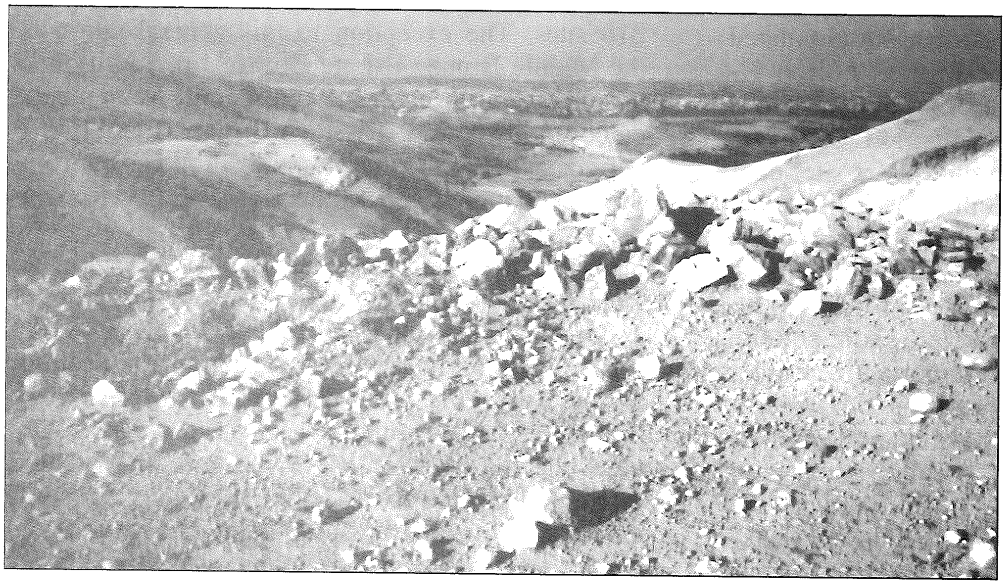
Chronology/Survey	2000 Survey		1996-2000 Survey	
	N	%	N	%
Chalcolithic/Early Bronze	9	21.43%	39	18.06%
Middle Bronze	1	2.38%	4	1.82%
Late Bronze	2	4.76%	5	2.31%
Iron I	9	21.43%	18	8.33%
Iron II	8	19.05%	35	16.20%
Persian	6	14.29%	26	12.04%
Hellenistic	15	35.71%	56	25.93%
Roman	12	28.58%	29	13.43%
Byzantine	13	30.95%	97	44.91%
Early Islamic	3	7.14%	21	9.72%
Middle Islamic	2	4.76%	19	8.80%
Total	42		216	

Wādī as-Sīr seem to have been densely populated during the Chalcolithic-Early Bronze I, Iron II-Persian, and Byzantine periods. The settlement was also dense during the Hellenistic period. Of the 42 sites recorded during the 2000 survey, six sites contained pottery sherds dated to the Chalcolithic and Early Bronze periods. Late Bronze II sherds came from two sites, whereas Iron I, Iron II, and Persian sherds were found at five, five, and four sites respectively. Nine sites produced Hellenistic pottery; five sites had Roman sherds. Important examples of Chalcolithic-Early Bronze remains are Tall Barakāt, Tall al-Ḥammām, Khirbat Shu'ayb, Tall al-Muṣṭāḥ (تل المسطاح) and Tall Bulaybil. Iron II-Persian, Hellenistic, and early Roman evidence was pronounced at Khirbat as-Sīr, Tall Bulaybil, Khirbat Umm Farwa (خربة أم فروة), Tall Barakāt, Khirbat al-Ḥabbasa, Tall aṭ-Ṭāḥūnah (تل الطاحونة), Tall al-Ḥammām, Khirbat al-Baḥḥāth, and Khirbat ash-Shitā. Notice that all these early antiquity sites are clustered either in the Wādī Shu'ayb dam area or along the Wādī al-Kafrayn and the Wādī as-Sīr. On the other hand, Byzantine sherds came from seven sites; Early Islamic and Middle Islamic sherds were found at three and one sites respectively. This late antiquity pottery was particularly abundant at Tall al-Muṣṭāḥ, Tall aṭ-Ṭāḥūna,, and Khirbat Sār. It is important to note that Tall al-Muṣṭāḥ and Tall aṭ-Ṭāḥūnah are located on the low hills adjacent to the Jordan Valley and Khirbat Sār is situated within the municipal boundary of the modern city of Wādī as-Sīr, near the watershed point of Wādī ash-Shitā. The Wādī al-Baḥḥāth region lacks major Byzantine and Islamic sites.

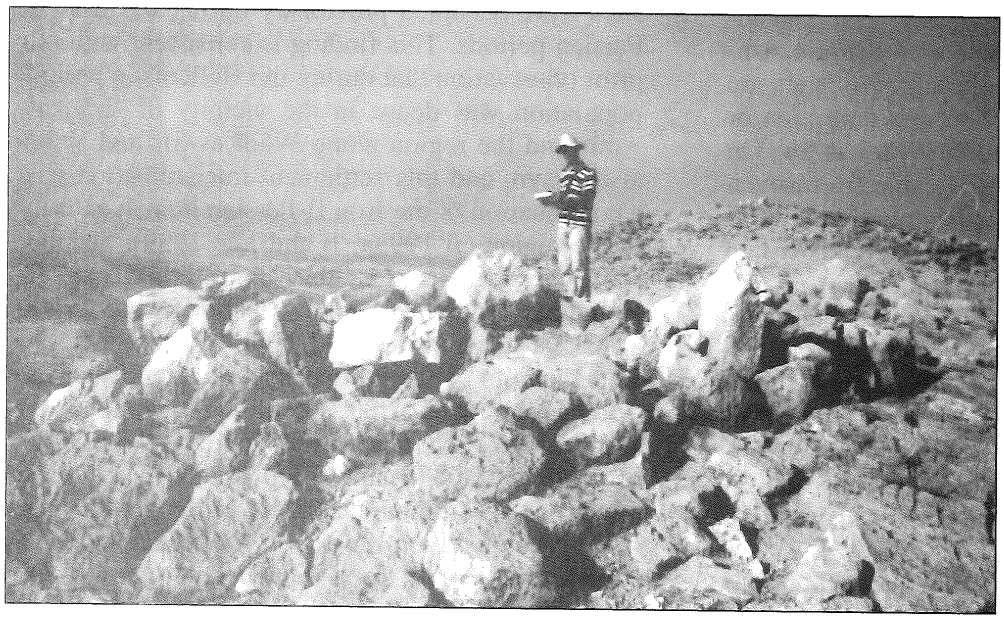
The preceding observation may be sufficient to demonstrate that the Chalcolithic-Early Bronze I and Iron I-Hellenistic periods were periods of significant settlement in the regions of the Umm Ḥadhar Plains, Wādī al-Baḥḥāth, Wādī Shu'ayb, and Wādī as-Sīr. This fact stands in contrast with the area between the modern city of Wādī as-Sīr and Wādī ash-Shitā, an upper stream of Wādī al-Kafrayn, which was more densely populated during the Byzantine-Islamic period than in the earlier periods. This observation is more or less in harmony with the results of the previous fieldwork along the Wādī as-Sīr and the Wādī al-Kafrayn, and hence, the lead author's prior discussion of ancient settlement patterns in the vicinity of 'Irāq al-Amīr still seems tenable (Ji 1998a). Despite the sub-regional differences in occupational pattern, however, suffice it to say that the regions of 'Irāq al-Amīr and Wādī al-Kafrayn as a whole continued to experience some level of prosperity from the Chalcolithic to the Islamic periods, as evidenced by more than 216 sites. The exception to this generalization is the Middle Bronze II-Late Bronze I period; up till now there is no evidence for specific settlements dated to this period. The Late Bronze II and Iron I periods appear to represent a transition period from this occupational gap to the Iron II-Early Roman settlement intensification.

Given the importance of 'Irāq al-Amīr to the Iron II-Hellenistic history in Jordan, let us address a couple of key findings related to the Iron II-Hellenistic period and their historical implication for the Tobiads at 'Irāq al-Amīr. First, in view of the 2000 survey results, it seems clear that in the areas of the Wādī al-Kafrayn dam, the Wādī Shu'ayb dam, and the Wādī al-Baḥḥāth, the Hellenistic period witnessed the greatest density of population and settlement, and many of the Hellenistic sites were occupied previously during the Iron II-Persian periods. This finding is consistent with our prior observation that during the Hellenistic period, population was dense in the vicinity of 'Irāq al-Amīr and the region along Wādī as-Sīr and Wādī al-Kafrayn, and this settlement intensification was a continuation of the Iron II-Persian human activity in the region (Ji 1998a; Ji and Lee 1999). Second, principal reasons for this long-term Iron II-Hellenistic settlement intensification along Wādī al-Kafrayn and in the Wādī Shu'ayb dam area are very likely to be the influence and prosperity of the Tobiads at 'Irāq al Amīr. According to some recent archaeological studies on the Tobiads, the regions of Wādī al-Kafrayn and Wādī Shu'ayb need to be treated as a continuation of the settlements in the Irāq al Amīr region. Besides, the Persian and Hellenistic dwellers of the 'Irāq al Amīr region, most likely the Tobiads, were possibly involved in building settlements for strategic and commercial purposes in the given areas along Wādī al-Kafrayn and Wādī Shu'ayb (Ji 2001). On the basis of archaeological and historical evidence, it also now seems reasonable to suggest that the onset of Tobiad habitation at 'Irāq al Amīr happened no later than the late Iron II, and in the early Hellenistic period, the principality of the Tobiads was already long established at 'Irāq al Amīr (Ji 1998b). Put together, the results of the 2000 survey of Wādī al-Kafrayn and Wādī Shu'ayb offer strong empirical evidence for the view that the region experienced a great density of population during the Iron II-early Hellenistic period, and this dense occupation was closely related to the prosperity of the Tobiah's habitation at 'Irāq al Amīr.

Third, in this vein, one interesting finding from the 2000 survey is the concentration of large late Hellenistic settlements in the Umm Ḥadhar Plains



2. *A watchtower-like structure at Survey Site 187 (looking southeast).*



3. *A watchtower-like structure at Survey Site 188 (looking southeast).*



4. *A watchtower-like structures at Survey Site 190 (looking southwest).*

and its immediate vicinity. Examples are Tall Barakāt, Tall al-Ḥammām, Tall aṭ-Ṭāḥūnah, and possibly Khirbat al-Ḥabbasa. Related to this finding is the evidence from Rujm Umm Ḥadhar South (رجم أم حذر الجنوبي) in the Umm Ḥadhar Plains, which appears to be a fortress or fortified villa built originally in the mid second century BC and used through the early first century BC (Ji and Lee 1999; Waheeb 1997). In a recent paper, the authors have presented in detail the archaeological and historical significance of these sites and the Umm Ḥadhar Plains to the study of transition from the Hellenistic period to the early Roman period in Jordan (Ji and Lee forthcoming). Hence, the readers may refer to this paper for a more detailed discussion of the Umm Ḥadhar Plains and its vicinity. To recapitulate some important points on the region and the late Hellenistic period, however, in the 'Irāq al-Amīr region many Iron II-early Hellenistic sites were likely to have been abandoned at the beginning of the late Hellenistic period, although many of the sites were resettled by the early Roman period, following a brief occupational hiatus (Ji 1998a; Ji and Lee 1999; P. Lapp 1962; 1963; N. Lapp 1983). In view of this potential absence of prominent late-second-century Hellenistic sites outside of the Umm Ḥadhar region, the frequent appearance of late-second-century pottery in the Umm Ḥadhar Plains and its vicinity may imply that the Umm Ḥadhar region was inhabited during the late second century BC, and thus, its human resettlement slightly antedated other late Hellenistic settlements along Wādī al-Kafrayn and Wādī as-Sīr.

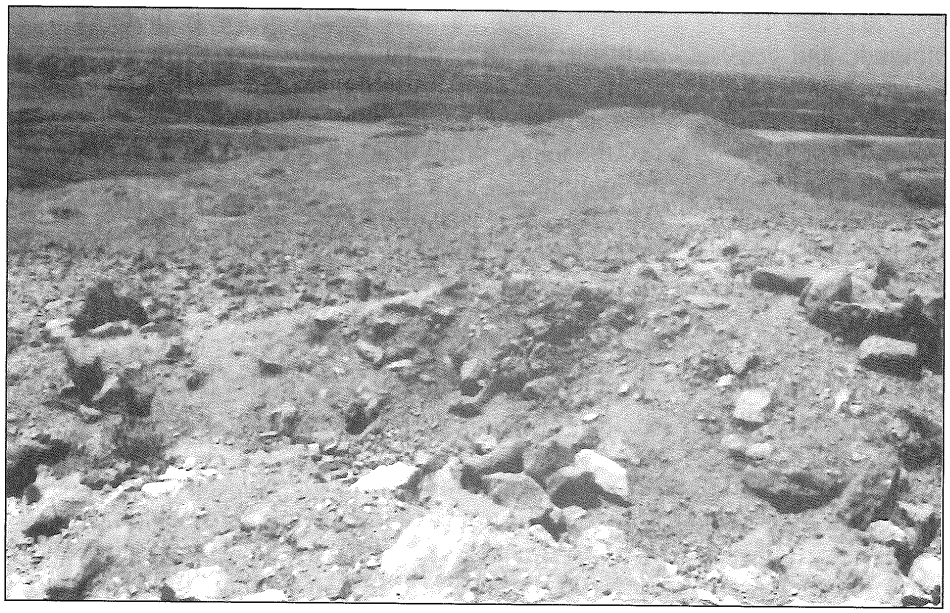
Description of Selected Sites

1. *The Wādī al-Kafrayn and the Wādī Shu'ayb Dam Region*

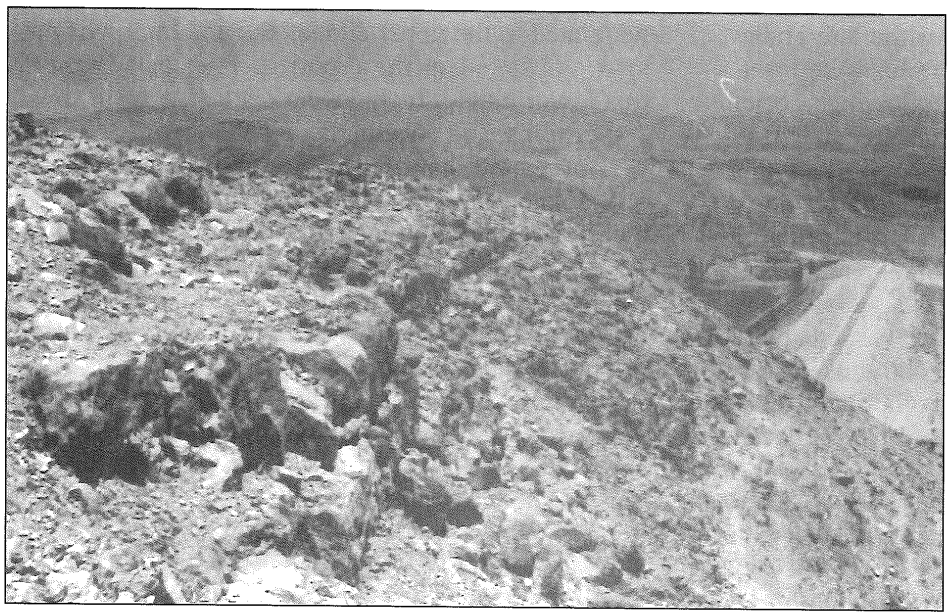
Tall Barakāt تل بركات (Survey Site 178; PG: 213.87/140.08): Tall Barakāt is situated at the southern end of the ridge which forms the western side of the Umm Ḥadhar Plains, about 200m west of the Wādī al-Kafrayn dam. This site appears to have been a large walled settlement overlooking the Wādī al-Kafrayn and the southern Jordan Valley. The spur on which Tall Barakāt stands commands a remarkable strategic view over the surrounding areas. Tall Barakāt was visited by Prag and Barnes (1996), and they provided detailed description of the site. According to our survey, Tall Barakāt consists of three parts: an Early Bronze city on the northwestern part of the site, a smaller later citadel on the southeastern part, and another citadel at the eastern end of the site (see **Figs. 5-7**). Specifically, on the northwestern part, we observed the remains of enclosure walls associated with Early Bronze pottery. Several ancient buildings were found to be associated with the enclosure walls near the acropolis of the Chalcolithic-Early Bronze settlement, one of which seems to have been an about 7 x 9m house divided into two rooms by a compartment wall. In addition, we noticed that the lower course of walls of a roughly triangular-shaped citadel was clearly discernible for over 100m along the southern sides of the site. The external defense walls measure approximately 1.5m thick. These walls must represent "the upper citadel of the Roman fortress" of Prag and Barnes, who describe the upper citadel as "narrow and triangular" with retaining walls, possibly fortification walls, which "were constructed to the north and south to extend and retain the structures at the top" (1996: 56). Situated on the eastern terrace of this site is a rectilinear citadel that must be related to the upper citadel situated on top of the spur. As stated in the report of Prag and Barnes, this lower citadel includes an enclosure wall, towers, cisterns, and aqueducts.

During the survey of Prag and Barnes (1996: 59), a small number of Roman and Byzantine pottery was reportedly collected plus a large number of Early Bronze pottery sherds. Not surprisingly, Chalcolithic-Early Bronze pottery dominates our survey pottery assemblage from the northwest part of Tall Barakāt suggesting an Early Bronze Age occupation of this site. At the east side of Tall Barakāt, however, the survey team found several diagnostic late Hellenistic-early Roman pot sherds plus possible Byzantine body sherds. This ceramic evidence indicates that "the Roman fortress" of Prag and Barnes may be renamed to the "late Hellenistic and early Roman fortress" and reassigned to the late second and early first centuries BC (see Ji and Lee forthcoming for the late Hellenistic and early Roman numismatic evidence from Tall Barakāt, which confirms the results of our preliminary pottery analysis).

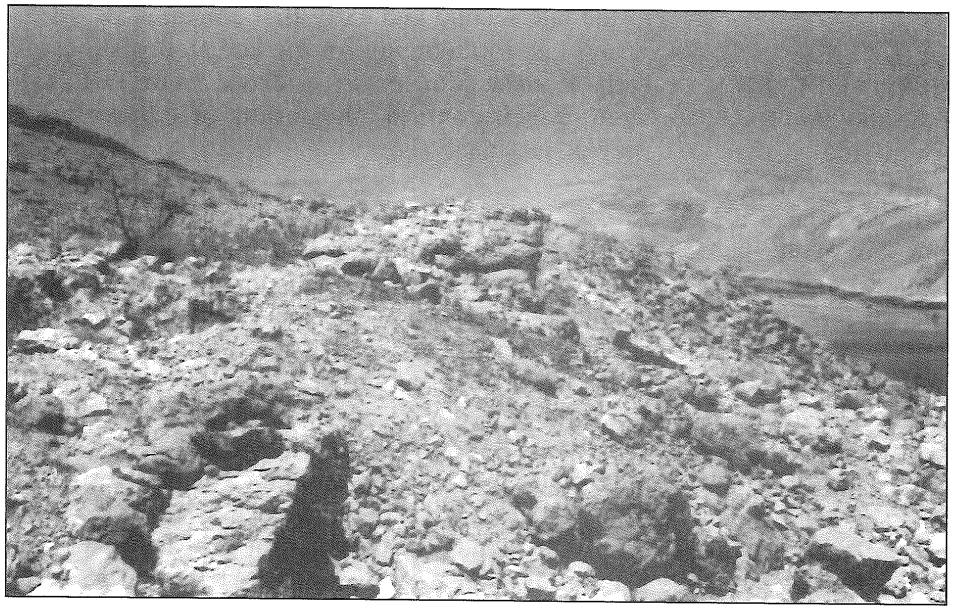
Khirbat al-Ḥabbasa خربة الحبّسة (Survey Site 180; PG: 214.43/139.18): Khirbat al-Ḥabbasa is a fortification site about 800m east of Tall Barakāt and about 500m northeast of Tall al-Ḥammām. This site is situated on an isolated summit of the hill that overlooks Tall al-Ḥammām, the warm springs near al-Ḥammām, and the southern Jordan Valley. Prag and Barnes (1996) visited Khirbat al-Ḥabbasa and published a detailed description of the fortress. This site also appears in Glueck's survey report (1951: 384), yet he did not visit the site. We saw Khirbat al-Ḥabbasa essentially as Prag and Barnes



5. The Early Bronze Age settlement area on the northwestern part of Tall Barakāt (looking south).



6. The Late Hellenistic and Early Roman upper citadel at Tall Barakāt (looking east).



7. The Late Hellenistic and Early Roman lower citadel at Tall Barakāt (looking north).

described it except that there are many more discernible compartment walls inside the rectangular building at the upper citadel than presented by Prag and Barnes. At the upper citadel, Prag and Barnes discerned the line of a main enclosure wall, two lines of compartment walls inside the enclosure wall, and the substantial retaining walls on the slopes just below the citadel. The original upper citadel appears to have been at least 4m high above bedrock. The lower citadel encloses an area of 4150m sq, and the area inside the enclosure wall consist of a series of terrace walls, various building remains, and water storage facilities. As illustrated in the study of Prag and Barnes, there are ancient aqueducts which brought water to the cisterns in the lower enclosure from the plateau to the east.

Given the systematic survey of Khirbat al-Ḥabbasa by Prag and Barnes, the survey team centered its efforts on the collection of pottery. Prag and Barnes found a small amount of pottery dated to the late Hellenistic-early Roman and late Byzantine-early Islamic periods. As Prag and Barnes stated, pottery was very sparse on the surface. The survey team collected only two diagnostic sherds possibly dated to the late Hellenistic and early Roman periods plus a small number of body pot sherds.

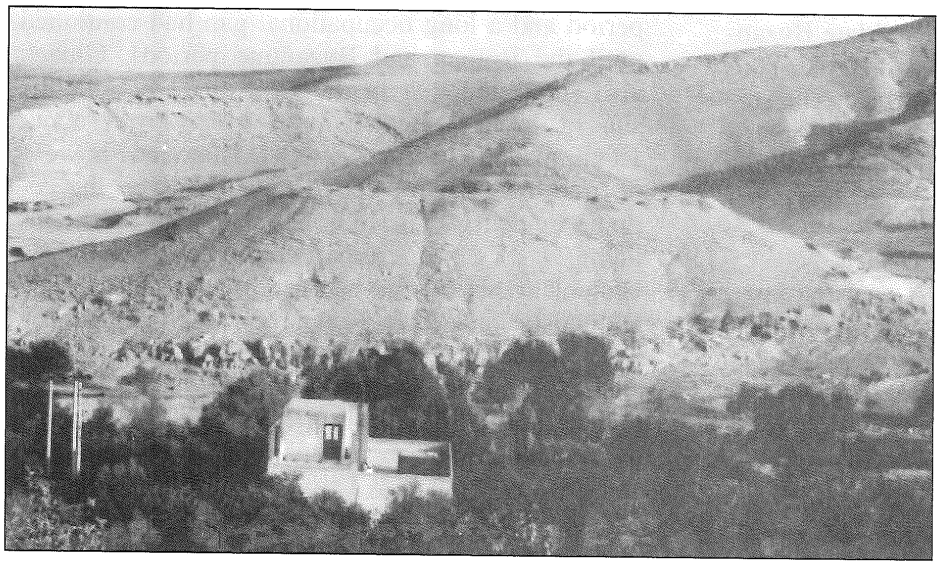
Tall Bulaybil تل بليبل (Survey Site 181; PG: 210.52/146.30): Tall Bulaybil is located on a natural rise approximately 200m north of the Wādī Shu'ayb dam, near the confluence of Wādī Juray'ah (وادي جريعه) into Wādī Shu'ayb. Situated on top of a high hill, Tall Bulaybil dominates the approaches from the Jordan Valley to the Juray'ah Valley and the Jordanian Plateau via Wādī Shu'ayb. The summit of Tall Bulaybil is flat and rectangular (**Fig. 8**). Unfortunately, the summit of the site has largely been bulldozed and cleared by military activities, and now a military trench and associated installations surround the summit. This hilltop currently includes no visible ancient building remains. According to the survey, however, part of the defense walls which once enclosed the entire site are discernible around the site, particularly on the eastern side. The survey team identified two to three defense walls on the eastern slope, which probably indicate that Tall Bulaybil was fortified at least twice in different periods. The latest defense system seems to have included several square or rectangular towers, one of which was measured and documented by the survey team. This tower is about 6m by 12m, and still remains standing about 1m high. It was solidly constructed of limestone blocks with walls measuring about 1m thick. This observation is in line with Glueck's analysis of aerial photographs (1951: 370) which led him to suggest that in ancient times, Tall Bulaybil was protected by a fortification system. The most noticeable structure at Tall Bulaybil is a potential gate system associated with a tower and a staircase leading up to the tower (**Fig. 9**). This gate system is located on the southern slope of the site, and the staircase was about 6m wide and probably included more than 20 steps.

There is an abundance of pottery at this site, plus several natural caves between the site and Wādī Shu'ayb. At Tall Bulaybil, Glueck (1951: 370-371) collected numerous Iron I-II sherds plus a small number of Roman and Byzantine fragments, yet he "found no Bronze Age sherds whatsoever on this site". On the basis of this result, he gave weight to the identification of Tall Bulaybil as biblical Beth-Nimrah. Glueck further pointed out that Tall Bulaybil had been abandoned after the Iron II period and a long occupational gap had continued until the Roman and Byzantine periods. Glueck also suggested that in the Hellenistic period, the site of biblical Beth-Nimrah was moved about 1.5km to Tall Nimrīn (تل نمرين). This view, however, may be now subject to revision given the ceramic evidence that we noted at the site; Tall Bulaybil was a thriving urban center during the early Hellenistic period and was resettled during the late Hellenistic and early Roman periods. The survey team collected Early Bronze, Iron I, Iron II, Persian, Hellenistic, and late Hellenistic-early Roman pottery sherds. The Iron II and Hellenistic sherds dominated the pottery assemblage.

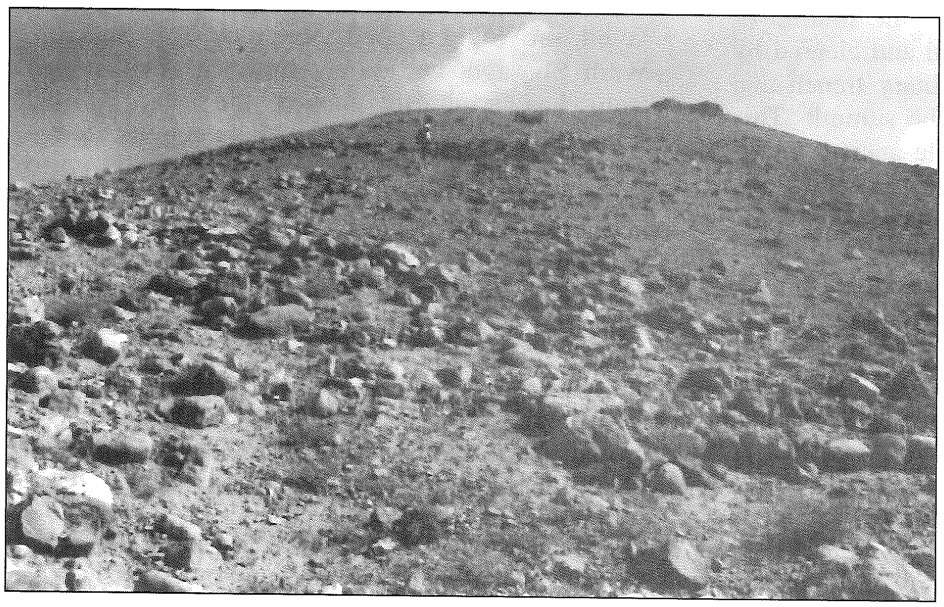
Khirbat Shu'ayb (خربة شعيب) (Survey Site 183; PG: 211.43/146.27): Site 183 is a completely ruined site on a ridge, approximately 1km east of Tall Bulaybil, providing a good view over Tall Bulaybil, Wādī Shu'ayb, and Wādī Juray'ah. The survey team has arbitrarily named the site, Khirbat Shu'ayb. The defense wall, which encloses the entire site, is about 2m thick and still stands up to about 2m high (Figs. **10, 11**). Four rooms flank the northern side of the defense wall, each of which measures about 3m by 6m. The site appears to have been partitioned into four sections by three walls built in the direction of east and west. Three round structures of different sizes were observed along the western defense wall, which seems to have been originally built as part of the defense system. Two additional building remains are visible near the southern end of this site, probably used for residency or storage. There is one possible Chalcolithic or Early Bronze tomb on the western side of this site, and the survey team collected nu-

merous pot sherds in and around this tomb. The pottery sherds from Khirbat Shu'ayb are assigned to either the Chalcolithic-Early Bronze period or the Persian-Hellenistic period.

Tall al-Ḥammām (تل الحمّام) (Survey Site 186; PG: 213.93/138.74): Tall al-Ḥammām, one of the largest ancient ruins in the Jordan Valley, provides a commanding view of the approaches from the Ghawr to the Wādī al-Kafrayn (**Fig. 12**). It is located approximately 400m south of the Wādī al-Kafrayn dam. Glueck (1951; Khouri 1988: 76) identified this site as biblical Abel Has-Sittim where Joshua and the Israelites had camped before crossing the Jordan River. The hilltop of this site must have been a fairly flat, platform-like area before modern military activities disturbed it (**Figs. 13, 14**). Although the summit of Tall al-Ḥammām was badly destroyed by the military in the recent past, various wall lines are still clearly visible in places (**Figs. 13, 14**). Given the evidence of surface remains, the summit of this site must have been fortified by defense walls, and this view is clearly in accord with Glueck's observation (1951: 379) that there are "the remains of a large and originally very strongly-built Iron Age I-II fortress". According to our survey, there are two separate discernible courses of defense walls, showing that this settlement was fortified at least twice in different periods. The enclosing walls are at least 1.5m thick, according to the visible remains on the surface, and some of them survive up to two to three courses high. The northern end of Tall al-Ḥammām consists of several rooms, all of which abut the northern fortification wall. This structure must be one of "the massive towers" in Glueck's description. A similar structure is found along the eastern city wall. The survey team also observed



8. General view of Tall Bulaybil (looking west).



9. A potential gate system and a staircase leading up to the city at Tall Bulaybil (looking northwest).

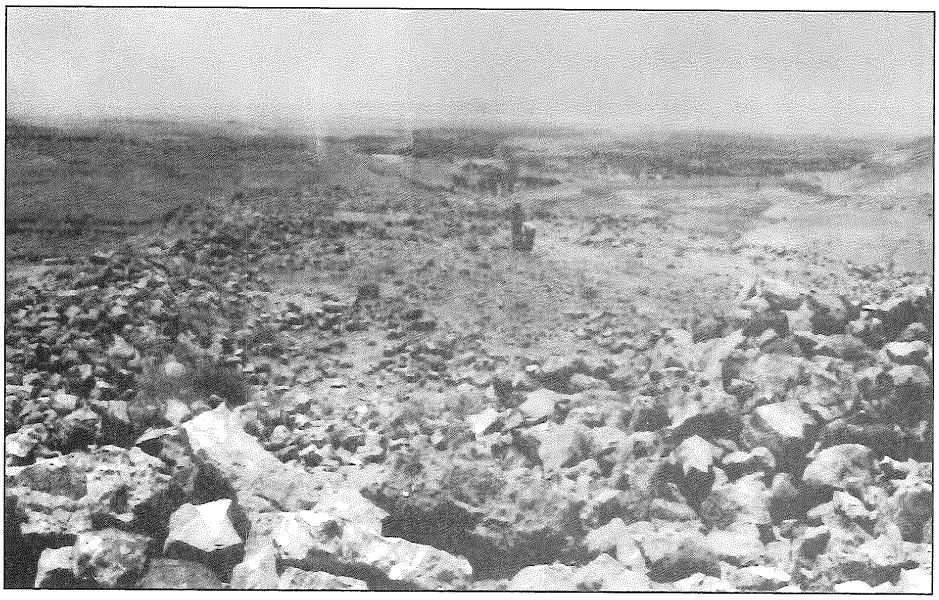
fragments of walls of a couple of other buildings in the central part of the site, and at least one large building complex has survived at the southern end of the site. All these buildings seem to have been the remains of strongly-built public and private houses. This finding indicates that the area inside the fortification walls was once occupied by a large number of houses and other buildings.

As the southwestern end of the summit has been completely bulldozed, it is impossible to trace the plan of architectural remains. Regarding this area, Glueck (1951: 379) writes that the southwestern end of the hilltop "forms an elevated platform, separated from the rest of the enclosed area by a cross-wall. This raised section, which culminates in the two towers at the s. w. end, is about 33m long and about 17m wide, and seems to form an inner citadel". Given the presence of some faint wall lines, Glueck's description seems to be relevant and accurate. Glueck's description continues, "There are traces of a strong glacis built against the tower at the n. e. end. Extensive clearances might reveal the presence of a glacis built against the entire outer fortification wall".

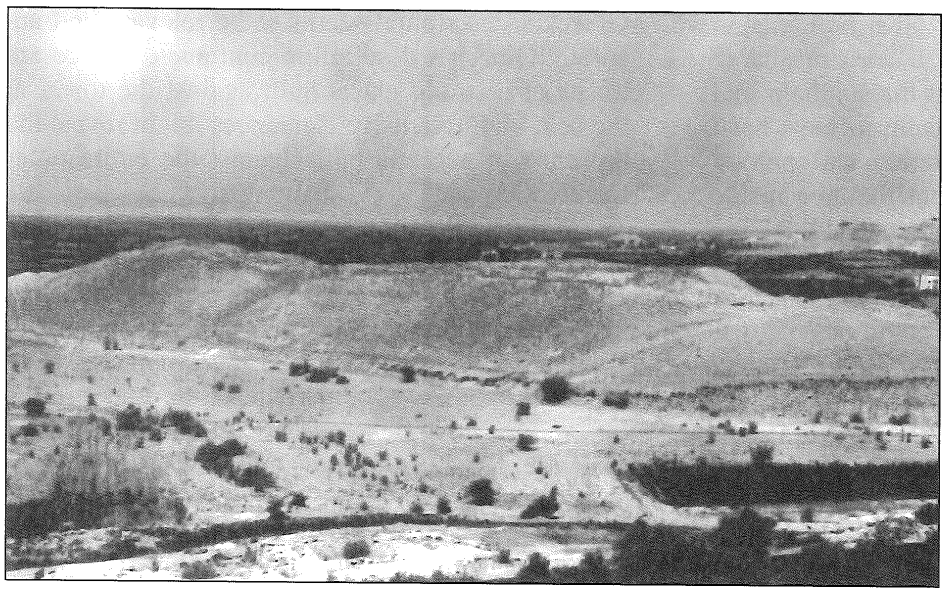
To the west of the summit of Tall al-Ḥammām is a lower *tall* that Prag (1991) made a systematic contour survey of in 1990. At the same time, Prag undertook an excavation of part of the Early Bronze Age settlement at the lower *tall*. As Prag (1991: 65) states, "The surface of the lower tell is covered with stretches of walls and rectangular structure. Most of the walls are between 50 and 80 cm wide....the size of the walled settlement on the lower tell, c. 300 x 340m". Prag dates the remains at the lower *tall* to the Early Bronze I-III periods and the transition from Early Bronze to the Middle



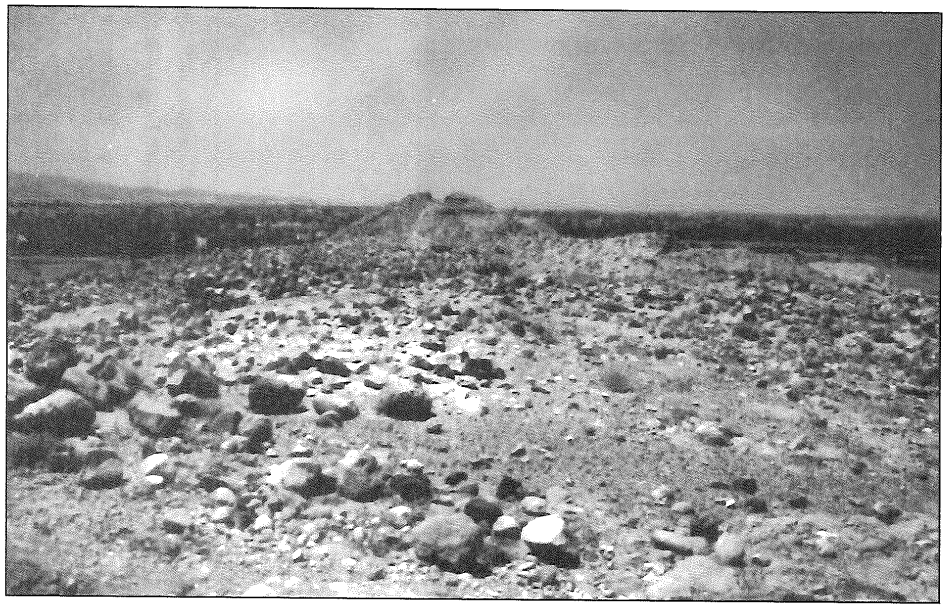
10. The western fortification wall and buildings on the northern part of Khirbat Shu'ayb (looking northeast).



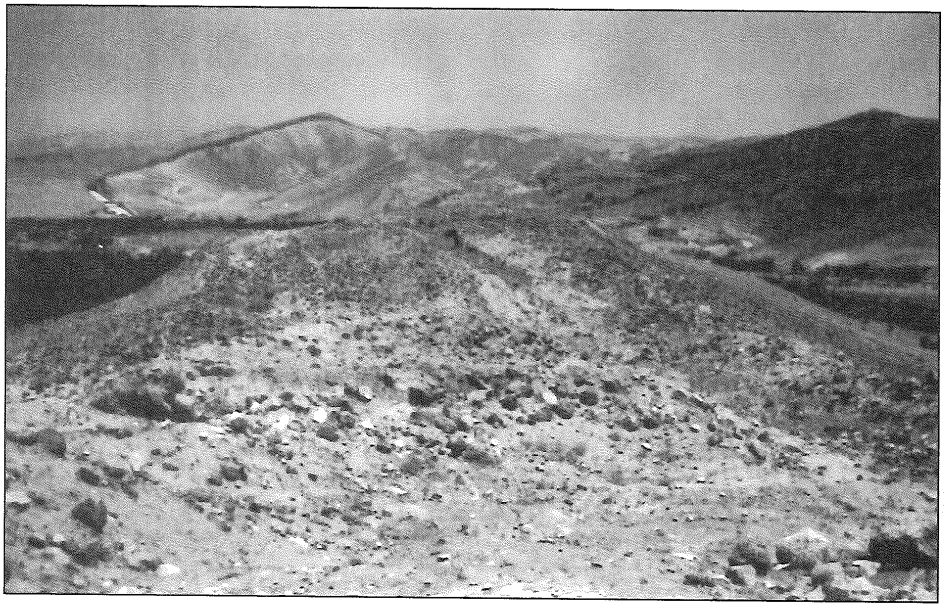
11. A large empty courtyard on the central part of Khirbat Shu'ayb (looking southwest).



12. *General view of Tall al-Ḥammām (looking southwest).*



13. *The southern half of the summit at Tall al-Ḥammām (looking southwest).*



14. *The northern half of the summit at Tall al-Ḥammām (looking north-east).*

Bronze period.

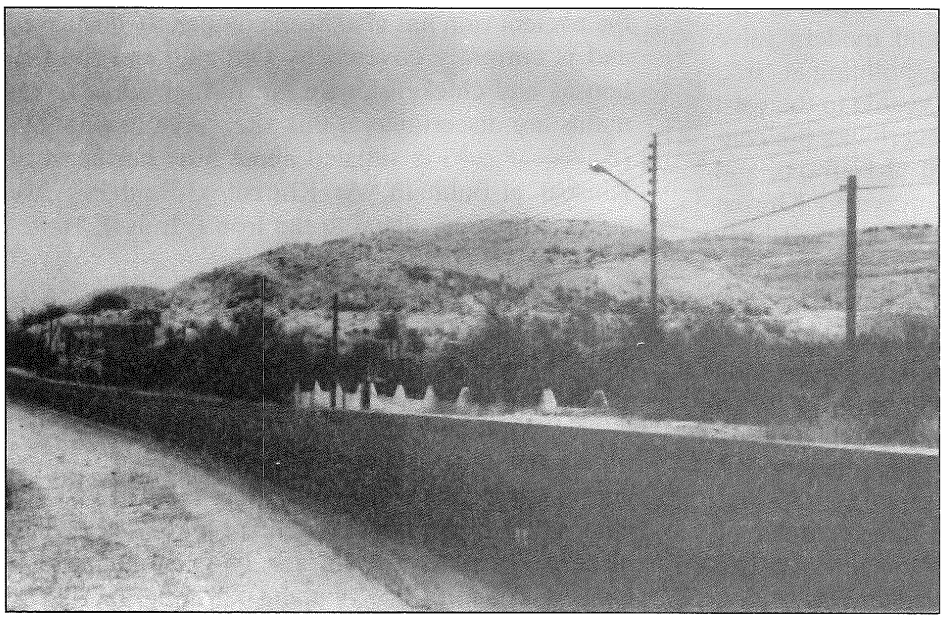
Glueck (1951) found a large number of Iron I-II sherds along with some scattered Early Bronze I, Roman, and Byzantine sherds. The Jordan Valley survey team reported the presence of Early Bronze, Middle Bronze, Iron I-II, and Early Islamic evidence at the site (Yassine, Ibrahim and Sauer 1988). The survey team collected Early Bronze, Late Bronze II-Iron I, Iron II, Persian, Hellenistic, Roman, and Byzantine pottery.

Tall aṭ-Ṭāḥūnah (تل الطاحونة) (Survey Site 192; PG: 213.95/139.33): Approximately 400m north of Tall al-Ḥammām is a relatively small ancient site that is being destroyed by modern farming and building activities (**Fig. 15**). Given that this site occupies a relatively high hill near the Wādī al-Kafrayn dam, it has an excellent view of the entire southern Jordan Valley and many ancient cities in the area such as Tall al-Kafrayn, Tall Barakāt, Khirbat al-Ḥabbasa, and Tall al-Ḥammām. We identified remains of a roughly square fortress measuring roughly 30 x 30m at the acropolis of this site, which may have been built with four towers at the corners. Two of the four towers are found on the northern side of the fort, although it is not impossible that these tower-like structures represent an earlier structure below the square edifice. This structure must correspond to Glueck's "foundation remains of a large building, oriented n.-s., and measuring about 25 by 18m" (1951: 384). A couple of wall lines are discernible south of this square structure, yet the nature of these wall lines is not clear. This site is marked by the remains of a late Ottoman watermill, situated on the southeastern slope of this site, which is comprised of several rooms and a water conduit.

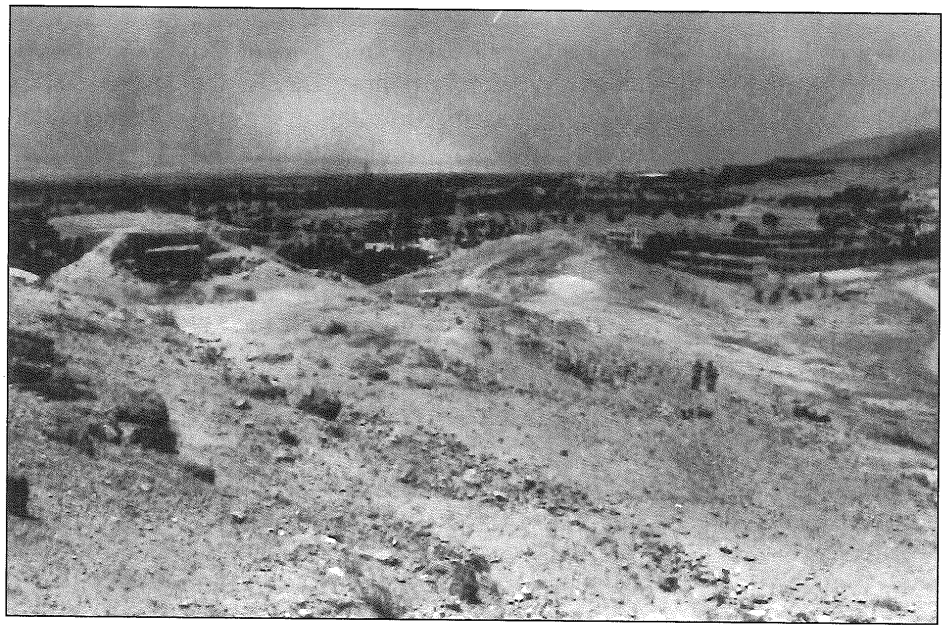
Glueck (1951) found a small number of Byzantine and Islamic pottery sherds; the Jordan Valley survey (Yassine, Ibrahim and Sauer 1988) yielded Early Bronze, Middle Bronze, Late Bronze, Iron II-Persian, early Roman, and Early Islamic. According to our survey, pottery is abundant on the site; our survey yielded Chalcolithic-Early Bronze, Hellenistic, early Roman, Byzantine, and early Islamic pottery on the surface.

Tall al-Muṣṭāḥ (تل المسطاح) (Survey Site 193; PG: 210.08/145.30): Tall al-Muṣṭāḥ, situated 1km south of Tall Bulaybil on the south bank of Wādī Shu'ayb, occupies a strategic position, overlooking the confluence of Wādī Juray'ah and Wādī Shu'ayb and controlling the entrance to the Juray'ah Valley as well as the perennial water sources along the Wādī Shu'ayb (Khouri 1988: 73) (**Fig. 16**). Glueck (1951: 368) visited this site during his Transjordan survey, and described Tall al-Muṣṭāḥ as "a large, sharply defined, flattish-topped, truncated, wedge-shaped tell". Presently, Tall al-Muṣṭāḥ includes a large visible rectangular structure measuring about 15 x 25m, partially destroyed by military trenches and road building. The vague outlines of a couple of partition walls are also discernible in this building. The survey team collected about 30 tesserae along the eastern wall of this structure, possibly indicating this building was an ancient church. The ancient remains of this site, except for this rectangular structure, are now completely destroyed and cleared by military, agriculture, and road-building activities.

Glueck (1951) assigned Tall al-Muṣṭāḥ to Early Bronze I; the Jordan Valley survey team (Yassine,



15. General view of Tall aṭ-Ṭāḥūnah (looking northwest).



16. *General view of Tall al-Muṭāḥ (looking northwest).*

Ibrahim and Sauer 1988) found Early Bronze I-III and Byzantine sherds. According to our survey, at Tall al-Muṣṭāḥ, late Byzantine and early Islamic pottery dominates the ceramic assemblage, and this pottery is scattered around the rectangular structure and on the southern and western slopes of the site. Meanwhile, Early Bronze potsherds and flints centered on the low hill west of the rectangular structure. Our ceramic corpus is comprised of Early Bronze, Byzantine, and early Islamic sherds.

2. The Wādī al-Baḥḥāth, Wādī ash-Shitā and Wādī as-Sīr Region

Rujm al-Buḥayra (رجم البحيرة) (Site 194; PG: 223.41/143.70): This medium-sized site is on a natural terrace on the northern bank of Wādī al-Baḥḥāth, an upper stream of Wādī al-Kafrayn, currently occupied by a cemetery and modern olive and fig orchards. A large Ottoman building at 'Irāq al-Amīr Survey Site 59 is clearly visible to the west from this site. Rujm al-Buḥayra overlooks the confluence of Wādī as-Sīr and Wādī al-Kafrayn, and the approaches from Wādī al-Kafrayn to Khirbat ash-Shitā and Nā'ūr (ناعور). The surface wall lines are faint, but the survey team could identify outer walls of two rectangular buildings, one of which had been built on top of the other. The earlier structure is roughly square, measuring 20 x 20m, and is slightly larger than the later one. Building ruins cover an area of ca. 40 x 50m, and several circular structures spread over the site. The villagers call this site Maqbarat al-Buḥayra (مقبرة البحيرة: Cemetery of al-Buḥayra) because of a large number of graves that dot the northern part of the site. Studies of surface pottery indicate that this site was settled in the Chalcolithic-Early Bronze, Late Bronze II, Iron I, and Hellenistic periods.

Khirbat al-Baḥḥāth (خربة البحّاث) (Survey Site 195; PG: 225.98/145.78): Khirbat al-Baḥḥāth is a medium-sized ruin on the southern bank of Wādī al-Baḥḥāth. approximately 50m southwest of the confluence of Wādī ash-Shitā and Wādī al-Baḥḥāth. The vague outlines of a potential city wall or a large building are discernible in the midst of numerous graves which spread over the entire site. The large building measures at least 9 x 19m, and some of its intact walls are about 1.4m thick. The walls are currently standing three to four courses high. Another wall line is identifiable about 5m south of this structure, yet the nature of this wall line is not clear. The eastern and western part of the ancient ruin has also been completely destroyed and is currently covered by Ottoman and modern houses and chicken farms. No further building remains are discernible at this site. 'Ayn al-Baḥḥāth (عين البحّاث) is situated about 50m northeast of Khirbat al-Baḥḥāth. At Khirbat al-Baḥḥāth, we collected pottery dated to the Iron I, Iron II, Hellenistic, and Byzantine periods.

Khirbat ash-Shitā خربة الشتا (Survey Site 209; PG: 226.05/146.90): Khirbat ash-Shitā is a currently-occupied village that is bisected by a road from the city of Wādī as-Sīr to 'Irāq al-Amīr via Wādī ash-Shitā. Although abandoned modern brick houses and modern concrete houses cover most of this ancient village, part of one ancient building is clearly discernible under one of the late Ottoman brick houses. The wall line is about 2m long and 80cm

thick, standing 30cm high. Except for this early evidence, no architectural remains are visible on the site. Currently, the northwestern part of this site is covered by a cemetery. The survey team also noticed one cuphole (30cm in diameter) carved into a detached limestone block, about 10m south of the early wall line. There is a strong water spring called 'Ayn ash-Shitā (عين الشتا), about 200m northeast of this site. We collected a small number of diagnostic pottery from Khirbat ash-Shitā, all of which are attributable to either the Hellenistic or Byzantine eras.

Khirbat Sār (خربة سار) (Survey Site 210; PG: 228.60/150.40): Khirbat Sār is located in the eastern part of the modern city of Wādī as-Sīr, at the western edge of the Jordanian Plateau overlooking the head of Wādī ash-Shitā. Glueck (1939: 153-155) visited this site and described a plan of the visible architectural remains in detail. Our investigation of Khirbat Sār shows that it remains largely intact since Glueck visited the site in the 1930s. The primary structure is a massive ruined rectangular building, possibly a temple, associated with two rows of arches. Glueck defined this structure as an Ammonite "qasr". According to our measurements, this structure is approximately 16m (north-south) and 17m (east-west), which is smaller than Glueck's measurement (19.8 x 20.0m). The walls are about 3 to 7 courses high (ca. 5m), and approximately 3m thick. The eastern side of this rectangular building is faced by a large courtyard measuring approximately 15.5 x 21.5m with two parallel rows of arcosolia on its south (6 arches) and north (5 arches) sides. Recall that according to Glueck (1939: 155), there were seven arcosolia on both sides of the courtyard and the arcosolia "were backed up by a wall, which in effect formed a continuation of the lines of the n. and s. walls of the qasr". Currently, the southeastern end of this courtyard, although buried under debris, is faintly discernible. On this side, however, we observed only six arcosolia, which disagrees with Glueck's illustration. Outside of these arcosolia are several wall lines, and one of them seems to form a continuation of the walls of the rectangular building. There are at least two to three large building complexes on the eastern and southern areas of the site. A large number of walls are clearly discernible on the surface, yet it is virtually impossible to trace the exact plan of the buildings. Glueck mentioned that there were remains of a small reservoir on the northeast side of the site. In the meantime, however, modern cultivation around Khirbat Sār has either destroyed or covered the reservoir, since it is no longer visible at this site.

Glueck dated the main rectangular structure to the Iron I-II period, yet his dating is quite far from convincing since we failed to collect any Iron Age pottery at Khirbat Sār. In this vein, notice that Glueck's dating of this building is primarily based on the typology of the structure rather than the pottery associated with it. Glueck (1939: 155) stated: "from the construction of the main building, with its huge blocks, laid at the corners in headers and stretches, we feel certain, even without really adequate pottery evidence, that it was originally built in the Early Iron Age". Glueck continued, "Although the nature of its construction alone led us to believe that it had to be assigned to the Early Iron Age, the discovery of similar sites with indubitable ceramic evidence enables us to attribute it certainly to EI I, with its history continuing down into EI II". Glueck reportedly collected Roman, Byzantine, and Islamic sherds in addition to a small quantity of Iron Age sherds. We found only late Hellenistic, early Roman, Byzantine, early Islamic, and middle Islamic ware on the site, strongly indicating that the buildings at Khirbat Sār belong to the periods later than the Iron Age.

Khirbat Umm Farwa (خربة أم فروة) (Survey Site 214; PG: 223.41/150.21): On this small site is a modern village with several late Ottoman block houses built on a low rocky knoll by 'Ayn Farwa (عين فروة), roughly 1km north of al-Baṣṣa (البصة) and 3km northeast of 'Irāq al-Amīr. This site has a relatively heavy scattering of potsherds in addition to at least four caves that were most likely used for residence and storage in antiquities. There is some evidence of quarrying as well. One possible ancient wall line, visible under a late Ottoman house, measures 2m long and 1m thick. The survey team collected five grinding stones on the surface. At Khirbat Umm Farwa, we collected Iron I, Iron II-Persian, and Hellenistic pottery.

Khirbat as-Sīr (خربة السير) (Survey Site 216; PG: 227.00/151.72): Khirbat as-Sīr is a large ancient ruin at the head of Wādī as-Sīr, which is now almost completely bulldozed and cleared in order to build terraces for horticulture and olive orchards. Given the size of the bulldozed area and a heavy concentration of potsherds, Khirbat as-Sīr must have been a thriving ancient village that occupied much of the hill. Despite intensive modern activities, there are some ancient building fragments and several stone heaps which dot the site. Near the potential acropolis of Khirbat as-Sīr are the remains of a rectangular building that was constructed from

small to medium stones. The building measures at least 6.5m (north-south) by 17m (east-west), and the walls are best preserved at the northwest corner where it stands up to two courses high. Approximately 10m east of this building is another rectangular structure, measuring 7.2 x 8.7m, which includes a couple of inner partition wall lines amid rock tumble. It is probable that the remains of this building were originally part of one large building complex. Situated about 20m northeast of this building complex is a third potential ancient building whose eastern wall measures 15m long in the north-south direction. The survey team could not trace the remainder of this building further because of rock tumble which covers an area of about 15 x 20m. On the northeast side of the site, a scatter of foundation walls and stone heaps indicate the presence of additional buildings and installations, where the survey team successfully identified at least two wall lines amid the stone tumbles and heaps. Both wall lines measure about 5m long in different directions, yet it is obvious that these walls belong to one large building. On the south side of the site, virtually nothing remains to indicate ancient buildings.

At Khirbat as-Sīr, we found a seal impression engraved on a jar handle, which was studied subsequently by Jürg Eggler. According to the lead author's conversation with Eggler (March 22, 2001), in the impression is a tree with a jutting jagged tree-top flanked by two standing figures. This motif is a variant of the early Iron Age theme of the tree-cut, typically dated to late Iron I and Iron II (1075-900 BC). Apparently, Eggler's dating of the seal impression is compatible with the pottery that we found on the surface of the site. We collected a large number of pot sherds, all of which were attributed to the periods of Late Bronze II, Iron I, Iron II, Persian, or Hellenistic.

Conclusion

Thanks to the three seasons of systematic survey of the 'Irāq al-Amīr region, we are now quite well informed as to the chronological distribution of ancient settlements in the region and their geographical extent. Besides, as a result of the surveys, several facts of settlement patterns and history in the region, including their implication for the study of the Tobiads, can be presented. The primary concerns of this preliminary report, however, were to present archaeological finds from the 2000 survey and report the result of preliminary analysis of the finds. Given that detailed studies of pottery, architectural remains, and artifacts from the survey are still underway, a more systematic presentation of the data covered in this report will be available to the readers in due course. Also, not intended to be a historical analysis of archaeological findings, this report has offered a rather limited integrative perspective of the historical importance of the survey results.

To conclude, three seasons of archaeological survey in the region of 'Irāq al-Amīr and Wādī al-Kafrayn have produced new evidence for examining the nature of settlement in this region from the Chalcolithic to the Islamic periods. In light of the survey results, the Chalcolithic and Early Bronze periods appear to have been an era of significant settlement in the survey region; the evidence of this early period of human occupation is extensive and dense, particularly along Wādī as-Sīr and Wādī al-Kafrayn. The survey area also includes a large number of Chalcolithic and Early Bronze burials, as demonstrated in the previous papers on the dolmens and rock-cut chamber tombs in the vicinity of 'Irāq al-Amīr (Ji 1997; Loh and Ji 2000). The Iron II-Hellenistic and early Roman periods are well represented in the surveys as well. It seems apparent that the number of occupied sites in the regions of 'Irāq al-Amīr andWādī al-Kafrayn rose dramatically during the Iron II period after a long occupational abatement, and this settlement intensification continued into the Hellenistic period. In particular, the early Hellenistic period was one of the best represented periods of all historical periods in the region. This fact contrasts with the early Hellenistic settlement abatement in the Jordanian Plateau (cf. Ji 2001; Smith 1990; Tidmarsh 2001). The 'Irāq al-Amīr region also experienced substantial human activities during the Byzantine period, and its evidence is quite ubiquitous across different geographical segments of the survey area. This prosperity of 'Irāq al-Amīr and its vicinity appears to have been associated with the social and economic incline during the Byzantine period in the Jordanian Plateau and the Jordan Valley. To be sure, in Jordan, the Byzantine settlement intensification is well-established (cf. Boling 1989; Ibach 1987; Parker 1992). Islamic settlements were less extensive and confined mostly to the area in close proximity to the Jordan Valley and the modern city of Wādī as-Sīr. There is some evidence of Islamic settlements at 'Irāq al-Amīr and its immediate vicinity; yet, they are not impressive as compared to the earlier settlements in the area.

Acknowledgment

The authors wish to thank all the people who made the 2000 fieldwork successful and productive. Our gratitude first goes to Dr. Fawwaz al-

Khraysheh, Director-General of the Department of Antiquities, Adib Abu Shmeis, our Department of Antiquities representative, and other members of the department. Without their support for and interest in this project, the fieldwork would not have been possible. Appreciation is also due to Nachum Sagiv who assisted us with various aspects of the survey. The project was deeply indebted to the research grants from the Versacare Foundation and the Korean Research Foundation. We would like to address our warm thanks to the members of the two foundations. Much support also came from Dr. Larry T. Geraty at La Sierra University and Dr. Kye Hoon Shin at Sam Yook University, Korea. Their support and assistance are much appreciated. Last but not the least, we would like to thank all the staff and student volunteers who participated in the project and worked with us.

C.C. Ji
La Sierra University
Riverside, CA
U.S.A.

J.K. Lee
Sam Yook University
Seoul, Korea

Bibliography

Boling, R.G.
1989 Site Survey in the el-'Umeiri Region. Pp. 98-188 in L.T. Geraty *et al.* (eds.), *Madaba Plains Project 1*. Berrien Springs: Andrews University.

Glueck, N.
1939 *Explorations in Eastern Palestine, III* (AASOR 18-19). New Haven: American Schools of Oriental Research.
1951 *Explorations in Eastern Palestine, IV* (AASOR 25-28). New Haven: American Schools of Oriental Research.

Herr, L.G. and Christopherson, G.L.
1996 *Madaba Plains Project Survey Manual.* Berrien Springs: Andrews University.

Ibach, R.D.
1987 *Archaeological Survey of the Hisban Region.* Berrien Springs: Andrews University.

Ji, C.C.
1997 The Chalcolithic and Early Bronze Cemeteries near 'Iraq al-`Amir and the Preliminary Report on Salvage Excavations. *ADAJ* 41: 49-68.
1998a Archaeological Survey and Settlement Patterns in the Region of 'Irāq al-`Amīr, 1996: A Preliminary Report. *ADAJ* 42: 587-608.
1998b A New Look at the Tobiads in `Irāq al-`Amīr. *LA* 48: 417-440.
2001 'Irāq al-`Amīr and Hellenistic Settlements in Central and Northern Jordan. Pp. 379-390 in *SHAJ* 7. Amman: Department of Antiquities.

Ji, C.C. and Lee, J.K.
1999 The 1998 Season of Archaeological Survey in the Regions of 'Irāq al-`Amīr and the Wādī al-Kafrayn: A Preliminary Report. *ADAJ* 43: 521-539.
f.c. From the Tobiads to the Hasmoneans: The Hellenistic Pottery, Coins, and History in the Regions of 'Irāq al-`Amīr and the Wadi Hisban. In *SHAJ* 8. Amman: Department of Antiquities.

Khouri, R.G.
1988 *The Antiquities of the Jordan Rift Valley.* Amman: Al Kutba.

Lapp, N.L.
1983 *The Excavations at Araq el-Emir I* (AASOR 47). Winona Lake: American Schools of Oriental Research.

Lapp, P.W.
1962 Soundings at `Araq el-Emir (Jordan). *BASOR* 165: 16-34.
1963 The Second and Third Campaigns at `Araq el-Emir. *BASOR* 171: 8-39.

Loh, M.C., and Ji, C.C.
2000 A Preliminary Report on the Human Remains from a Rock-Cut Chamber Tomb near 'Irāq al-`Amīr. *ADAJ* 44: 201-209.

Parker, S.T.
1992 The Limes and Settlement Patterns in Central Jordan in the Roman and Byzantine Periods. Pp. 321-326 in *SHAJ* 4. Amman: Department of Antiquities.

Prag, K.
1991 Preliminary Report on the Excavations at Tell Iktanu and Tell al-Hammam, Jordan, 1990. *Levant* 23: 55-66.

Prag, K. and Barnes, H.
1996 Three Fortresses on the Wadi Kafrain, Jordan. *Levant* 28: 41-61.

Smith, R.H.
1990 The southern Levant in the Hellenistic Period. *Levant* 22: 123-130.

Tidmarsh, J.
2001 The Problem of Early Hellenistic Jordan. Pp 191-206 in A. Walmsely (ed.), *Australians Uncovering Ancient Jordan.* Sydney: University of Sydney.

Villeneuve, F.
1988 Prospection archéologique et géographie historique: la région d'Iraq al-Amir (Jordanie). Pp. 257-288 in P. Gatier *et al.* (eds.), *Géographie Historique au Proche-Orient*. Paris: Centre National de la Recherche Scientifique.

Waheeb, M.
1997 Report on the Excavations at Wadi al-Kafrayn Southern Ghors (Al-Aghwar). *ADAJ* 41: 463-468.

Yassine, K., Ibrahim, M. and Sauer, J.
1988 The East Jordan Valley Survey, 1976 (Second Part). Pp. 187-206 in K. Yassine (ed.), *Archaeology of Jordan.* Amman: University of Jordan.

THE 2001 SEASON OF THE JARASH CITY WALLS PROJECT: PRELIMINARY REPORT

Ina Kehrberg and John Manley[1]

In October of 2000, the authors examined the foundations of the west Gerasa city wall north of the South Theatre (Braun, Kehrberg and Manley 2001; Kehrberg and Manley 2001). The promising findings, securely dating the wall foundation there to the early second century AD, have led to a CBRL funded project to examine the city wall foundations and their stratigraphy at various points along the circa 3.5km long enclosure wall.

The results of this season in September-October 2001 were far richer than anticipated. Almost immediately, the first major find in trench 100 on the inner face of the north city wall overlooking the modern archaeological camp, was in fact not a foundation trench but a sealed hypogean tomb under the rocky foundation of the city wall (**Fig. 1**). The doorway of the one-chamber shaft tomb was sealed by irregular blocks wedged in the doorway and held in place by an earth-clay binder. The tomb is oriented north-south and the chamber contained a single burial, it seems of a young person or child, put on its back with the head at the south entrance.[2] The superficial disturbance and damage of the skeletal remains had been caused by rodents.

The ceramic and other objects in the chamber and the pottery sherds from the dromos fill (**Figs. 2-4**) place the burial in the Late Hellenistic period of the late second or at latest at the very beginning of the first century BC, confirmed by the one Hellenistic coin of the late second century BC found at the feet of the deceased.[3] The date of the coin fits the pottery and glass finds (four astragals in glass and a large number of games pieces) in the chamber and pottery types from the dromos fill.

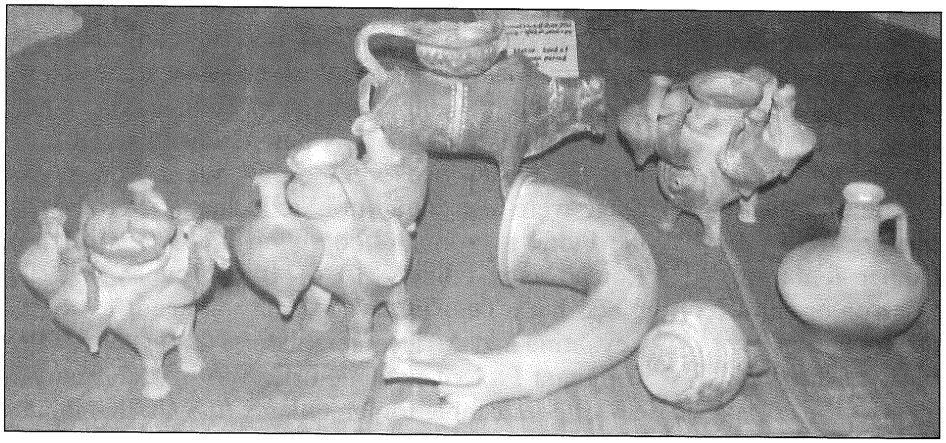
A lagynos (see Kehrberg, forthcoming a) was accompanied by four pottery 'models', if such they are, their unusual quality being enhanced by their uniqueness. Preliminary search has so far failed to find parallels in Jordan for this or later periods. Looking beyond her borders, however, similar vases were found and the closest forms come from contemporary Punic Carthage in Tunisia (Gauckler 1915; Cintas 1950).[4] It is paramount to point out that the wheel-made zoomorphic vases from Carthage were also found in Late Hellenistic tombs of the Punic necropolis underlying the Odeon of the Roman city (Cintas 1976; Ben Younes 1982). Since both Tunisia and Jordan belonged, as their Levantine and African neighbours, to the culturally dominant Ptolemaic Hellenistic World, the discovery of comparable tomb contents (the Carthaginian tombs also contained child burials) is not entirely surprising. The Gerasa/Antioch on the Chrysorhoas vases, including the bull vase, are not 'figurines'.

---

1. The Jarash City Walls Project (JCWP) season 2001 (JCWP01) team were: Iman Oweis, curator of the Jarash Archaeological Museum and Representative of the Department of Antiquities (DoA); Kate Wolrige, trench supervisor; Andrew Card, assistant trench supervisor; Marita Manley, volunteer helper; four workers from the DoA. The co-directors of the project are Ina Kehrberg, John Manley and David Kennedy. Gabriel Humbert supervised the cleaning of the pottery tomb finds and mended the complete forms. The JCWP project has been affiliated by the CBRL who have also funded the 2001 season; additional support was given by the 'Roman Studies Society', UK. Through its Director-General, Dr. Fawwaz al-Khrayseh, the Department of Antiquities of Jordan generously provided the in-field workforce, housing and equipment. Without this vital help from the DoA, the JCWP 2001 season could not have taken place. Abdel Majeed Mjelly, responsible for the DoA restorations and resources at Jarash, was very helpful in suggesting some areas for excavation where he had already cleared the terrain of modern dirt and ancient city wall tumble.
2. The well preserved skeleton is with the 'Institute of Anthropology and Archaeology (*IAA*)', Yarmouk University, Irbid, for examination and conservation. Iman Oweis plans to recreate exactly the burial chamber with the burial gifts as a permanent exhibit in the Jarash Archaeological Museum. For earlier published notes of *JCWP01* findings and the tomb contents see Kehrberg and Manley 2002a-d.
3. The coins of the *JCWP* 2001 and 2002 seasons are studied by Julian Bowsher; the glass studies, excepting the tomb finds, are done by Daniel Keller; the gold pectoral and other metal finds from the tomb are studied by Iman Oweis.
4. Zoomorphic vases, in particular of bull and horse, are well known from the Iron Age and again especially from the Late Hellenistic period on in the Eastern Mediterranean, often referred to in Jordan as 'Alexandrian' influence. These as our wheel-made pots must be distinguished from the popular mass-produced mould-made askoi (in animal and human forms). A detailed study by the authors of the burial, the contents and their significance is underway and will result in a comprehensive publication.



1. JCW01.104-114 hypogean tomb under city wall 100.



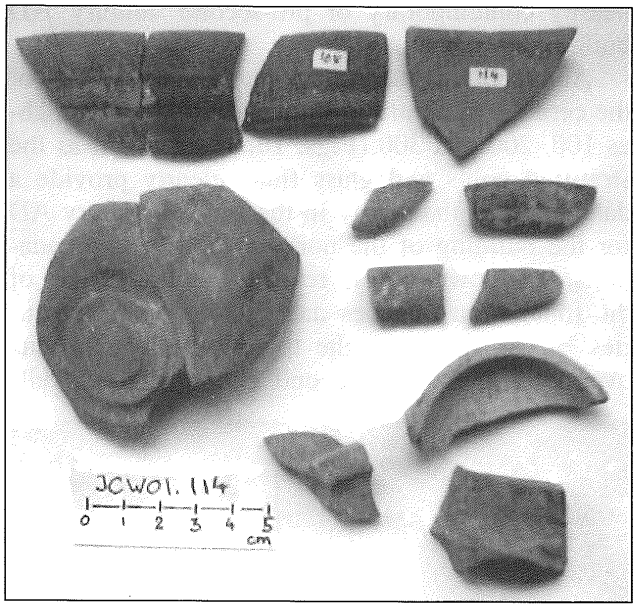
2. JCW01.109 pottery tomb group before cleaning.

A more fitting description appears to be that of toys or models portraying everyday life, or both: they do not belong to the familiar class of mould-made terracottas or moulded figural unguentaria and *ex-voto* which occur regularly and in quite large groups in first century AD tombs (see e.g. Iliffe 1945) throughout the Roman World. The pottery rhyton[5] and gold pectoral (**Fig. 4**) are, however, familiar Hellenistic apparel and accoutrement in tombs of well-to-do citizens. The 'ptolemaised' Hellenistic Gerasean family, is no exception in the Levantine culture of the day and the camel vases with their Rhodian amphorae strapped to their backs may indeed represent the actual trading activity and signify that the family owned a caravan.

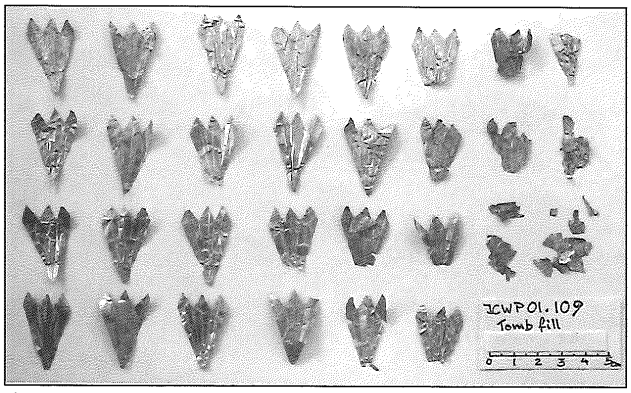
This interpretation may be supported by the other most unusal find, the ceramic model of a clepsydra (see **Fig. 2**), its origin derived from an Egyptian water clock and used by travellers to extract drinking water from shallow and muddied puddles or pools. Phoenician travellers in Spain were known to have carried a bronze clepysdra, very similar to our pottery model, on their belts.[6] Next to the interred there was an iron strigil, regarded in Antiquity, for both boys and girls, as a symbol of refinement and education. The implications indicated by the lagynos (see **Fig. 2**) — a ritual vessel introduced by the Ptolemies in their versions of

5. Fragments of a seemingly identical pottery rhyton were found in 'contaminated' Iron Age context directly below Hellenistic contexts at the 'Ammān Citadel Temple of Heracles (see Koutsoukou *et al.* 1997: 130 and fig. 25). As the figurative part of the rhyton was mould-made, both the Jarash and 'Ammān rhytons symbolise a wild cat, it is quite possible that the rhyton had been 'mass-produced' and sold at various Hellenistic markets in Jordan and perhaps elsewhere in the Levant.

6. I owe this information to Martin Almagro.



3. JCW01.114 dromos fill sherds with joins from 105.



4. JCW01.109 gold pectoral no 29 after cleaning (conservation I. Oweis; photo L. Borel).

Hellenistic Dionysiac funerary rites and symposia — the rhyton, iron strigil, gold pectoral and glass set of astragals with counters show the owner to have been a fully integrated member of the Eastern Mediterranean Hellenistic society.

The objective of the project is, however, to examine the stratification of the city wall foundations at various strategic points. This was done as at the 'tomb trench' (wall/trench 100) westernmost of the North Gate between towers 46 and 47, and at two further soundings nearer the North Gate, walls/trenches 200 and 300 (see the new town plan of Gerasa in Braun *et al.* 2001: 434, fig.1).

All three trenches revealed that the foundations of the city wall were constructed according to the topography of the terrain: trench/wall 100 was founded on top of the rocky outcrop of the tomb; several dirt layers had accumulated above the sealed dromos of the tomb and provided the original Roman surface (the tomb was obviously not known in the Roman period) from which construction of the city wall commenced. The stratified contexts of trench 100 have yielded secure dating material. Trench/wall 200 revealed a shallow Roman foundation trench cut into 'Jarash Soil', the virgin *terra rosa*, down to the sloping bedrock: on it three built courses of foundation wall were level with the upper cut of the foundation trench and literally wedged into the narrow space of the Roman trench (**Fig. 5**). Trench/wall 300, nearest the North Gate with the Trajanic inscription (Welles 1938: inscriptions 56 and 57) showed that the city wall



5. JCW01.200 S-section, upper edge of foundation trench cut near top of 203.

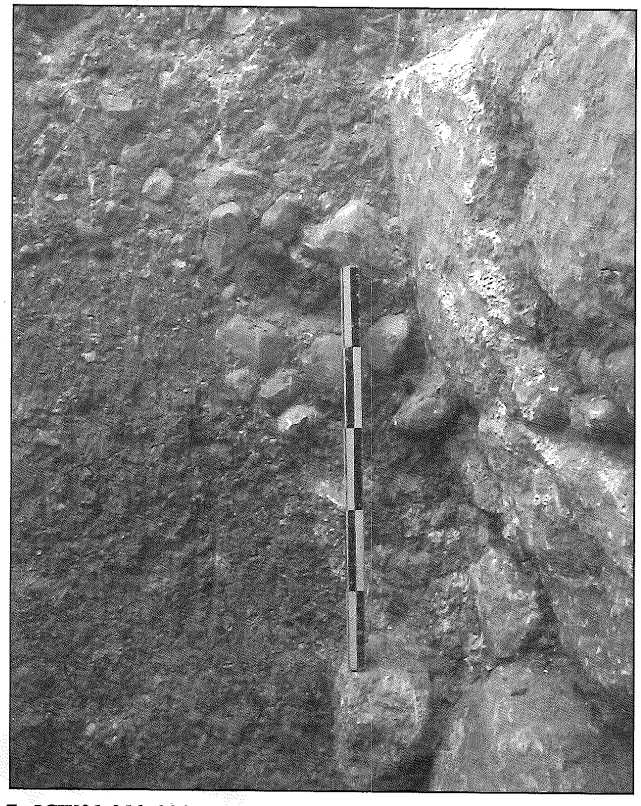
7. The city wall above trench 100 provided additional pottery evidence for dating when we removed a reused column drum; the exposed inner core structure of the city wall contained no later sherds than of second century pottery.

was founded on over eight courses of foundation wall 302 (**Fig. 6**); the cut of the Roman trench is distinct in both the E-W baulks of Trench 300 (**Fig. 7**). The depth and size of the foundation is due to the steep wadi bed sloping toward the west bank of the Chrysorhoas: we put our trench there for optimum finds. The sections show that construction of the city wall foundations and the upper parts vary for each wall segment under examination (**Figs. 8, 9**), a fact that cannot be interpreted chronologically and, instead, favours a topographical explanation (including the use of handy spolia from demolished nearby contemporary or pre-second century AD building sites?).

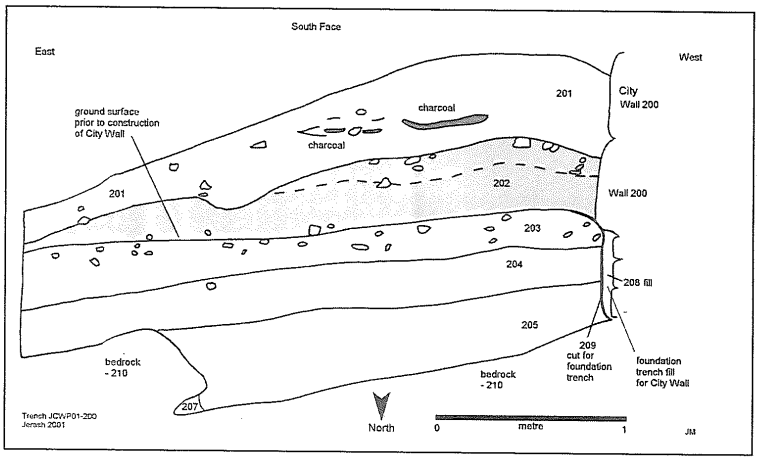
Above all, the diagnostic quantity and variety of the ceramic finds of the Roman levels from trenches 100, 200 and 300 (**Figs. 10, 11**), as well as the stratified coins and glass finds clearly provide a date not later than early in the second century AD for the building of the northern city wall foundations. The lower levels revealed in the baulks of the foundation trenches date from the first centuries BC to AD, near the top of the Roman cuts overlapping into the second century.[7] The well-



6. JCW01.300 deep cut and foundation wall 302, west of North Gate.

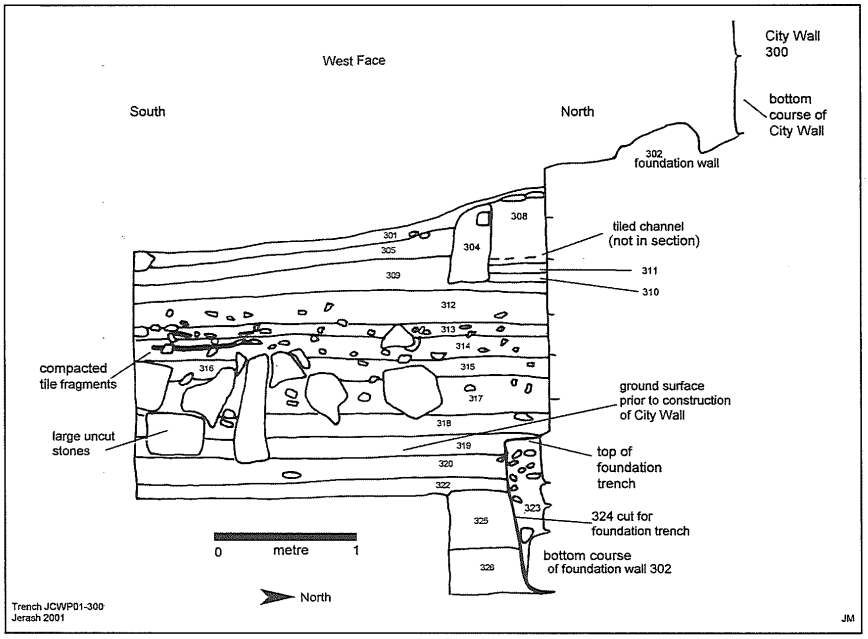


7. JCW01.319-323 W-face of foundation trench, upper edge of cut near top of 319.

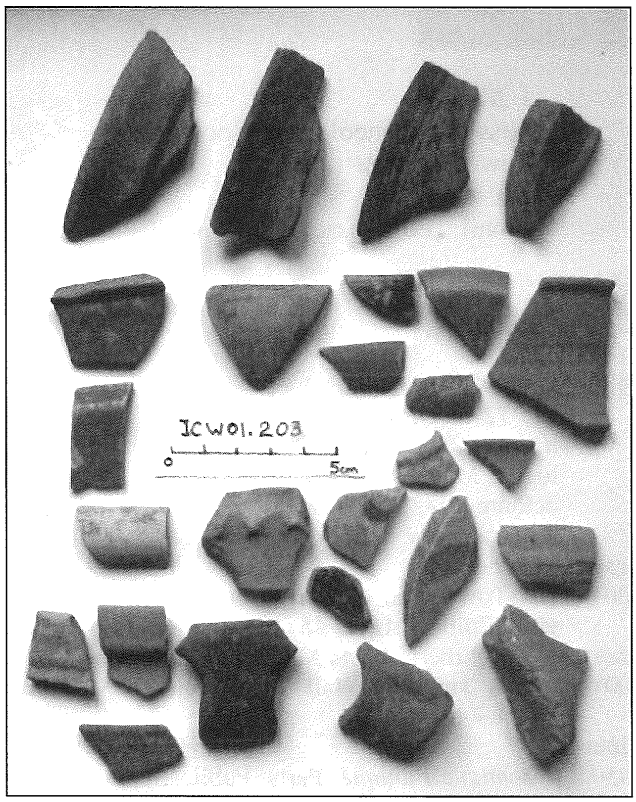


8. JCW01.200 S-section drawing of trench and profile of wall 200 (K.Wolrige, computer image J. Manley).

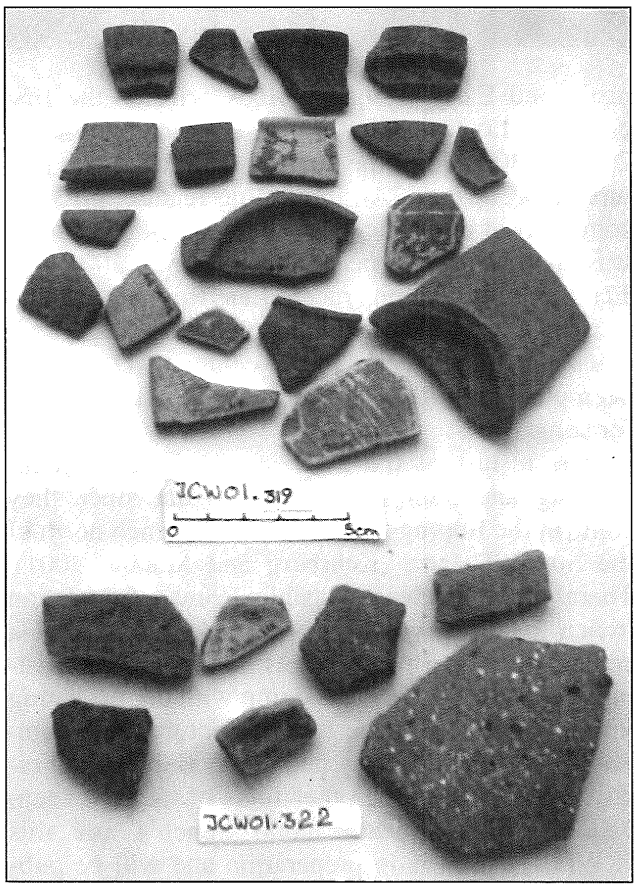
7. The city wall above trench 100 provided additional pottery evidence for dating when we removed a reused column drum; the exposed inner core structure of the city wall contained no later sherds than of second century pottery.



9. JCW01.300 W-section drawing of trench and profile of wall 302 (A. Card, computer image J. Manley)



10. JCW01.203 sherds.



11. JCW01.upper 319, lower 322 sherds.

spaced trenches 100-300 provide sufficient material evidence to posit that the northernmost inner-wall terrain shows remarkable homogeneity from Late Hellenistic to Roman. The pottery finds indicate domestic activities, i.e. occupation, from the Late Hellenistic period on. Imported wares are almost entirely missing and most of the pottery consists of common and some coarse household wares. Larger scale excavations further inward from the periphery of the north city wall would be necessary to reveal such 'occupations'. However, it seems already clear that the northern picture varies from the excavated southern terrains and although vastly incomplete does seem to suggest different types of occupation or use of the terrain in the Late Helle-



12. JCW01.307-310 'channel'.

nistic and Early Roman periods prior to the first city wall. Lowest strata Iron Age sherds in trenches 200 and 300 add to the already familiar Jarash picture of occupation. An interesting feature, possibly some sort of domestic or production-linked channel was found in the upper strata of trench 300 (**Fig. 12**): the carefully constructed Late Roman 'installation' (the rest lies still unexplored underground) dates to the third-early fourth century AD and had been put there after the city wall had been standing for some time.

The results of the 2001 season have been rewarding and interesting, in particular since they confirm the findings of the city wall trench north of the South Theatre (Kehrberg and Manley 2001). There also the clearly visible Roman foundation trench for the city wall was cut into layers of first centuries BC and AD deposits, in that case consisting of a pottery kiln waste dump with the fill dating to the beginning of the second century. The comprehensive pottery study and comparative stratigraphy, together with the other finds of the first excavation ('South Theatre 2000 trench') and this JCWP01 season is in preparation and will be published jointly with the final JCWP excavation season of 2002.

I. Kehrberg
Council for British Research in the Levant
al-Jubaiha, 'Ammān,
Jordan
Email: inakehrberg@hotmail.com

J. Manley
Sussex Archaeological Society,
Lewes, Sussex
UK
Email: ceo@sussexpast.co.uk

References

Ben Younes, H.
1982 Musées Tunisiens I. Objets puniques. P. 68, nos. 71; 72 in *De Carthage à Kairouan. 2000 ans d'art et d'histoire en Tunesie*. Exhibition Catalogue, Musée de Paris de la Ville de Paris, 20 octobre 1982 - 27 février 1983. Paris: Association frainçaise d'Action Artistique.

Braun, J-P. *et al.*
2001 The Town Plan of Gerasa in AD 2000: A Revised Edition. *ADAJ* 45: 433-436.

Braun, J-P., Kehrberg, I. and Manley, J.
2001 Jerash. The City Wall Excavations 2000. *AJA* 105/3: 446-448.

Cintas, P.
1950 *Céramique Punique*. Paris: Publications de l'Institut des Hautes Etudes de Tunis III: esp. 195; no. 18 pl. 57.
1976 *Manuel d'Archéologie Punique II. La civilisation carthaginoise. Les réalisations matérielles*. Paris: A&J Picard (post-humous): esp. 343-387 (Les tombes hellénisées).

Gauckler, P.
1915 *Nécropoles puniques de Carthage* 1. Paris: A. Picard: esp. pl. 154.

Iliffe, J.
1945 Imperial Art in Trans-Jordan. Figurines and Lamps from a Potter's Store at Jerash. *QDAP* 11: 1-26.

Josephus, Flavius
1957 *Jewish Antiquities* 12-14. Loeb Classical Library 7. London (English transl. R. Marcus).
Kehrberg, I.
fc a Late Hellenistic and Early Roman Pottery of Gerasa: A commercial enterprise in view of international norms. In *SHAJ* 8. Amman: Department of Antiquities.
fc b Gerasa Seen from Below. A comparison of artefactual evidence and uses of sites, an alternative urban history. *PEQ* (2003).
Kehrberg, I. and Manley, J.
2001 New Archaeological Finds for the Dating of the Gerasa Roman City Wall of Gerasa. *ADAJ* 45: 437-446.
2002a First Report of the Jerash City Walls Project: Excavations 2001. *CBRL Newsletter* 2002/1:16-17.
2002b La protégée du rempart de Gérasa. *Le Monde de la Bible* 144.
2002c The Earliest Hellenistic Tomb Find in Jerash or Antioch on the Chrysorhoas. The Jerash City Walls Project: Excavations 2001. *Occident and Orient* 7/1: 7-8.
2002d Jerash/Gerasa: I. Kehrberg and J. Manley report. *AJA* 106/3.
Koutsoukou, A. *et al.*
1997 *The Great Temple of Amman. The Excavations.* Amman: ACOR.
Kraeling, C.H. (ed.) *et al.*
1938 *Gerasa. City of the Decapolis.* New Haven: Yale University.
Welles, C.B.
1938 The Inscriptions. Pp. 355-466 in Kraeling 1938.

A SIXTH CENTURY WATER-POWERED SAWMILL AT JARASH

Jacques Seigne

In his poem *Mosella*, written in the fourth century AD, Ausonius [a Gallo-Roman poet] says:

> "...as to the other river (the Erubrus, now known as the Ruwer, a tributary of the Mosel near Trier, Germany), turning the mill-stones with rapid, whirling motion, and drawing the creaking saws through smooth white stone, listens to an endless uproar from each of his banks" (362-364).

These lines, apparently written in AD 367, have caused a lot of ink to flow (see, for general comments and bibliography, Wikander 1981: 91-104; 1989: 185-190; 2000: 401-410). The use of water-power for grain milling is well known, from texts and numerous archaeological remains, all over the Roman World, at least from the beginning of the Christian Era in the Near East (for a general overview, see for example Humphrey, Oleson and Sherwood 1998: 29-34). On the other hand, archaeological remains that could be attributed to such an early use of waterpower for sawing wood or stone had, until now, been entirely unknown. Nevertheless, some scholars proposed theoretical reconstruction of "possible" mechanical sawing machines from Antiquity, based mainly on the assumption that "...restoration of an oscillating saw would require use of the crank, for which there is little evidence in antiquity..." (Humphrey, Oleson and Sherwood 1998: 34).

This *a priori* led some scholars suppose the use of circular saws, fixed either directly on the axle of the wheel of the mill (Landels 1978: 25), or moved by a system of sprocket wheel and gear overdrive. These reconstructions raise a lot of objections, of which one of the most obvious relates to the possibility of manufacturing iron discs of very large diameter (more than 2m), low thickness (2-3mm), perfectly circular and flat, and hard enough to resist a minimum of wear over time (profitability). In such a device, it would also be necessary that the stone blocks to be sawn are fixed on a mobile frame able to move in a regular and perfectly controlled way along an axis rigorously parallel to the plan of the saw. Such devices, mechanically and technically very complex, came into existence only recently.

To overcome this difficulty, other authors, like D.L. Simms, proposed the use of a continuous wire saw (Simms 1983). Even if one does not consider the problems raised by the mechanical parts of such an installation (see for example the far from convincing drawing published by Simms 1983: fig. 1), nor those related to the problems of driving the wire blade (profiles of the pulleys, friction and adherence to the driven pulley, tension of the wire, etc.), the simple manufacture of a loop without a visible connection (knot or welding), several meters in diameter, from a resistant wire whatever its nature, of 2-3mm maximum thickness, was not possible in Antiquity. Let us recall simply that this technique today uses high resistance steels (completely unknown in Antiquity), in the form of helicoidal wire or with built-in diamond teeth, and is employed only for the cutting of soft to semi-hard stones.

The technical difficulties raised by the two preceding systems led other authors, like P. Rosumek, to consider the use of a pendulum saw moved by means of a crank (Rosumek 1982). In spite of its apparent simplicity, the machine imagined by Rosumek calls upon many mechanical elements: pinions, axles, eccentric, etc. and supposes the use of a pendular saw, the point of suspension of which should be able to change, in a controlled way, in the course of sawing. The technical aspects of such an installation are not approached in detail, nor is the problem of guidance of the saw or that of the articulation saw/crank, which is essential to ensure the correct operation of sawing.

However, for the majority of the specialists of Antiquity, even to the above-mentioned authors, none of the proposed hypotheses appeared convincing. Their doubtful position seemed all the more justified since no undisputed remains of a water-powered sawmill dating from Roman times were known (some traces of such a possible installation, dating to the seventh/eighth century had apparently been found at Ephesus but were never fully published). Most of them reached the conclusion that Ausonius *Mosella* description was most probably a poetic allegoric form, far removed from a simple description of some real antique mechanical device.

A Seventy-Year-Old Unknown Discovery

"In 1926,... Mr Horsfield... converted a large supporting vault under the south side of the Artemis *temenos* into a museum for the permanent preservation on the site of inscriptions and other portable objects." (Kraeling 1938: 4). It was apparently during that "preliminary restoration" programme, undertaken at Jarash (جـرش) before the joint British School of Archaeology in Jerusalem and Yale University archaeological research cam-

paigns started, that the eastern end of the southern supporting vault of the sanctuary of Artemis was cleared. At the southeastern corner of the *crypto-porticus* a small room, partially opened up at that time, revealed the remains of a water-powered installation of some kind, which had never been published, nor apparently described. Since that time, the area was used as a store for inscribed stones collected on the site and the different remains from the water installation were progressively covered by stone blocks of all kinds and sizes (**Fig. 1**). Despite this, the surviving remains form a coherent whole, "discovered" during the Gerasa antique water supply survey program we started in 2000, and can be clearly interpreted. Our thanks go to Dr. Fawwaz Al-Khraysheh, Director-General of the Department of Antiquities of Jordan, and to Dr. Roberto Parapetti, Director of the Italian Mission for the Study of the Temple of Artemis, who gave us permission, support and information to study this find. Our thanks go also to Suzanne Kerner, David Graf, Jean-Louis Paillet and Andrew Wilson for their help in collecting references (with special gratitude to the last who also kindly suggested some corrections to the English version of the text).

Coming from the courtyard of the Temple of Artemis, a double water channel (the source of which is actually unknown but was surely connected to the main aqueduct of the city) fed two large connected cisterns that are currently in a very ruinous state (Fontana 1986: 182, structures A and B in fig. 7). The small one, to the south, served as the header-tank for a water installation located nearly four meters below in the southeast corner subterranean chamber of the sanctuary. The side walls of the vertical and horizontal water channels are still preserved, as are the positions for the bearings for an horizontal shaft placed over the lower channel (**Fig. 2**).

During the 1930's excavations, the American archaeologists found in the same room of the southern Artemis Temple underground gallery, on either side of the tailrace, two hard limestone column drums that had been partly sawn. These drums are currently stored against the walls of the underground room.



2. The head race and wheel race. Actual state.

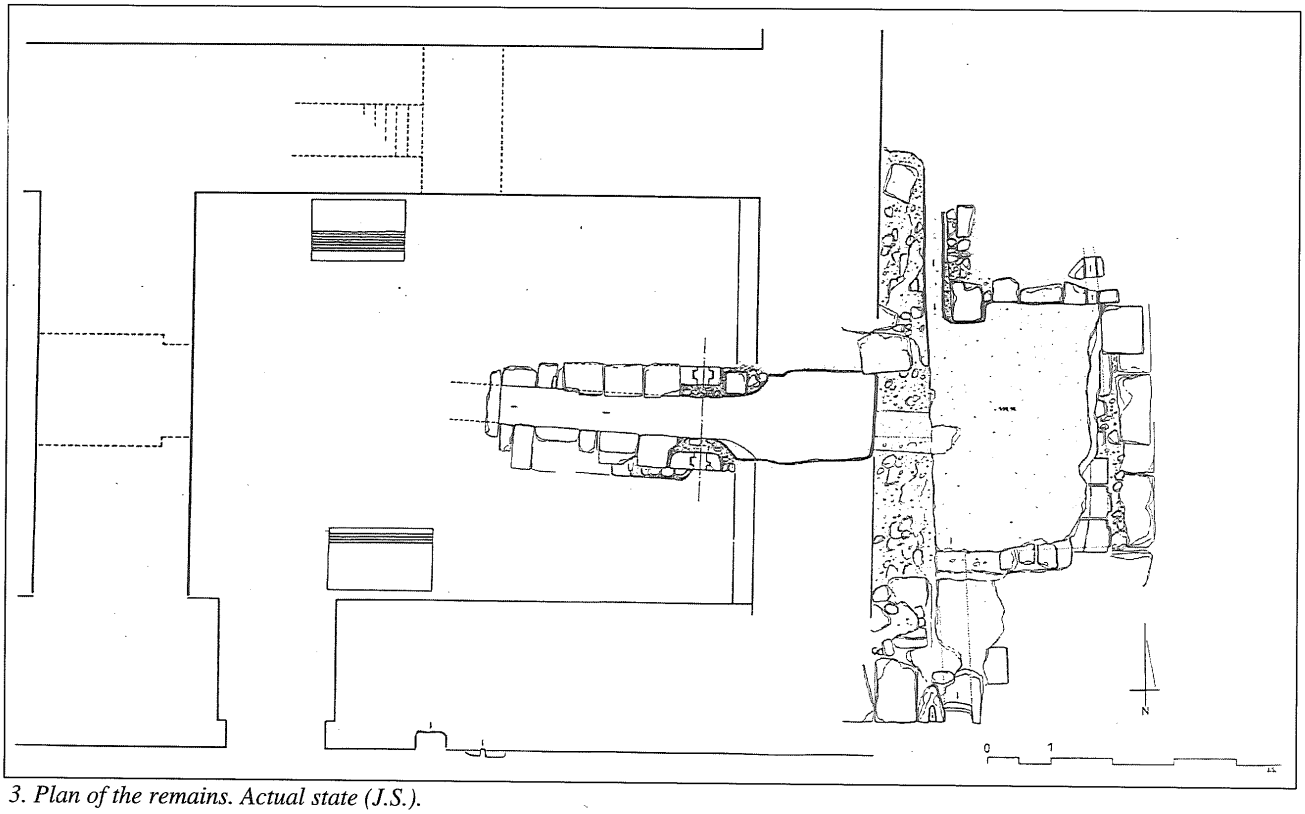


1. General view from the west. Actual state.

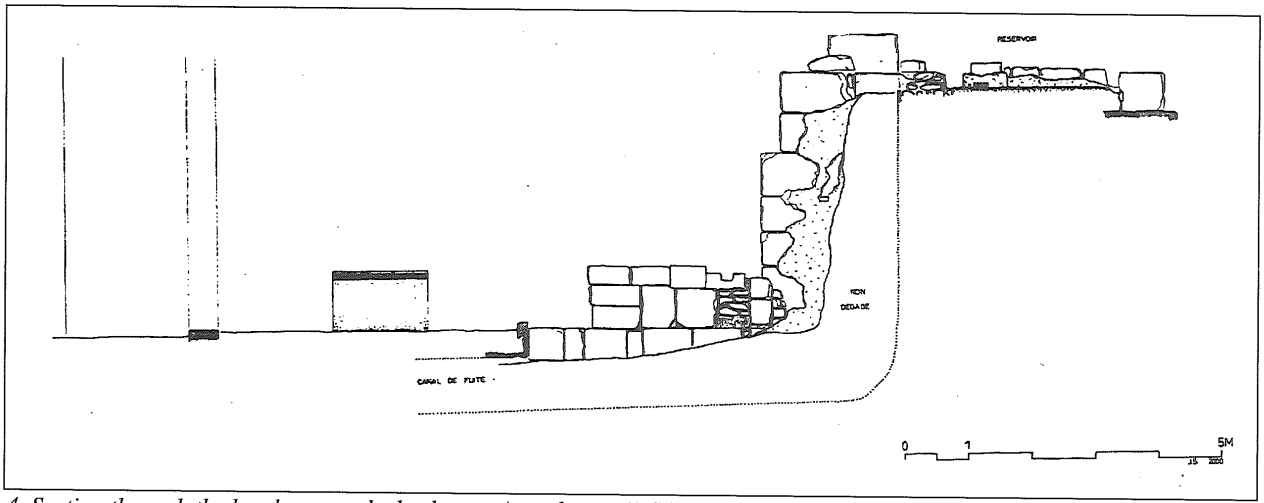
Remains of a Water Mill

The installation occupies a rectangular chamber of 8.65m length and 6.65m width, originally covered by a barrel vault. In the middle of the western wall, an axial door, 1.51m wide, gave access to all the other underground rooms of the *cryptoporticus.* In the southern wall a second opening of the same width (1.52m), offered direct access from the street skirting the southernmost frontage of the sanctuary. The inner floor of the room lies at about 3.80m below the level of the water tank floor. Inside the room, the surviving remains of the hydraulic installation include **(Figs. 3, 4)**:

- the head-race, vertical channel, ±1.35m broad by ±2.30m deep, perforated through the thickness and in the middle of the eastern wall. It was probably built at the place on an old opening. Its walls are still covered with a thick coating of pinkish mortar. Most of the filling of the channel is still *in situ* and could be excavated;
- the ±0.60m broad wheel race, covered in its western part, was not fully excavated. Its depth remains unknown;
- the walls of the wheel race are still *in situ,* completely preserved. They are built of large reused blocks of hard limestone fixed with lime mortar.



3. Plan of the remains. Actual state (J.S.).



4. Section through the head race and wheel race. Actual state (J.S.).

The rectangular carved places, planned for the embedding of two bearings for a shaft of a waterwheel, are perfectly visible on the "waiting beds" of two of them (**Figs. 2, 3**). The external face of the southern one carries, very distinctly, the circular traces caused by the friction of an "object" whose dimensions can be estimated (see below and **Fig. 5**). These marks enable us to know further that the position of the horizontal shaft of the wheel of the mill was modified during the machine's life (lowered or heightened by ±0.14m);

- the outlet channel was not explored. It seems to have flowed along the axis of the room. It probably runs under the threshold of the eastern door before turning south to join the main sewer of the street. As for the wheel race, it remains to be excavated.

The visible archaeological remains suggest that there was formerly a bucketed waterwheel, about 0.50m wide (maximum) and with a diameter of between 4.00 and 4.50m, with an horizontal shaft. The absence of any piece of millstone and, above all, the fact that the two shaft bearings, placed directly on the top of the millrace walls, are immediately on either side of the waterwheel exclude the possibility of a grain mill (in such a mill, the wheel-shaft bearings would be spaced asymmetrically on either side of the waterwheel to allow for the pit-wheel and the gearing for turning the millstones). The lack of any trace in the walls of the chamber or elsewhere of any other bearing confirms this interpretation. Further, circular wear-marks on the exterior surface of the southern millrace wall show that something (probably a wooden disc built up with iron nails), of at least 1m diameter as shown by the traces, was fixed at either end of the wheel-shaft (**Fig. 5**). From all these archaeological evidences, we may conclude that an overshot waterwheel was mounted on a short horizontal shaft with two vertical wooden(?) wheels, one at each end of the shaft.

Two Partly-Cut Column Drums

Two drums of columns (n° 1 and 2) were found by the American archaeologists in the western part of the room (**Fig. 3**). They are currently stored against the southern wall (block 1) and the northern wall (block 2), positions that strongly suggest they were originally found on the right and left side of the tailrace. They are the only two uninscribed architectural fragments visible in this room which is used as a temporary epigraphic store by the American excavators. Both column drums originally came from the porticoes of the Temple of Artemis and were abandoned when they had been only partly sawn. They are similar in size, both about 1m in diameter, and with lengths of 1.67m and 1.51m respectively. The block n° 1 has four saw-slots penetrating to the same depth even though the outer surface was curved (**Fig. 6**). The block n° 2 has two groups of four saw-slots, separated by four preparatory cutting lines. The four saw-slots of each of the two groups penetrate to the same depth, and the width of each partly-cut slab is similar (**Fig. 7**).

The various traces visible on the two column drums can only be explained by the use of a group of four saw blades, separated by a few centimetres and working simultaneously.

The presence inside the chamber of the two drums, each weighing more than 2 tonnes, shows that they had been brought there intentionally, which strongly suggests that their conversion into thin slabs could not have been carried out elsewhere.

All the preceding archaeological data lead to the conclusion that there was a direct connection between the water-powered installation and the hard limestone column drums being sawn. The water mill structures and other related archaeological remains found correspond, from all the evidence, to a powered sawmill: an overshot waterwheel would have been used for sawing large hard limestone slabs.

Reconstruction

The Saws

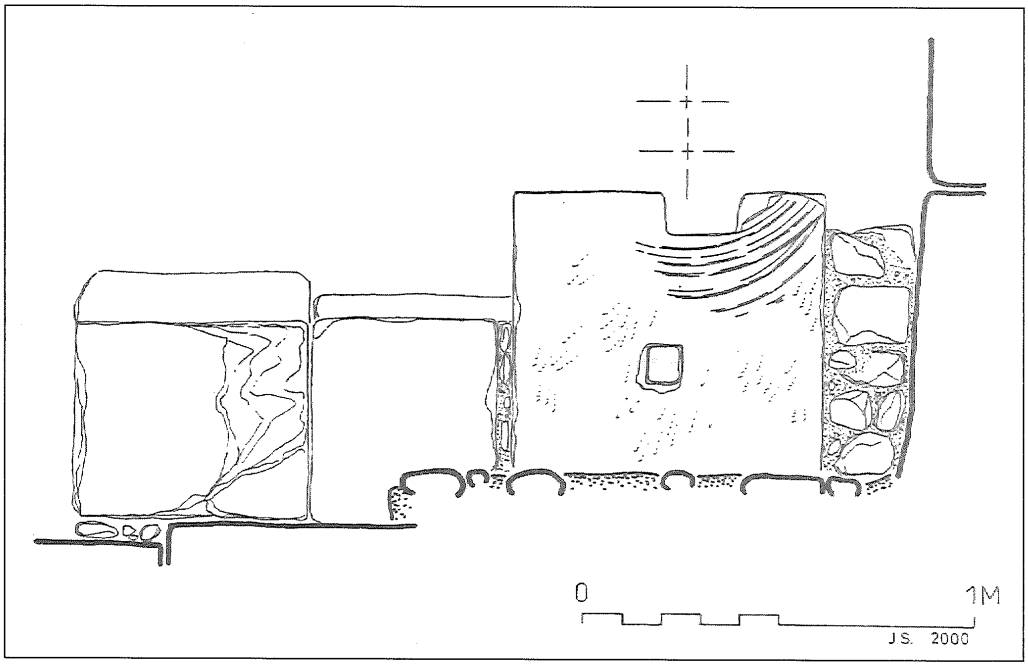
Saws used for cutting hard stone do not have teeth but are used with an abrasive material (such as sand or emery) and water that is applied to the work-surface by the pressure of the blade.

If the elements preserved *in situ* in the underground room of the sanctuary of Artemis do really belong to a mechanical sawing installation, the latter was surely not equipped with circular saws. This possibility is completely excluded: the technical problems mentioned above would have been even more complicated here by the need for assembling a group of four identical saw discs, in parallel, exactly of the same size and separated only by a few centimetres, at each end of the wheel's mill shaft. Moreover, the position of the water wheel inside the room, near the eastern wall, would have excluded any possibility of moving the blocks under the saw blades.

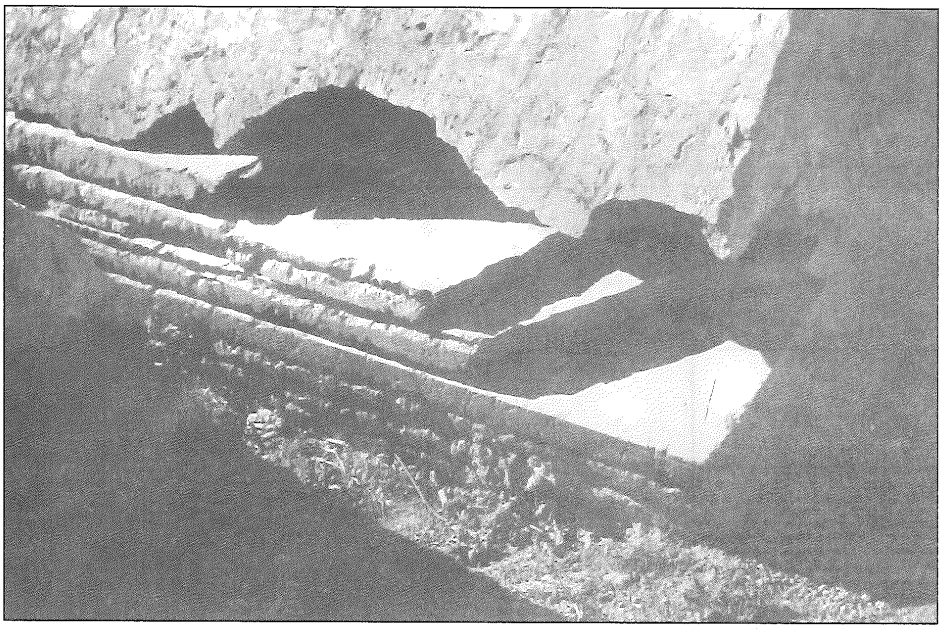
For similar technical reasons, the use of eight continuous wire saws working simultaneously is absolutely not conceivable.

All the archaeological evidence leads to the conclusion that the sawing tools were of the "traditional" framed type.

Traces visible on the partly cut columns drums show that the saws were multi bladed. The size of the blocks (1m in diameter and about 1.70m in length) implies that the saws had a minimal vertical race of 1.10m and a minimal blade useful length of 2.20m (length of the block plus a minimal working race of at least 0.50m). All these constraints result in restoring wooden frameworks carrying four blades each, their overall low size limits



5. Southern elevation of the wheel race showing traces of the outside "wheel" on the wall and the two successive positions of the water wheel axle (J.S.).

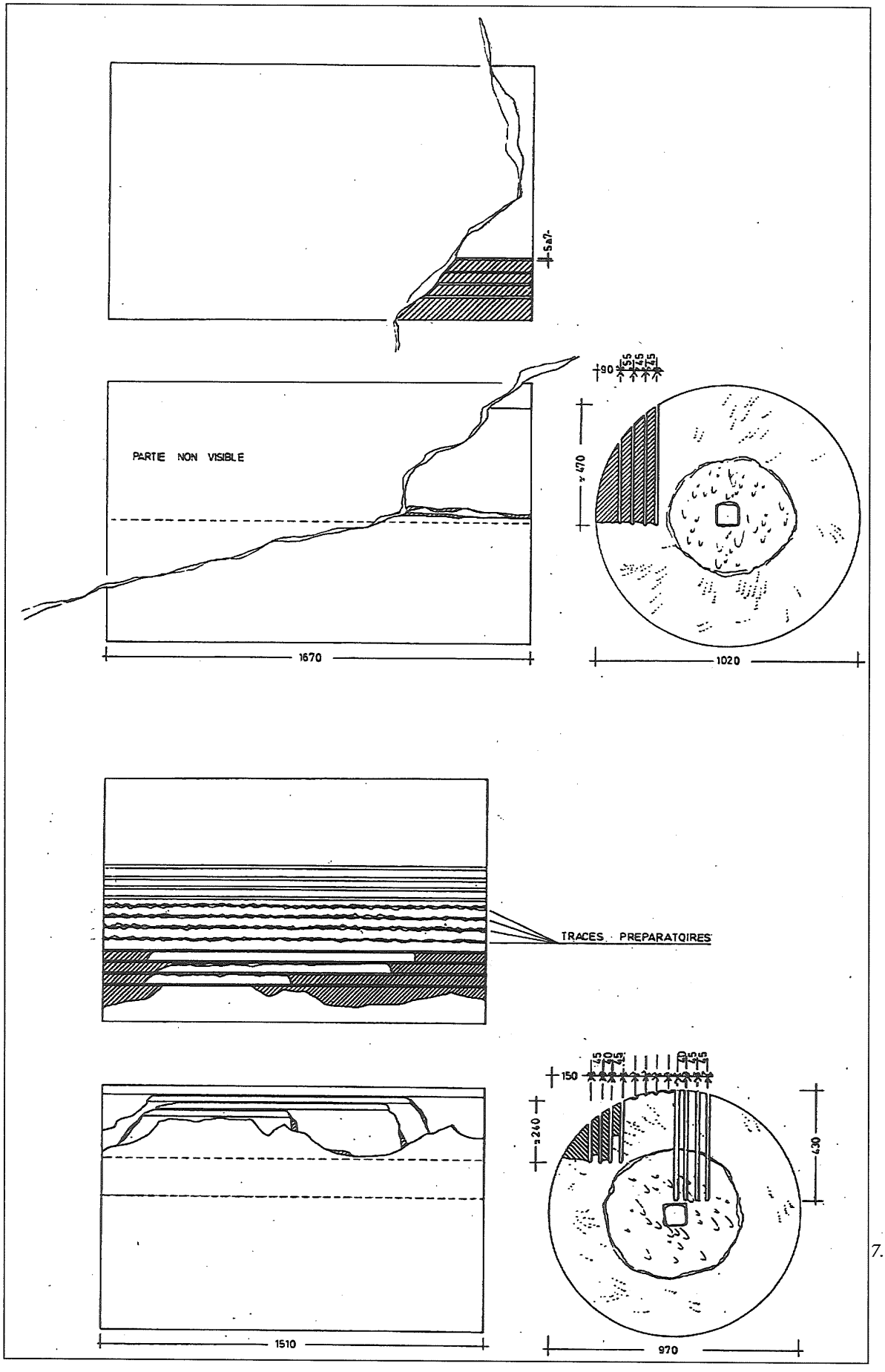


6. Column drum n° 2, detail.

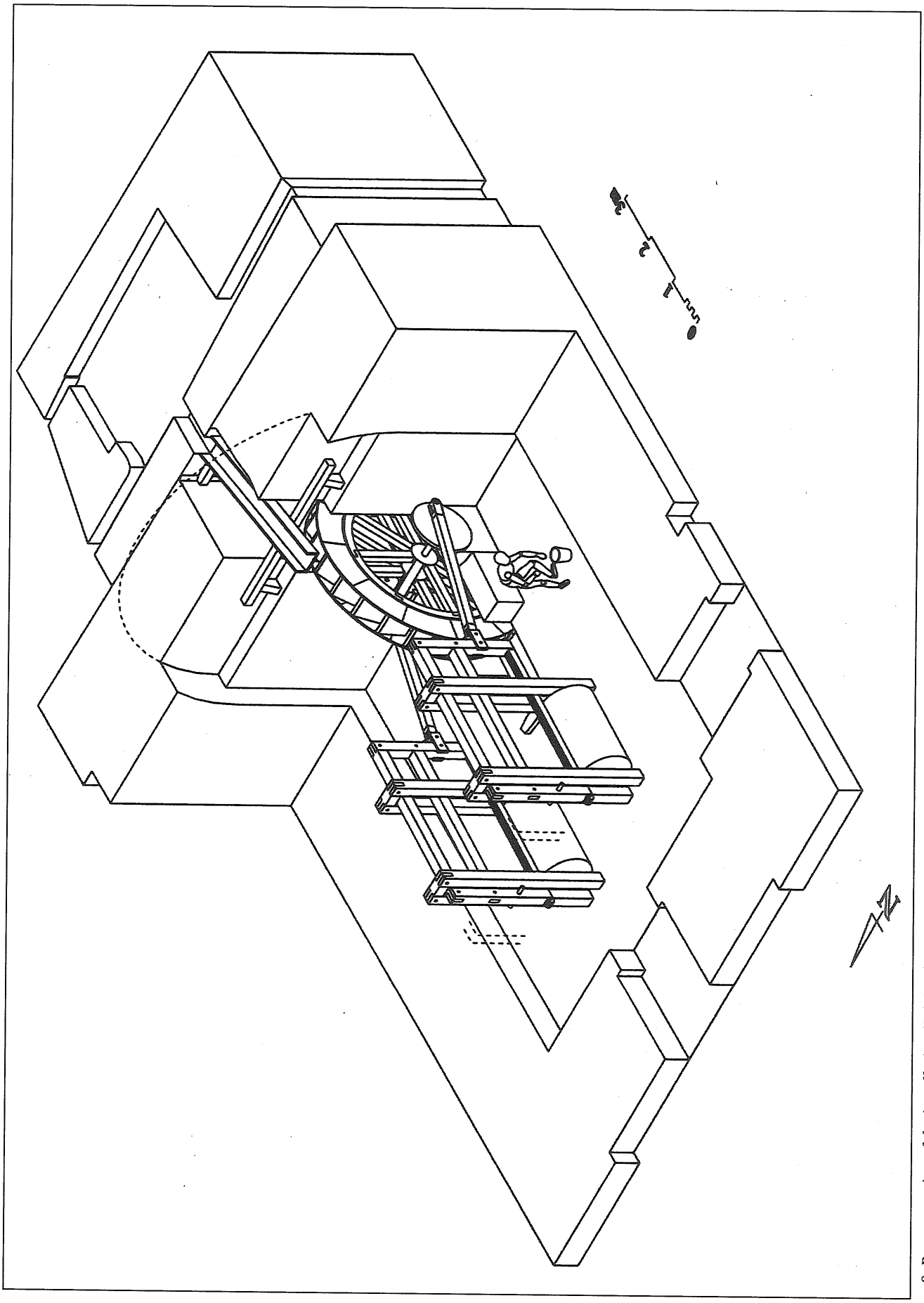
being ±2.60m in length, ±2.00m in height and ±0.20m in thickness.

The tension of the blade of a saw must be as perfect as possible. On a single blade framed saw, tension results from the torsion of a rope placed opposite to the blade. However, it is very difficult to forge strictly identical iron blades of more than 2.50m length. Because of their small difference in length, due to the artisan manufacturing techniques, in a multi-bladed saw each blade had to be able to be put in tension separately. This detail leads to the conclusion that the frame has to be a rigid one, the usual high tightening rope being replaced here by a piece of wood firmly pinned with the other pieces of the structure. The independent setting in tension of the blades could be carried out, for example, by small metal or wooden pieces, inserted on the level of the ends of each blade and the lower part of the rigid frame of the saw.

These saws must have cut vertically down through the stone, with the blades moving back and forth horizontally, so as to take advantage of their weight which can be estimated at ±300kg (0.35m^3 of wood or ±270kg plus ±30kg for the iron blades). Moreover, the size and the shape of the column drums as well as the places of sawing do not make it possible to imagine that these frameworks could be horizontal, except by giving them disproportional dimensions.



7. Column drums 1 and 2 (J.S.).



8. Reconstruction of the installation (DAO: Thierry Morin).

Lastly, the size of such tools and the perfectly rectilinear aspect of each cutting exclude the use of any pendulum device for the guiding and the handling of the saws. The weight and the size of the tools, as the perfect parallelism noted in the layouts of the sawing, result moreover in restoring a guiding device, maintaining the saws laterally during work, most probably by an external wooden frame fixed to the ground and/or to the walls. These guidance structures were also essential to lift up the saws at the end of the cutting. Resumption of archaeological excavation of all the room appears as absolutely necessary.

Mechanical Device

The archaeological remains make it possible to consider only a solution with a mechanical device ensuring the transformation of continuous circular motion, provided by the mill, into longitudinal reciprocating motion necessary for the correct operation of cutting stones with vertical multi-bladed framework saws. We thus should consider either a system with cranks or a system with eccentrics and connecting rods.

Whereas the remains of the installation are exceptionally well preserved, no other element which could be related to the installation described was found in the room. In particular, neither pit nor stage for low articulation of beam can be reconstructed on either side of the wheel race (this is absolutely necessary for a crank system device, see for example Diderot et d'Alembert 1751-1772: figs. 2 and 3 plate III, *Moulin à scier les pierres en dalles)*, although the built ground is mainly preserved in that place. In the absence of any archaeological remains which could be related to a crank beam, it is thus very probable that the mechanical installation did not call for a system with cranks, but with an eccentric and connecting rod. According to the evidence actually visible at the site, each of the wooden wheels — that one could infer without any great risk of error — were fixed at each end of the water wheel-shaft would have carried an eccentric metal pin. Long connecting rods would have linked the eccentrics to the end of the saw-frame **(Fig. 8)**. By using the two ends of the wheel-shaft, the whole assembly would be balanced and able to turn out simultaneously eight slabs of hard limestone, each of a very large size. The sophistication of the mechanism at Jarash shows that this was probably not just a prototype.

A 1500-Year-Old Sawmill

This workshop must be dated later than the fifth century AD, a time when the Temple of Artemis, abandoned as a place of worship, was used as a "stone quarry" for the construction of Byzantine monuments. Only at that time could columns from courtyard porticoes have been dismantled and reused as material for stone slabs. It must however date from before 749 when a great earthquake completely destroyed Jarash and led to its progressive abandonment.

It is possible to be more precise: the construction of such a water-powered workshop could only have been undertaken at a time when the technology and the necessary capital were available and when there was a strong demand for stone slabs. Pending a resumption of the excavation work and more detailed study of the ruins, one might propose that construction of this water-powered site probably took place at the time of Justinian (AD 527-565) and his immediate successors, a period of relative prosperity in Jarash when more than twenty churches and chapels as well as bath houses were built, all great consumers of stone slabs for floors and walls. If this dating is confirmed, then the water-powered workshop at Jarash preceded by more than six hundred years the oldest water-powered sawmills currently known.

The discovery at Jarash, of a water powered installation which could be related to a mechanical stone saw mill, shows that the utilisation of the eccentric, in a highly developed form with connecting rods, may date back at least to the sixth century AD in the Middle East. It is thus possible that in the fourth century AD, Ausonius really did see on the banks of the Mosel, not far from Trier, mills "...driving strident saws across blocks of marble...".

J. Seigne
Centre National de la Recherche Scientifique
Institut de Recherche sur l'Architecture Antique
3. Place Anatole France
37000 Tours
France

Bibliography

Diderot, D. et d'Alembert, J.
1751-72 Architecture, vol. II. *L'Encyclopédie*. Paris.
Fontana, M.V.
1986 Archaeological Research in the Sanctuary of Artemis. Pp. 180-183 in F. Zayadine (ed.), *Jerash Archaeological Project I, 1981-1983*. Amman.
Humphrey, J.W., Oleson, J.P. and Sherwood, A.N.
1998 *Greek and Roman Technology: A Source Book*. London.
Kraeling, C.H.
1938 *Gerasa, City of the Decapolis*. New Haven.
Landels, J.G.
1978 *Engineering in the Ancient World*. London.

Rosumek, P.
1982 *Technischer Fortschritt und Rationalisierung im antiken Bergbau*, (Habelts Dissertationsdrucke, Reihe Alte Geschichte, 15). Bonn.
Seigne, J.
2002a Une scierie mécanique au VI° siècle. *Archéologia* 385, janvier 2002: 36-37.
2002b A sixth-Century Waterpowered Sawmill. *International Molinology* 64, July 2002: 14-16.
Simms, D.L.
1983 Water Driven Saws, Ausonius and the Authenticity of the Mosella. *Technology and Culture* 24: 635-643.
1985 Water-Driven Saws in Late Antiquity. *Technology and Culture* 26: 275-276.
Wikander, O.
1981 The Use of Water-Power in Classical Antiquity. *OpRom* 13: 91- 104.
1989 Ausonius Saw-Mills Once More. *OpRom* 17: 185-190.
2000 Industrial Uses of Water. Pp. 401-410 in O. Wikander (ed.), *Handbook of Ancient Water Technology*. Technology and Change in History 2. Leiden.

A THAMUDIC E TEXT FROM MĀDABĀ

Pierre Bikai and Fawwaz al-Khraysheh

Introduction*

An inscription was found in the western part of the Mādabā Archaeological Park (متنزه مادبا الأثري), a project of the American Center of Oriental Research (ACOR) under the directorship of Pierre Bikai. It was not found in a stratified layer, but in modern debris above the mouth of a Roman-Byzantine cistern in the area where G. Schumacher (1895) located a temple on his map of Mādabā. Remains of a Roman temple were found ca. 100m to the east (Piccirillo and Denton 1996: 30).

The text is carved on the flat side of a piece of hard white limestone (flint) measuring 23 x 21cm (**Fig. 1**). It is executed in clear and standardized letters varying in size from 1 to 2cm, indicating execution by a professional. It consists of ca. 227 letters, of which 211 are complete and clear, 11 are partly preserved, and 5 were chipped off of the periphery, but can be filled in. The text is written in 11 horizontal lines. It begins from left to right, but when a line ends, the next line starts at the side where the prior one ended, a type of writing called a "plow-line" or *boustrophedon*. The text contains new information about religion, new names, as well as traditional Arab names. It also opens a window to the better understanding of the grammatical structure of the dialect, particularly in the use of verbs. The date of the text is uncertain, but it may well come from a period before the sixth century AD, by which time Christians dominated Mādabā (no less than 13 churches have been uncovered in the old city so far) and the goddess *'Allāt* (mentioned three times in the text) would no longer have been worshipped under that name.

The inscription is among the longest of its kind found to date; its importance, however, may be that it was found in Mādabā. Many Thamudic E inscriptions have been documented in various parts of Jordan, including Wādī Ramm (وادي رم) and Wādī al-Judayid (وادي الجديّد) (King 1988), and the area of Bāyir (باير) (al-Khraysheh 1994: 109-114). A very long text was found near Mādabā (at Uraynibah أرينبه, to be published by M. Daviau), and there are assemblages at al-Yādūda (اليادوده) (LaBianca 1992), Wādī ath-Thamad (وادي الثمد) (M. Daviau, personal communication), as well as at al-Jīza (الجيزه) and Saḥāb (سحاب) (King 1990: 603-605). The total number of Thamudic E inscriptions that have been found between al-Muwaqar (الموقر) near 'Ammān and al-Azraq (الأزرق) to the east exceeds 200 (al-Khraysheh 2000: 59-70). As northern Jordan is an area where Safaitic inscriptions dominate, such numbers of Thamudic inscriptions in the north were unexpected.

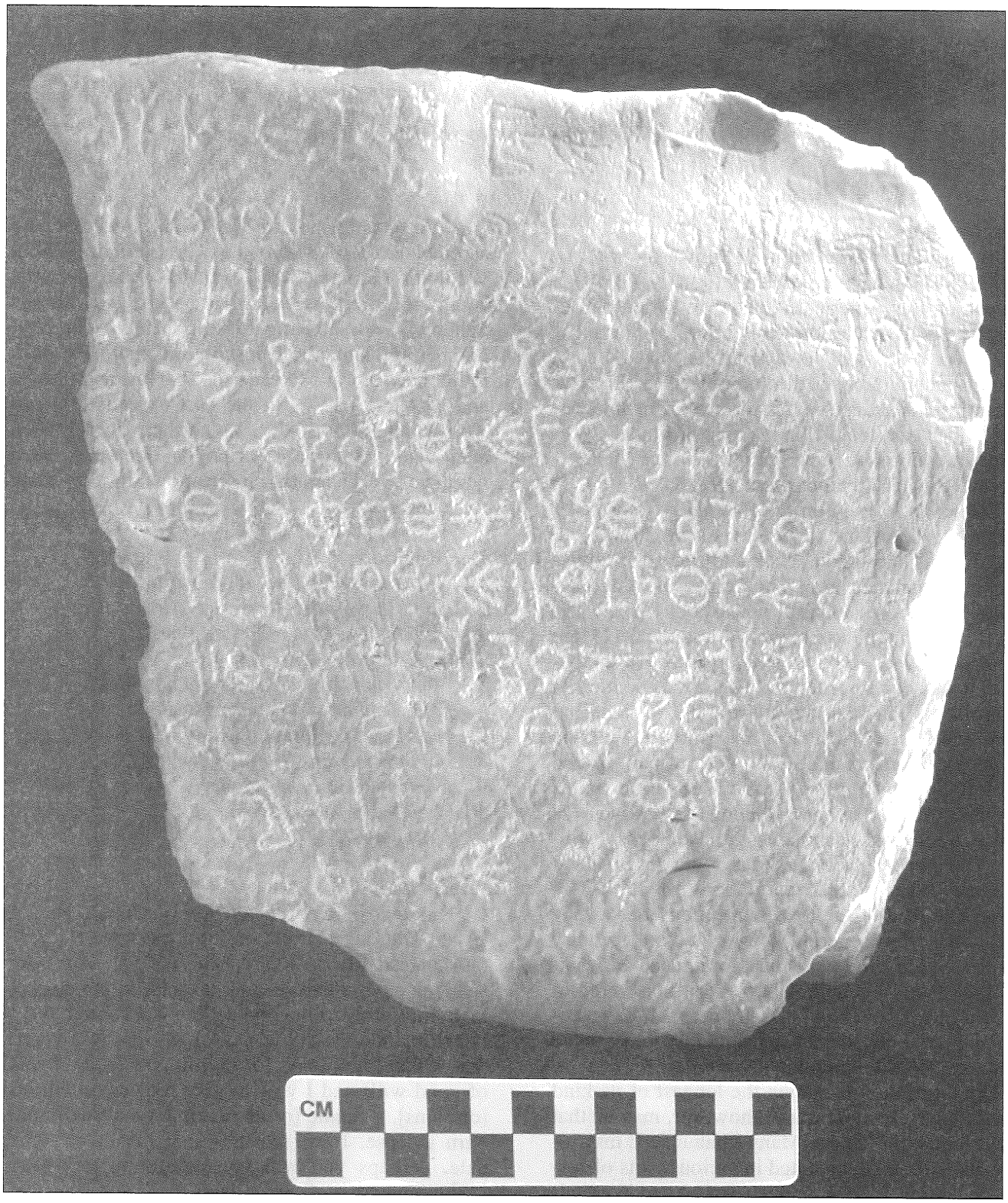
Transliteration

1 [l]flhn bn ḥnn bn 'tm dh'ln (ṭ/y) w s
2 qm h' lh ṣ'b fṭḍr' w t'ny w tsh(h)
3 (d) lhb kll m f'l w ndhr 'rb' (') sl't
4 mnrt w 'fnt w yṯḥlb ṣḥry w
5 ['']llk trḥm 'ly w dhkrt lt 'shy'n kllh(m)
6 [b]dr w hbdn w 'ṣlḥ w 'qrb w bn ...
7 w hblh w 'wdhlh w zd w bn ḥrb w
8 (w)dn w mlk bn s'dlh w 'thl w wshk(t)
9 w bd w wyl w wsm w dhkrt
10 lt mn yl'nn w l'nt lt mn y(kh)
11 (bl) wq'n dh

Translation

This text [is by] Falhan, son of Ḥunna, son of 'Atam Dhu'lan [Ṭa(y)? or from the tribe Na(ṭ/j?] (as suggested by al-Khraysheh 2000: 59-70). I am sick [or have a sickness as if death is coming]. I raise [my soul] to the god *Ṣa'b* and I submit and I kneel [or bow down] and acknowledge to give all that which I am doing [or to him god *Ṣa'b* all acts of good will] and I vow to give four commodities [or coins], a candle [or an oil lamp on a stand] and burn incense. I am sweating and my color turns pale. Perhaps you will be merciful to me. May 'Allāt remember all our people, Badr and Habadan and 'Iṣlaḥ and 'Aqrab and son of [... and] Wahaballah and 'Awadhallah and Zayd and son of Ḥarb and 'Adan and Malik, son of Sa'dallah, and 'Athal

* An early version of the article, co-authored by Fawwaz al-Khraysheh and Pierre M. Bikai, was published in Arabic ("An Arabic Inscription in Thamudic Characters from Jordan", *Adumatu* 2 [July 2000]: 59-70). By an error of the editors of *Adumatu*, the name of Pierre M. Bikai was omitted. The article here contains additional material developed by Pierre Bikai. Many of the English definitions of individual words were developed with the use of Wehr 1976. I thank Patricia M. Bikai and Thomas A. Dailey for their editing of the manuscript.



1. The inscription (photo by Pierre M. Bikai).

[or 'Athyl] and Washikat and Bud [or 'Abd] and Wayil and Wasam [or Wasim] and I mention 'Allāt about those who curse us and may 'Allāt curse [those] who destroy our text. This is what I have in my mind.

The Text in Relation to Classical Arabic

This script is usually called Thamudic E, Hismaic, or Tabukian (see King 1990: 11-14; Macdonald 2000: 44-45). Van Den Branden (1956: vi) suggested that it was "proto-Arab". Macdonald (1998:

184) stated that "'Thamudic' is simply a 'pending file' for texts which have yet to be properly classified and on which an enormous amount of work still needs to be done". Our text could more correctly be called "pre-classical Arabic" or a North-Arabian dialect from eastern Jordan, as it is very close to classical Arabic in the way it is written and pronounced and in its grammatical usage. As we shall see, this large text provides evidence that the people who produced the inscription spoke in a dialect of the Arabic language that preceded the classical Arabic of the Qur'ān but was related to it. Almost every area in the Arab world has a different dialect of Arabic; for example, in the area of Lebanon, there are at least three dialects. These dialects differ from classical Arabic mainly in pronunciation and in the use of vowels. For example, the verb "come" in the central coastal area, is "ta'a" in the north is "t'w" in the south "t'i" (in Palestine, it is "ta'āl"). Variant pronounciations of many letters can be found in a short distance from each other, and it was the same in antiquity.

No one can questions the influence of the Qur'ān and the expansion of Islam on the Arabic language.

> "... Arabic hitherto spoken in Arabia proper and its immediate neighbourhood, went with the Muslim armies to the farthest ends of the far-flung empire. Life in camp and on expedition brought men of different tribes into close contact and the vicinity of the tribal quarters (khiṭaṭ) in the great cities soon led to a levelling of thier dialects ... All narratives referring to Arabic and bedouin life (e.g., the amthāl al-'Arab, ayyām al-'Arab, but also the maghāzī and sīra) preserved to some extent the uncouth originality and artless naiveté of the old language. In the literature of ḥadīth (traditions) and fiḳh (jurisprudence) the social and economic changes left thier marks on the vocabulary, phraseology, and even morphology" (*EI, s. v.* 'Arabiyya).

Our text reflects one dialect, perhaps that of a tribe from Mādabā. It will be traslated in relation to classical Arabic because the text is Arabic written in an old style. In this we follow the Arabic saying that "the letters replace the tongue ... and we should translate with letters what the tongue speaks" (Ibn Manẓūr, *s.v.* the letter *hamzat*).

The Definite Article

In our text there is no use of the definite article "*h*" as is found in Hebrew, Safaitic, Lihyanite, and possibly in Thamudic (as suggested by King 1990: 78; al-Roussan 1992: 59; and Macdonald 1998: 179; 2000: 49); instead there is the use of the definite article "'*l*" , *'al*, but in a contracted form (*al-mudghamāt*), which is pronounced but not written (thus we propose below the way this Arabic dialect was pronounced). For example, in our text, the name of the goddess is "*lt*" (lines 5 and 10). From the beginning of Arabic writing (ca. seventh century AD) until today, this is pronounced as 'Allāt. Furthermore, "*whblh, 'wdhlh*, and *s'dlh*" in lines 7 and 8 are pronounced *Wahab-'allah, 'Awadh-'allah*, and *Sa'd-'allah*, respectively. Similarly, the name *'bdlh 'Abdu-'Allah* appears in Safaitic and Thamudic (Harding 1971: 400); this is the same name as that of the Prophet Muḥammad's father. Before Islam, it may have been written *'bdlh* but pronounced *'abdu-'allah*. Hence the definite article "'*l*" is present as much as it is in classical Arabic. The use of "*bin*" for son and "'*l*" as the definite article relates more to classical Arabic. Macdonald (1998: 179) states that there are:

> ... forms of language related to Arabic but distinct from it — which are identifiable by the use of the definite article h-, rather than 'l-, ... From the 5th century B.C. to the sixth century A.D., another North Arabian language, using the definite article 'l-, makes sporadic appearances ... This language has been called Old Arabic (on the model of Old English, Old French, etc.) since it appears to be an ancestor of the Arabic known from later periods. Until shortly before the rise of Islam, it appears always in scripts of other, more prestigious languages (Sabaic, Dedanitic, Aramaic, Greek) and the texts are often in a mixture of Old Arabic and the language normally with the script. (See also Macdonald 2000).

The Arabic names and toponyms in the Petra Papyri of the sixth century AD tend to have 'l as the definite article, even though they were written in Greek characters; e.g., there are phrases such as "*bayt al-akhbar*" and "*janat al-salam*" and, in Inv. 83 line 87, the name of Leontios, son of *'Abdu'allah* "λεοντιος, αβδαλλου" (personal observation); see also the Greek inscriptions from Umm al-Jimāl أم الجمال (Littmann, Magie and Stuart 1913: nos. 277 and 295). These show that the definite article existed and was stressed in Greek though it was not required in Old Arabic texts. The name Leontios son of Abdallah found in the Petra Papyri, is *Asad* son of *'Abdu'allah* in Arabic, a very common name in Thamudic and Safaitic and, an indication of Arab adaptation of Greek names. However, the opposite situation prevails in classical Arabic, with the sun letters we write "'*l*" but we do not pronounce the "l", as in *'al-shams* being read as (*'ash-shams*).

The hamzat and the 'alif

In this text, *hamzat* or *'alif* never appears with "*lh*" (for example, "*lh*" in line 2 is read as *'allah*) and also *lt* (as *'allat*, three times in lines 5 and 10). In most Safaitic and southern Thamudic inscriptions, the *'alif* is omitted in writing, but pronounced at the beginning and after the second "*l*" of *'Allah* and *'Allāt*. In this text, the same omission occurs with the names *whblh* and *'wdhlh* in line 7, and *s'dlh* in line 8. Similarly, in the Qur'ān, in *'Allah* and *'Alraḥman*, the *'alif* is not added to the *lām* or the *mīm*, respectively, but it is pronounced. The same omission occurs in the word *'ism*: in *bism 'Allah*, the *hamzat* is not written. The question then is why the *hamzat* or the *'alif* appears in "*dh'ln*" (line 1), "'*rb*'" (line 3), "'*shy'n*" (line 5), "'*ṣlḥ*" (line 6), and "'*thl*" (line 8). What can be said in regard to this is that the *hamzat* appears when it is part of the root derivation of the word as a consonant, and the *'alif* is not added when used as a vowel or as a soft letter (*hamzat waṣl*). Hence the *'alif* is embodied in the next letter. It is pronounced according to the dialect but not written because the majority of the Arabs say that "the letters replace the tongue ... and we should translate with letters what the tongue speaks" (Ibn Manẓūr, *s.v.* the letter *hamzat*). In a similar way this practice still exists in classical Arabic to some extent.

The *hamzat* is omitted from the beginning of the verbs *sqm*, *tḍr'*, *t'ny*, *tshhd*, and *h'* (line 2) as if they were written in colloquial dialect, but all these verbs would have a *hamzat* if they were written in classical Arabic, and read as *'asqamu, 'ataḍarra'u, wa 'ata'anny, wa 'atashahhadu,* and also *'aha'u* at the beginning of line 2. In modern Arabic dialects, the same discrepancy between what is pronounced and what is written continues. For example, in Saudi Arabia, if one wants to say wa *'ashkuru*, it is pronounced *washkur*; *'a'ṭiny* is *'ṭīny* in the Lebanese dialect, i.e., the *hamzat* is not pronounced nor should it be written if we want to write the letters that the tongue uses.

There are a variety of views about the *hamzat* as it is one of the most complicated letters. Ibn Manẓūr devotes a large section to explaining its forms, rules, and changes and dedicates several pages to explaining its function in the Arabic language. He reports that al-Azhary said, "... you should know that the *hamzat* has no spelling, it is written sometimes *'alif*, sometimes *yā'*, and sometimes *wāw*, and the soft *'alif* has no letter; it is part of a prolongation after a *fatḥat* (denoting initial long a) ... it has cases of softening, omitting, and replacing ..." (Ibn Manẓūr, vol. 1: 17-22).

To conclude, the *hamzat* in our text is not pronounced where it would be pronounced in classical Arabic in some cases; this is due to the dialect that this text represents.

In this text, *t'any* (line 2) is in the reflexive first person singular in the imperfect jussive; the *y* endings in *ṣḥry* and *'ly* (lines 4 and 5) confirm that the writer is speaking in the first person. Thus, our text cannot be in the third person singular because, if it were, *lhb* in line 3 would take *y* after the *l* like the *y* in *yṭḥlb* (line 4), *yl'nn*, and *ykhbl* (line 10), all third person singular. The pronoun should be first person singular (*'anā*), i.e., *'ata'anny* and *li'ahab* (*'anā*). However, in *yṭḥlb*, *yl'nn*, and *ykhbl*, the y represents the third person singular (*huwa*) of the verbs *ḥlb* and *l'n*, and the same for *ykhbl* from *khbl*.

The y (yā')

The *y* does not show in *zd*, and may also be missing from *mnrt* and *wsm*, depending on how they are read. The *y* also does not appear when it is used as a vowel between two consonants. It appears in *t'ny* (line 1), *yṭḥlb* (line 2), *ṣḥry* (line 4), *'ly* and *'shy'n* (line 5), *wyl* (line 9), and *yl'nn* and *ykhbl* (line 10). From those examples, it seems the *y* does appear in three cases:

1) when it is part of the stem of the word or used as a consonant as in *wyl* (*wāyil*) and *'shy'n* (*'ashya'una*), which is from the noun *shiya'* or the verb *shaya'a;*
2) when it is a tense indicator as in *yṭḥlb* from the verb *ḥalaba*; here the form is *taḥallaba*, imperfect jussive. Similarly, *yakhbl* is the imperfect form of the verb *khabala*;
3) when it is a possessive suffix added to the noun as in *ṣḥry*, the first person singular possessive of *ṣḥr*. In *'ly*, it is the first person pronoun suffix added to the preposition "on".

At-tashdīd

In this text, when there is intensification or *tashdīd* on a letter, the consonant is doubled, e.g., in line 1, *ḥnn (ḥunna), kll (kull)* in line 3, and *'llk* (*'allaka*) and *kllhm (kullahum)* in line 5. The question then arises as to why the *r, n*, and *h* are not doubled in *ftḍr' (fataḍarra'), w t'ny (wa ta'anny)*, or *w tshhd (tashahhada)*. These cases can be explained by the fact that there is no intensification in the original verb stems *ḍara'a, 'ana*, and *shahida.* This is clear from other texts, the noun or verb *ḥjj, ḥajjaj*, or *ḥajja*, the *j* is doubled, as attested in Safaitic and Thamudic (Harding 1971: 177; King 1990: 490). See also the verb *khṭṭ* in Thamudic (King 1990: 683).

Commentary

Line 1

[l]flhn: This type of text usually starts with a *l* (for). Here the *lām* is missing as the stone is chipped.

Falhan: A proper name on the pattern of *fa'lan.*

bn ḥnn: bin (son of) *Ḥunna*, a proper name that is well known in this period (not later than the sixth century AD). The *Ḥunna* tribe is mentioned by al-Nābigha al-Dhubyānī, the poet of the Lakhamid and Ghassanid kings, ca. AD 550 (*EI, s.v.* al- Nabigha). In one of his poems, he warns King al-Nu'mān ibn al-Ḥārith against attempting to invade *banī Ḥunna* territory in Wādī al-Qurā, *Banū Ḥunna bin Rabī'a bin Ḥaram bin Ḍinna* are from *'Udhrat bin Sa'd Huẓaym* and are descended from the *Quḍā'a* tribe (al-Bakrī al-Andalusī: 43-44).

The word *ḥnn* could also be derived from the verb *ḥanna* (to long or yearn). The names Ḥannā for a male and, Ḥanni, Ḥannat, Ḥanān for a female are common in the Arab world, while Ḥunayn is a well-known classical Arabic name, e.g., Ḥunayn bin Isḥāq, a physician of the Caliph al-Mutawakkil, who was born in Ḥyra (AD 809-73). Ḥanīna is the name of a number of villages, one of which is connected to Mādabā in Jordan. The name *ḥnn* is attested in Thamudic (Harding 1971: 206) and in Safaitic (Winnett and Harding 1978: 570; Winnett 1957: 156; see also King 1990: 495).

bn 'tm: son of 'Atam, an Arabic name from the verb *tamma, 'atamma*, to be or to become complete or accomplished. In the Arab world, this type of name is common when a family has had many children and they name what they hope will be the last one *'Atam. 'Atam* is a name known in Thamudic, Safaitic, Sabaean, and Qatabanian (Harding 1971: 19; Winnett and Harding 1978: 548; Winnett 1957: 137; see King 1990: 468).

dh'ln: Dhu'lan, proper name on the pattern of *fa'lan* meaning wolf or jackal (Ibn Manẓūr, *s.v. dh'l*). Arabs commonly name children after animals such as the lion, tiger, leopard, or wolf, usually after they have lost a child at an early age, in order to impart strength. *Dhu'lan* is a name attested in Sabaean (Harding 1971: 247). The other possible reading here is "*dh'l" (dhu-'al)*, meaning "of the tribe (or family) of *N* ...," with the "n" beginning another word. One reading of the two missing letters is *ṭy*, a word separate from the "*n*", taken to be the name of a tribe. In favor of the reading *ṭy* is the fact that in this text "*t*" is used for the feminine instead of "*h*" and the tribe of *Ṭay* is said to have used the feminine ending "*t*" rather than "*h*" used by all other Arabs (el-Farra', cited by Ibn Manẓūr, *s.v. hā'*). The second possible reading of the two damaged letters is *tj* which, added to the "n", would give the reading *dh 'l ntj*, from the tribe of *Natij*, a name that is not attested; see al-Khraysheh 2000: 59-70.

Line 2

w sqm: wa is a connector between *flhn* and *sqm (saqam, suqam, or saqim)* meaning illness or thinness, and also as if death draws near. The verb is *saqima*; the first person singular is *'asqamu* (Ibn Manẓūr, *s.v. sqm*). *Sqm* in our text is the verb *saqima* and, because of the dialect, it was pronounced *wa-sqam*, which in classical Arabic would be *'sqm 'asqamu (infra)*. The word *sqm* is common in Thamudic and Safaitic (Harding 1971: 322; Winnet and Harding 1978: 638; King 1990: 598).

h': From the verb *hawa'a*, as in *ha'a binafsihi ila al-ma'aly*, which can also be said in Arabic as: *rafa'aha wa samā bihā ilā al-ma'āly* (Ibn Manẓūr, *s.v. hw'*). *Hawa'a* and *rafa'a* both mean to lift or exalt. The *h'* in our text appears to be in the third person singular, but it is not; it should be read *'aha 'u*, first person singular (*supra:* the *hamzat* was not written). In classical Arabic it would read "*'aha 'u*", I exalt or elevate my soul to God. The only reference located goes back to the beginning of Islam, reported in al-Iṣfahānī, "*yā Banī Taym bin Murrāt, ha' Allahī liyaqdhifanna banū Makhzumīn banātina bil 'azaimi wa taghfalūn,*" (al-Iṣfahānī Appendix: 205). This verb is not commonly used today, except possibly at the beginning of the ululations, sounding like *hawiha.* The word *h'* appears in Thamudic (King 1990: 556).

lh: 'Allah is God, the supreme and the only one for Muslims (for the background, see *EI*, Allah and, in particular, Ilah):
Additionally, *'Abd-'allah* is similar to the formation *'Abd'il*; they are two different names of the same god. Attested in Thamudic 'bdlh (King 1990: 687, 690; see Harding 1971: 907).

ṣ'b: Ṣa'b, difficult or hard; it is attested in Thamudic and Safaitic (King 1990: 518; Harding 1971: 372; Winnett and Harding 1978: 588; Winnett 1957: 175), and as *Ṣ'b'l* in Thamudic (Winnett and Harding 1978: 588). It is also the name of a god who is mentioned in two Nabataean inscriptions, one from Petra: "God *Ṣa'b* who is in the foundation of al-Khubtha" (*RES* 1434; Winnett and Reed 1970: 158); the second is from Madā'in Ṣāliḥ (Winnett and Reed 1970: 157-58). The "god *Ṣa'b*, the grandfather of the Nabataeans" is mentioned in a Palmyrian text (*CIS*: 3991; Winnett and Reed 1970: 158; see also al-

Khraysheh 2000: 59-70); The Arab historian Ibn Ḥazam al-Andalusī (1983: 491-494) lists the names of the gods and the Arab tribes associated with them. Pre-Islamic Arab tribes were sometimes affiliated with a god or goddess (e.g., 'Allāt with the *Thaqīf, supra). Ṣa'b* also was the name of a tribe that became extinct: (Ibn Ḥazam al-Andalusī 1983: 447). *Ṣa'b* can also be a name for an individual; e.g. *Ṣa'b-dhu al-Qarnayn* was credited with completing the Ma'rib Dam in Yemen (*EI, s.v.* Marib).

ftḍr': the *f* is a conjunction; *tḍr'* is the imperfect jussive of the verb *ḍara'a*, to be humble, submissive, to humiliate, to implore, beg, etc. In the Qur'ān (S. VII: 55), there is: "'*id'ū rabbakum taḍarru'an wa khifyatan*," "call on your Lord with humility and in private"; in our text, *ftḍr'* could be equal to *fa'ataḍarra'u* in classical Arabic (*infra*). It is attested in Thamudic as a name, *ḍr'* (Harding 1971: 382).

w t'ny: t'iny is the reflexive passive of the verb *'ana'*, to submit, be humbled, etc. In our text it means "to be humbled," "*wa 'anati al-wujūhu lil-ḥayyi al-qayūmi,*" "all faces shall be humbled before (Him), the Living, the Self-Subsisting, Eternal" (Qur'ān, S. XX: 111). The word also can refer to the rising (by a Muslim in prayer) of his hands, face and knees when kneeling and bowing down (Ibn Manẓūr, *s.v. 'n'*). It is attested in Safaitic as a name, *'ny* (Harding 1971: 445).

wtshhd: tshhd is the reflexive imperfect of the verb *shhd*; (*shahida*) to testify, bear witness, attest, etc. It is attested in proper names as *shhd* and *shhdt* in Safaitic (Harding 1971: 360).

There is a possible alternate reading for the beginning of line 2: *w sq m l'lh Ṣa'b (wa saqa ma lil'ilahi Ṣa'b*; see al-Khraysheh 2000: 59-70). This is not likely, however, because the text is in the first person singular, as demonstrated by *t'ny* (line 2), "I submit"; *ṣḥry* (line 4), "my *ṣaḥry*"; *'ly* (line 5), "on me." If the verb were *saqa* in this case, it would be in the third person singular which would not fit the text.

Another interpretation could be: *w sqm l'l ḥṣ'b (wa saqamun l'ali ḥaṣa'bin)*, i.e., that the sickness was inflicted on the whole of the *Ṣa'b* tribe. This could fit grammatically. However, in line 5, *(')llk trḥm 'ly* denotes that the person is asking help for himself.

Line 3

lhb: l'hb in classical Arabic; the *l* denotes purpose and is best translated "to" with the infinitive; *l,* "affirmative, surely ... [*lamu jawabi al-qasami*], the *la* that corresponds to, or is the complement of, an oath" (Wright 1988: vol. 1: 282).

hb: from the verb *whb* (*wahaba*), to give or donate; *'hb* here is in the imperfect. The *'alif* in our text has been dropped because of the dialect (*infra*). It is attested in Safaitic and Thamudic as a name, *hb, hb'l,* and *hbt* (Harding 1971: 606).

kll: in Arabic *kull*, "all," is a noun in Arabic (in English "all" is not). Attested in Thamudic (Harding 1971: 504) and in Safaitic (Winnett and Harding 1978: 644; King 1990: 599).

m: mā is the indefinite relative pronoun, meaning whatever or that which.

f'l: from the verb *fa'ala,* to do, but in our case it should be read *'af'al*, "I do," because of the dialect (*infra*). Then "*mā 'af'al,*" would be "whatever I am doing." Attested as a name in Thamudic and Safaitic (Harding 1971: 469).

w ndhr: ndhr, to vow, to consecrate, to dedicate, etc.; the word in classical Arabic is *nadhara,* while in modern colloquial Arabic is *nadara.* Attested in Safaitic and Thamudic (Harding 1971: 559, 585).

'rb': four. Attested in Safaitic (Winnett and Harding 1978: 629).

[*'?*]: the reading is not clear at all but there is some sort of letter or sign visible; maybe it was meant to be an abbreviation for a number such as a sign (unattested). The hamzat (') can be part of *sl't* as it is in the plural.

sl't: commodity, commercial article, object of value, or anything for trade; it can also mean coin, as it appears in several Nabataean texts from *Madā'in Ṣāliḥ*: "... for the full price of a thousand Haretite sela's and to our lord King Haretat for the same amount ..."; "... will be liable to Tadhay (?) in the sum of a hundred Haretite sela's ... "; and " ... shall be liable to our lord Haretat, King of the Nabataeans, lover of his people, in the sum of a thousand Haretite sela's" (al-Fassi 1997: 49-50); attested in Thamudic (King 1990: 598) (see Kraysheh 2000: 59-70).

An alternate reading for line 3 could be: *lh bkll m f'l wndhr 'rb' (')sl't (lahu bikulli ma fa'al).*

In this case, the beginning is read as *lh*, "to him"; here the affirmative *l* is added to *huwa* "him," possibly meaning "to the god *Ṣa'ab*". Additionally *mf'l* (*maf'al or maf'ul*) could be "the good action" from the root *f'l* ; see al-Khraysheh 2000.

Line 4

mnrt: "al-manār is a source of light and *al-manārat* is a candle ... Ibn Sayidihi said *al-*

manārat is the place where we put the lamp" (Ibn Manẓūr, *s.v. nwr*). Attested in Safaitic as a name (Harding 1971: 568).

'fnt: from *'afana*. The words *'athana* and *'afana* have the same meaning, to smoke or to ascend ... Jacob said the two words are interchangeable ... *Wa 'aththantu thawbī bil-bakhūr ta'nīthan* (I smoked my dress with incense)" (Ibn Manẓūr, *s.v. 'thn* and *'fn*). It is attested in Safaitic (Harding 1971: 426) and *'fn* occurs as a name (Winnett and Harding 1978: 595).

w ytḥlb: ytḥlb is the imperfect jussive of the verb *taḥallaba* in the stem pattern *tafa''ala*; it is from the root form *ḥalaba*, to milk, drip, trickle, leak, seep, etc. The verb can have very different meanings: "*Wa taḥallaba al-'araqu wa 'inḥalaba idh sāla*," the sweat seeps, or "*wa ḥalaba al-qawmu*," they got together, they helped them (Ibn Manẓūr, *s.v. ḥlb*). The name *ḥlb* is attested in Safaitic (Harding 1971: 197).

ṣḥry: from *ṣḥr, "aṣ-ṣuḥratu ḥumratun taḍribu ilā ghabarat; wa rajulun aṣḥar wa 'imra'atun ṣaḥrā' fī lawniha", aṣ-ṣuḥratu,* a dusty red; a man is *aṣḥar* and a woman *ṣaḥrā'* in her color. It can also mean a yellowish color: "*aṣ-ṣaḥrā'* is the desert; *aṣḥara*, means also to appear, to go to the desert; *ṣuḥru* is a female name (Ibn Manẓūr, *s.v. ṣḥr*). The *yā'* at the end is a first person singular possessive (my *ṣḥr*).

Note that the line could be read: *[l] mnrt w 'fnt w ([l] munirat wa 'afnat,* i.e., as two female names (al-Khraysheh 2000: 59-70).

Line 5

'llk: from *'l-lk*, meaning "perhaps (you?)"; *'alla* or *la'alla* is the same, i.e., a particle that introduces clauses or verbal sentences with hopeful expectation. In our text, it means "may you", directed to the god *Ṣa'ab* "god *Ṣa'ab*, may you ...".

trḥm: the imperfect jussive of the verb *rḥm (raḥama); taraḥḥama* is the second person masculine singular, meaning to have mercy. Ibn Manẓūr (*s.v. rḥm*) says *"taraḥama al-qawmu: raḥama ba'ḍuhum ba'ḍan"*; here *taraḥama* is the plural that could be used in addressing a deity. *Rḥm* as a name is attested in Safaitic and Thamudic (Harding 1971: 273; King 1990: 597).

'ly: a preposition meaning on, upon; the *yā'* is a first person singular pronoun suffix, so the phrase is "upon me". However, there is a small possibility that *'ly* could be read *'illy*; in this case, then, it should take two *l*'s following the rules (*supra*); when the *l* is not doubled, it should be read *'aly* with the ending not stressed.

w dhkrt: dhkrt (from *dhkr*) is the simple perfect tense of *dhakara*, to remember, recall. The subject-marker, the *t* is feminine. It could be translated as "She may remember." Attested in Thamudic (King 1990: 597, 684).

lt: the name of the goddess 'Allāt. *Al-Lāt* is the:

> "... name of one of the three most venerated deities of the pre-Islamic pantheon, the two others being Manat and al-'Uzza ... The cult of al-Lat, the deity of the Thakif, descendants of the Thamud ... is attested over a vast area of the pre-Islamic Near East. She was at the same time the goddess of shepherds, from the Hidjaz to Ṣafa, and that of caravan-travelers, from Mecca to Petra and to Palmyra. ... The Arabic form of her name dates back at least to the time of the Khuza'i 'Amer b. Luḥayy, the reformer of the idolatrous cult in Mecca at the beginning of the 3rd century A.D., a period for which there is evidence of the cult of al-Lat in Nabataea, in Ṣafa and in Palmyra.
>
> Al-Lat is seen at Ṭa'if displaying the most primitive attributes of the Semitic Ba'la. Originally, she was represented by a white stone, in contrast to the black stone of Mecca; subsequently, she was associated with a sacred tree; then a sanctuary was erected for her, and this became a place of pilgrimage" (*EI, s.v.* al-Lat). Attested in Thamudic (King 1990: 687, 690).

'shy'n: followers, party, sect, etc. "... *ash-shī'atu atba'u ar-rajuli wa 'anṣāruhu, wa jam'uha shiya'un wa 'ashyā'un jam'u al-jam'i" (ash-shī'atu* are the followers of a man and his partisans; the plural is *shiya'un*, and *'ashyā'un* is the plural of the plural; Ibn Manẓūr, *s.v. shy'*). The word *shy'* is attested in in Thamudic (King 1990: 596), Lihyanite and Safaitic and as a name, *shy'n*, in Himyarite and Safaitic (Harding 1971: 364).

kllh(m): kll, kullun is a noun in Arabic; with a definite plural noun or plural pronoun suffix, it corresponds to all, all of; the pronoun suffix *"hm"*, them, serves as a subject, emphasized after the plural *'shy'n*. Attested in Thamudic (King 1990: 599).

Line 6

[b]dr: as a proper noun, it means the full moon; *Badr* can also be the name of a female or a male, *Bdr* is mentioned in Safaitic and Thamudic (Harding 1971: 97; Winnett and Harding 1978: 557). Among well-known contemporary Arab poets is Bader Shaker Assayyab.

hbdn: a proper name on the pattern of *fa'lan*, it is

still in use today by the Bedouin in Jordan (al-Khraysheh 2000). The name *hbd* appears in Safaitic (Harding 1971: 606).

'ṣlḥ: a proper name, meaning to repair or make peace. Attested in Safaitic and Thamudic (Harding 1971: 52; Winnett and Harding 1978: 552; King 1990: 473, 567).

'qrb: a proper name which means scorpion. The name is in use today by Arab tribes as a female name, while in our text and other related Safaitic and Thamudic inscriptions, it is used for a male (Harding 1971: 427; Winnett and Harding 1978: 595; King 1990: 527). An *'aqrabu Ḥannāt* from Banī Kanāna is mentioned by an Umayyad poet at the end of the seventh century (al-Iṣfahānī: vol. 16, 196).

bn: son of.

Line 7

whblh: (wahaballah) is a composite proper "theophoric name" composed of *whb* and *lh (wahaba-'allah)*. The verb *wahaba* means to give, to donate, to grant, etc. Hence *wahab'allah* means the gift of Allah. *Whblh* is attested in Lihyanite, Safaitic, Thamudic, and, similarly, *whb'l* is attested in all related dialects (Harding 1971: 651-53; King 1990: 563).

'wdhlh: a composite proper name from *'awadha*, to seek the protection (from or against), to take refuge (with or from). The translation of this name can be God is a refuge or a protector. The name *'wdhlh* is attested in Safaitic and Thamudic.

zd: zayd is a proper name from the verb *zāda*, to become greater, increase. This name *zayd*, and *yazīd, ziyād*, are very common names in the Arab world from pre-Islamic time to the present. Attested in Lihyanite, Safaitic, and Thamudic (Harding 1971: 296; King 1990: 506).

bn ḥrb: son of *ḥarb,* a proper name meaning war; this name was known in pre-Islamic times and is still in use today. Attested in Safaitic and Thamudic (Harding 1971: 182; King 1990: 492).

Line 8

(w)dn: only part of a *wāw* is preserved; *waddan*, on the pattern of *fa'lan*, is from the verb *wadana*, to be wet. Attested in Safaitic (Harding 1971: 639). The second possibility is that it could be *'Addan* or *'Adan*, also attested in Safaitic (Harding 1971: 410).

mlk bin s'dlh: a composite name, *Malik* son of *Sa'dallah. Malik* means king and is also a common Arabic proper name from the verb *malaka*, to take possession, take over, acquire, reign, etc. This name is very common in Arab literature and history; it is attested in Lihyanite, Safaitic, and Thamudic (Harding 1971: 564-65; King 1990: 550).

s'dlh: a composite name of *Sa'd* and *Allah*. From *sa'ida*, to be happy, lucky; the name can be translated as the joy of God. *S'dlh* and *s'd'l* are known from Lihyanite, Safaitic, and Thamudic (Harding 1971: 318-19, 510).

'thl: 'Athal or *'Athyl* meaning high-born, deep-rooted, of noble origin; it is from the verb *'athala* to consolidate, strengthen, "*'Uthyal* is a place near al-Madīna, and *'athal* is the tamarisk tree ... *'Uthal* the name of a mountain, and after it the male name *'Uthalan* was given, and *'Uthalah* is a name" (Ibn Manẓūr, *s.v. 'thl*). This name is attested in Safaitic (Harding 1971: 21).

wshk(t): Washik and *washuka*, to be quick or hurry; *washk,* speed, swiftness; and *washīk*, eminent, forthcoming. *Wshkt* is a proper feminine name. *Washīkat* was the slave girl of Budal of the Khalīfat al-Amīn ca. AD 813. Another *Washīkat* was the mother of Abī Muslim al-Kharasānī (al-Iṣfahānī: vol. 3: 150; vol. 17: 82). It is also attested in Thamudic and Safaitic (Harding 1971: 643; King 1990: 562).

Line 9

bd: Bud, a proper male name. The derivation of this name cannot be from the verb *badda*, to distribute, disperse, nor from *budd*, a way out, escape, nor *bada'a,* to begin, start, etc. Rather it is the name of the "idol of worship" (Ibn Manẓūr, *s.v. bdd*); that is why the name never changed to *bd'allah;* rather, it is attested as *bd* in Thamudic (King 1990: 477), and in Safaitic and Thamudic as *bd'l* (Harding 1971: 96-97).

wyl: Wayl is the original form of *Wā'il;* the *hamzat* in it is called "the imported *hamzat* after the consonant *'alif* ..." (Ibn Manẓūr, *s.v.* the letter *al-hamzat*). *Wā'il* is a derivation of the verb *wa'ala,* to seek refuge, to seek shelter or safety. *Wā'il* is a very common name in Arabic. It is attested in Lihyanite, Safaitic, and Thamudic (Harding 1971: 632; King 1990: 563.).

wsm: Wasīm means handsome, graceful, pretty, or good-looking; it can be a proper name for a male, and one of God's titles: *wasīmun qasīmun*. It is derived from the verb *wasama,* to brand, to stamp, or mark. Attested in Safaitic (Harding 1971: 642), and as *wsm'l* (King 1990: 562).

dhkrt: See above.

Line 10

lt: See above

mn: man is the indefinite relative pronoun, meaning whoever, he who, those who, the one(s) who (King 1990: 685).

yl'nn: yal'ananna, from *la'ana* (with one *n*) to curse or damn in the jussive form; the "*n*" at the end means us. Another reading could be *mn yushayi'ūnana,* but we do not have the *y* after the *sh* as in *'shy'n* (line 5). *Mn yl'nn* should not be read *"yushayi'ūnana"* (al-Khraysheh 2000: 59-70); rather it should be read as *"yal'anan,* or *yal'ananna"*, and the translation would be "may *'Allāt* remember whoever curses us (as he forgives them)".

l'nt: curse, with the *t* to indicate the third person feminine singular (King 1990: 68).

lt: See above.

mn: See above.

Line 11

ykhbl: Yakhbulu, from the verb *khabala,* to confound, confuse, or complicate, in the imperfect *khbl*; it is attested as a name in Lihyanite and Safaitic (Harding 1971: 214; King 1990: 683).

wq'n: From the verb *waqqa'a; at-tawwaqu'* means what is in the mind or thought. The *tawqī'* of a writer is to make clear what is his intention (Ibn Manẓūr, *s.v. wq'*). In this text it should be read as *'uwaqi'n,* I sign to approve what the text refers to (*supra*); attested in Thamudic (King 1990: 686).

dh: dha means this (demonstrative pronoun); here the *'alif* does not appear at the end because it is a soft *'alif (supra);* (King 1990: 683).

Conclusion

This text is a prayer, dedicated to the god *Ṣa'b,* who was called for healing from an illness, and to the great goddess *'Allāt,* who was asked to protect (remember) the clan (followers). This type of prayer is still being practiced today, for example, by the Eastern Churches. Before the end of the service, the priest raises his hands and recites a rememberance of the fathers, i.e., the saints, and he then lists a large number of names including the patriarch, the bishop, the head of the monastery, and he ends by asking rememberance of the inhabitants of the town, the sick, the hungry, etc. The list is much longer than the one in our text (which is not Christian), but the two are similar. This text also indicates that a vow was taken with it to the temple or the shrine, where it was installed. Finally the dialect reflects a tribal form of pronunciation for which there remain analogies among the Arabic-speaking tribes of the desert.

Proposed reading of the text in the ancient dialect:
lifalhan bin ḥunna bin 'atam dhu'lan ṭy
wsqam ha' lah ṣa'b faṭḍara' wt'ini wtshahhad
lahab kull maf'al wndhur 'arba' ['?] sil'at
manarat w'afnat wyṭḥileb ṣaḥry
'allak taraḥam 'ly wdhakarit 'allat ashyu'na kull-hum
bader whabdan w'iṣlaḥ w'aqrab wbin ...-
wahballah w'awadhallah wzayd wbin ḥarb w
wudan wmalik bin sa'dallah w'athal wwashikat
wbud wwayel wwasam wdhakaret
lat man yal'anana wla'anet lat man ykhbul waq-qa'n dha

P.M. Bikai
American Center of Oriental Research
P.O. Box 2470
Amman 11181, Jordan
acor@go.com.jo

F. al-Khraysheh
Department of Antiquities
P.O. Box 88
Amman 11181, Jordan

References

al-Bakrī al-Andalusī = 'Abdullah bin 'Abdal'azīz al-Bakrī al-Andalusī
1983 *Mu'jam Ma'istu'jam* (Arabic). 4 vols. 3d. ed. Beirut: Alam al-Kutub.
ibn Ḥazam al-Andalusī = Abī Muḥammad 'Aly bin Aḥmad bin Sa'īd bin Ḥazam al-Andalusī
1983 *Jamharat Ansāb al-'Arab* (Arabic). Beirut: Dar al-Kutub al-Elmiyat.
CIS = Corpus Inscriptonum Semiticarum
1907 *Corpus Inscriptonum Semiticarum 2: Inscriptiones Amamaicas Continens* II, f. 1. Paris: E Republicae Typographeo.
EI = Bearman, P.J., Bianquis, T., Bosworth, C.E., van Donzel, E., Heinrichs, W.P. and Pellat, C., eds.
1979 *The Encyclopedia of Islam.* Leiden: E.J. Brill.
al-Fassi, H.A.
1997 The Taymanite Tombs of Madā'in Ṣaliḥ (Ḥegra). *Proceedings of the Seminar for Arabian Studies* 27: 49-57.
Harding, G.L.
1971 *An Index and Concordance of Pre-Islamic Names and Inscriptions.* Toronto: University of Toronto.
Ibn Manẓūr = Muḥammad ibn al-Mukarram ibn Manẓūr
1955-92 *Lisān al-'Arab* (Arabic). 15 vols. Beirut: Dar Sader.
al-Iṣfahānī = Abī al-Faraj al-Iṣfahānī
no date *Al-Aghānī* (Arabic). Beirut: Dar al-Fikre.

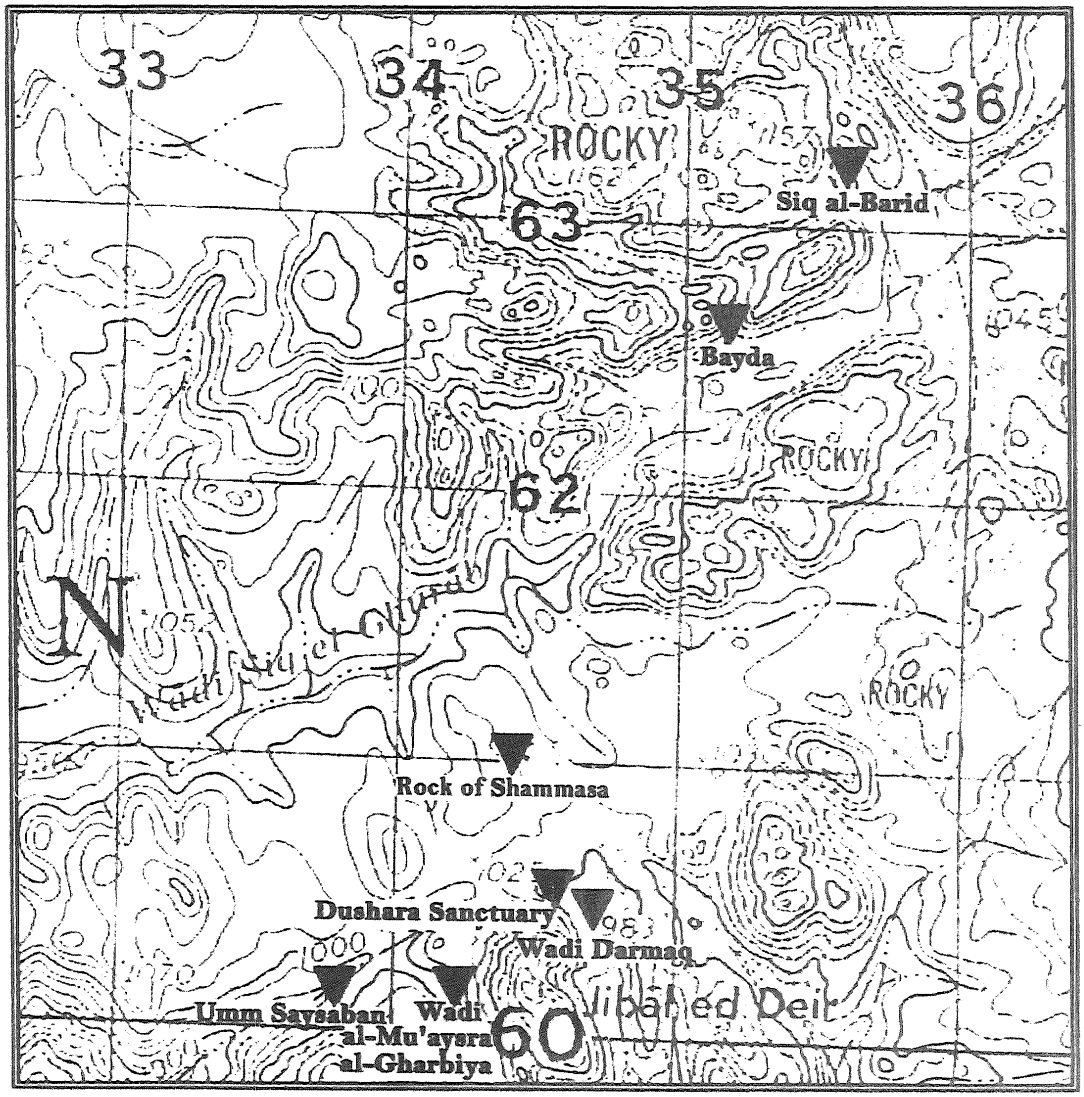
al-Khraysheh, F.
1986 *Die Personennamen in den nabatäischen Inschriften des Corpus Inscriptionum Semiticarum.* Ph.D. Dissertation. Marburg/Lahn: Phillips-Universität.
1994 Eine safaitisch-nabatäische bilingue Inschrift aus Jordanien. Pp. 109-112 in *Arabia Felix. Festschrift Walter W. Muller zum 60. Geburstag.* Wiesbaden: Harrassowitz.
2000 An Arabic Inscription in Thamudic Characters from Jordan. *Adumatu* 2 [July 2000]: 59-70 (Arabic).
King, G.
1988 Wadi Judayid Epigraphic Survey: A Preliminary Report. *ADAJ* 32: 307-17.
1990 *Early North Arabian Thamudic E.* Unpublished Ph.D. Dissertation, School of Oriental and African Studies, University of London.
LaBianca, Ø.
1992 A New Safaitic Inscription. *ACOR Newsletter* 4.2: 13.
Littmann, E., Magie, D. Jr. and Stuart, D.R.
1913 *Greek and Latin Inscriptions in Syria. Section A, Southern Syria. Part 8: Umm Idj Djimâl.* Publications of the Princeton University Archaeological Expeditions to Syria in 1904-1905 and 1909 Division III. Leyden: E.J. Brill.
Macdonald, M.C.A.
1998 Some Reflections on Epigraphy and Ethnicity in the Roman Near East. Identities in the Eastern Mediterranean in Antiquity: Proceedings of the Conference held at the Humanities Research Centre in Canberra 10-12 November, 1997. *MA* 11: 177-90.
2000 Reflections on the Linguistic Map of Pre-Islamic Arabia. *Arabian Archaeology and Epigraphy* 11: 28-79.
Piccirillo, M. and Denton, B.
1996 Archaeological Remains. Pp. 25-45 in P.M. Bikai and T.A. Dailey (eds.), *Madaba: Cultural Heritage.* Amman: American Center of Oriental Research.
Qur'ān =
1938 *Glorious Qur'ān.* Abdullah Yusuf Ali, trans. 2 vols. 3d ed. Cairo: Dar al-Kitab al-Masri.
RES = Répertoire d'épigraphie sémitique
1916-18 *Répertoire d'épigraphie sémitique* II. Paris: Imprimerie Nationale.
al-Roussan, M.M.
1992 *Al-Qabā'l ath-Thamūdiyat wa aṣ-Ṣafawiyat* (Arabic). Riyad: Jami'at al-Malik Sa'ud.
Schumacher, G.
1895 Madaba. *ZDPV* 18: 113-25.
Van Den Branden, A.
1956 *Les textes themoudéens de Philby 2. Inscriptions du nord.* Bibliotheque du Muséon 39 and 41. Louvain: Institut Orientaliste.
Wehr, H.
1976 *A Dictionary of Modern Written Arabic.* J. Milton Cowan, ed. 3d ed. Ithaca: Spoken Language Services.
Winnett, F.V.
1957 *Safaitic Inscriptions from Jordan.* Toronto: University of Toronto.
Winnett, F.V. and Harding, G.
1978 *Inscriptions from Fifty Safaitic Cairns.* Toronto: University of Toronto.
Winnett, F.V. and Reed, W.L.
1970 *Ancient Records from North Arabia.* With contributions by J.T. Milik and J. Starky. Toronto: University of Toronto.
Wright, W.
1988 *A Grammar of the Arabic Language.* 3d ed. Two vols. in one. Cambridge: Cambridge University.

A FORTIFIED SUBURB OF ANCIENT PETRA: SHAMMĀSA

Manfred Lindner and Elisabeth Gunsam

Introduction

The area called Shammāsa (شمّاسة) (YU 341 613) by the local people extends over ca. 1x1.5km and is located less than 3km, as the crow flies, from and to the NNW of ancient Petra proper (**Fig. 1**). Undeservedly neglected by surveyors and tourists alike, it was explored and surveyed in September/ October 1999/2000 and June 2001 by teams of the Naturhistorische Gesellschaft (NHG) Nürnberg under the direction of the authors, underlining thereby the need for further investigations of the neglected peripheries of Petra.[1]

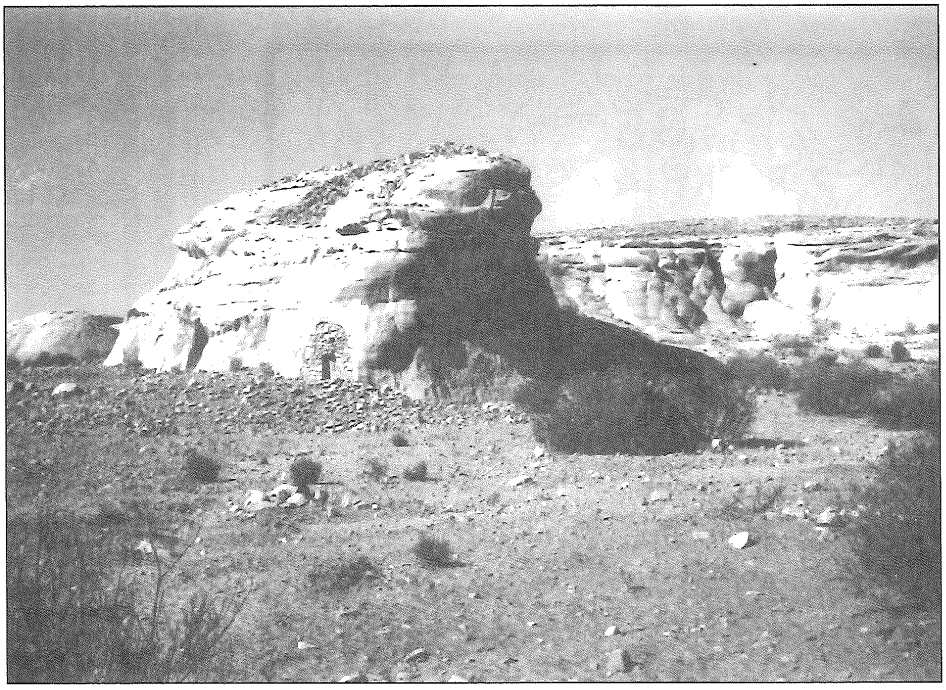


1. Location of Shammāsa between Bayḍā and Umm Saysabān.

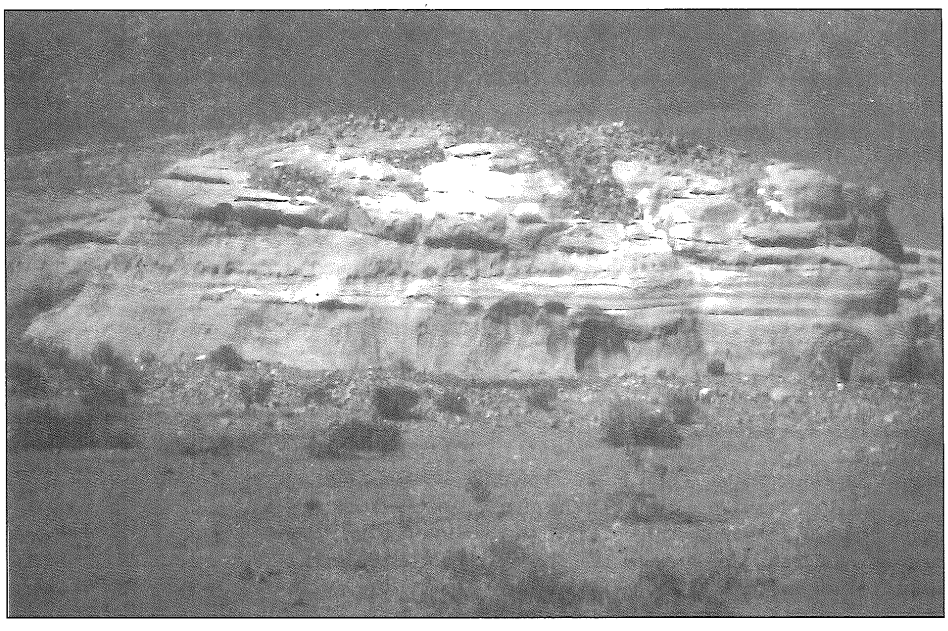
1. Thanks are due to the Directors-General of the Department of Antiquities of Jordan; their local representatives; the Bedouins of the area; the members of the Naturhistorische Gesellschaft (NHG) Nürnberg who comprised the team: Ulrich Hübner, Antonie Schmid and Elisabeth Schreyer; Robert Wenning, who read the manuscript and suggested improvements; last not least, to Dakhlallah Qublan from Petra-Umm Ṣayḥūn and his family. Regretfully the sketches of cisterns and winepresses could not be done by professionals.

The "Rock" of Shammāsa

The (eccentrically located) center of the area, first noticed in 1997, is a huge rock outcrop, rising at ca. 1025m asl in an approximate N/S direction out of a plain to the east and a rocky slope to the northeast (**Fig. 2**). The almost perpendicular sides, in fact cliffs, make it difficult to believe this steepness to be entirely of natural origin. There are, however, no typical Nabataean or other pickaxe strokes and no typical quarry walls. Moreover, as is well known, the usually soft Ordovician Disi sandstone around Petra is very hard and durable in certain places, as attested by a few other rocky rises and quarries in the vicinity. The Rock is 42m long, on its summit less than 12m wide and ca. 15m high, though less high from the ground on its western side. There, the adjoining rocky slope facilitated the access to the summit plateau both for defenders and aggressors (**Figs. 3, 4**). The summit was originally surrounded by a wall of carefully chosen, durable ashlars accurately set upon rock-hewn ledges. The latter are better preserved at the southwestern end. Whereas there are only traces of ledges left toward the east, the amount of building stones tumbled from the rim of the Rock at the southwestern edge, in fact on all sides, bears witness to the considerable size and height of the original wall. In the small space at the top, additional masonry between the exterior walls of not more than 300m^2 indicates the former existence of stone



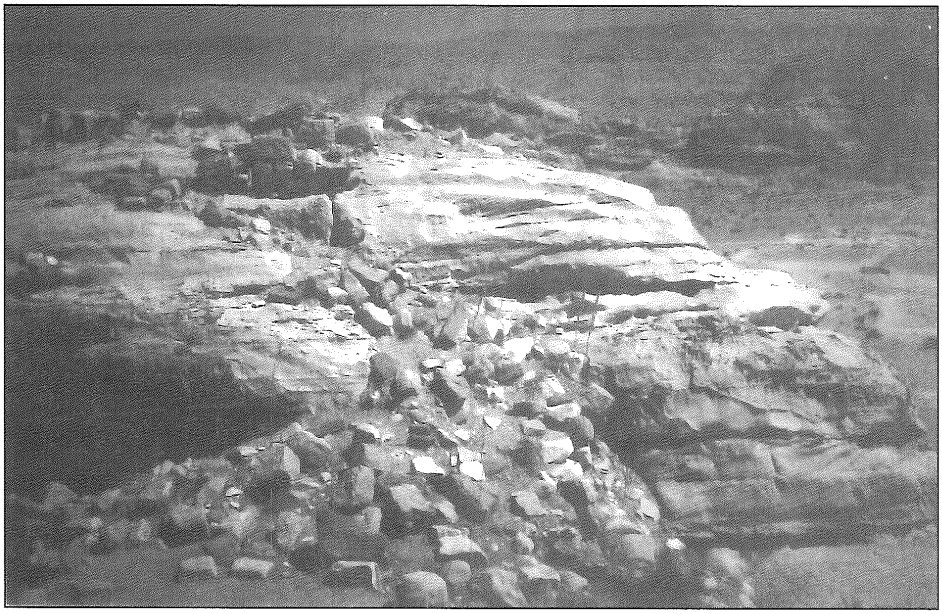
2. The Rock of Shammāsa in the morning, from northeast (1997).



3. The Rock at noon from the east. Note stone material fallen from the top (1998).

huts or bulwarks against the shots of aggressors. One diagonally finished ashlar was noted among the masonry. The fallen ashlars and the visible line of ledges might even suggest that no mere enclosure walls but a massive structure was built, thereby enlarging the narrow top. The width (0.40m) of the still existing foundation ledges make the assumption probable (**Fig. 5**).

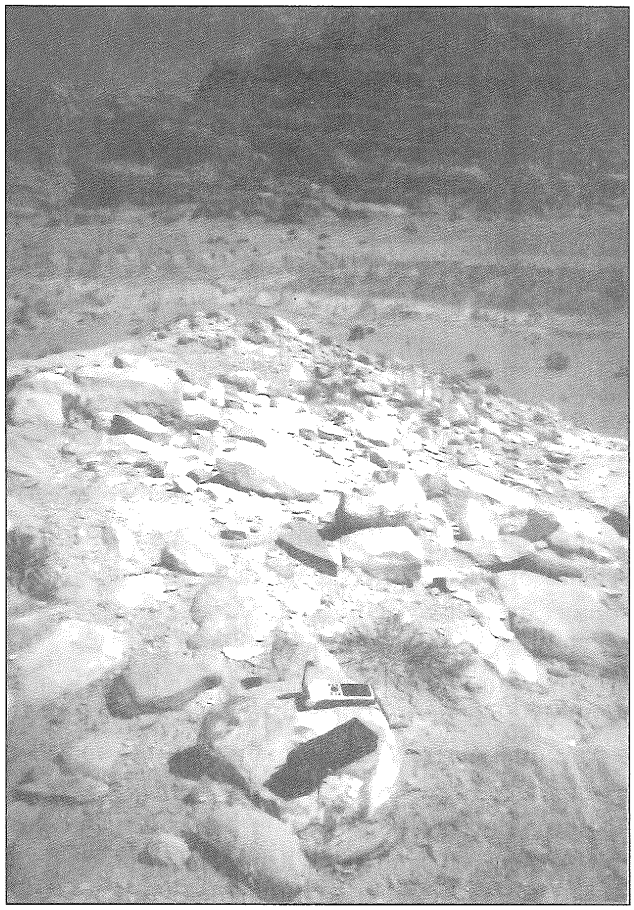
A rectangular excavation of 0.60x1.20m may have served as a child's grave. A deepening at the southeastern part of the top was additionally substructed. No means of storing water on the summit was noticed (**Fig. 6**). At the foot of the northern end, a small cave with an inexpressive opening is



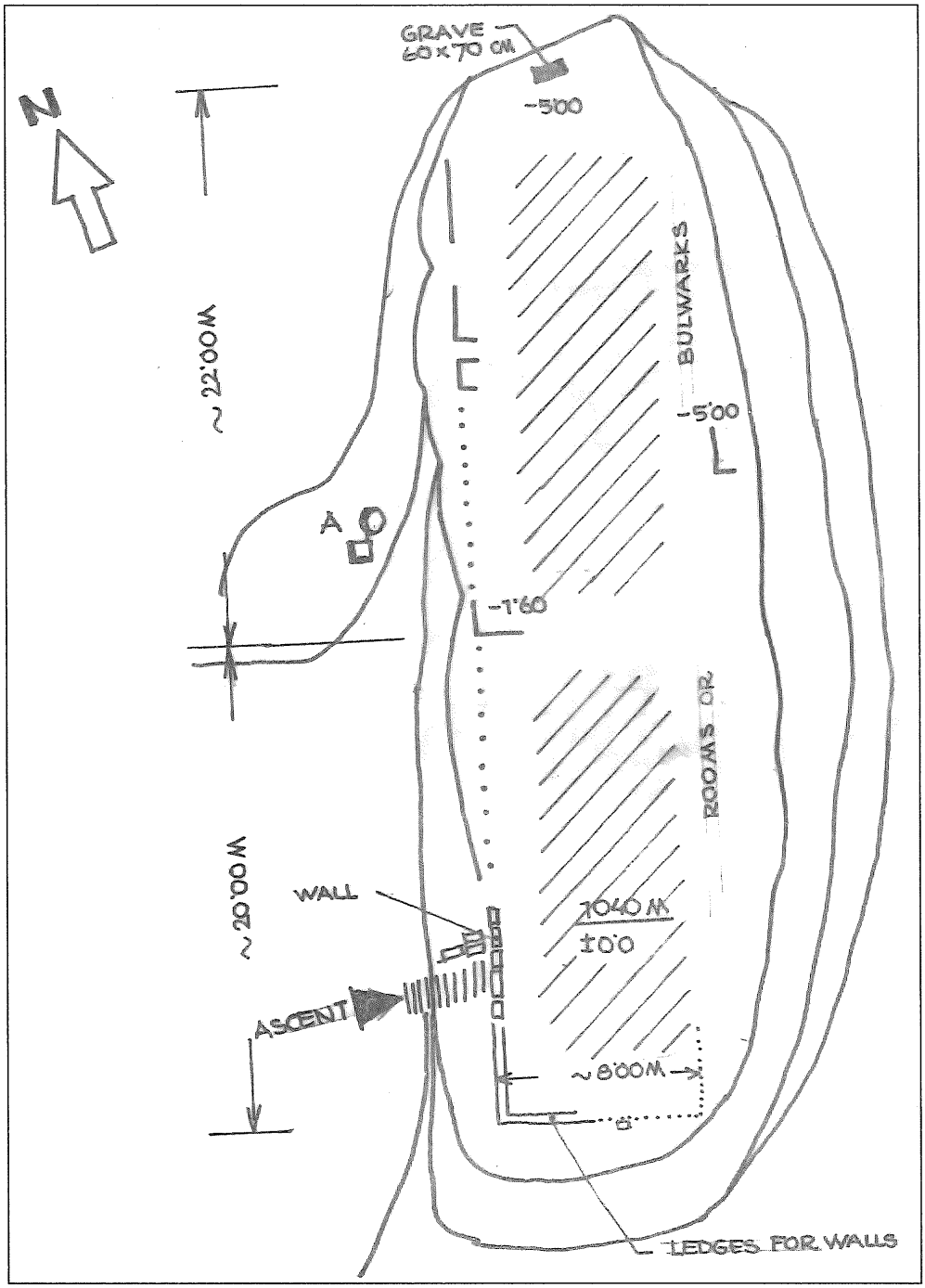
4. Southwestern edge of the Rock with ashlars on ledges still in situ (1999).



5. Durable ashlars on ledge in situ.



6. Remnants of masonry on top of the Shammāsa Rock.



7. Drawing of the top (E. Gunsam).

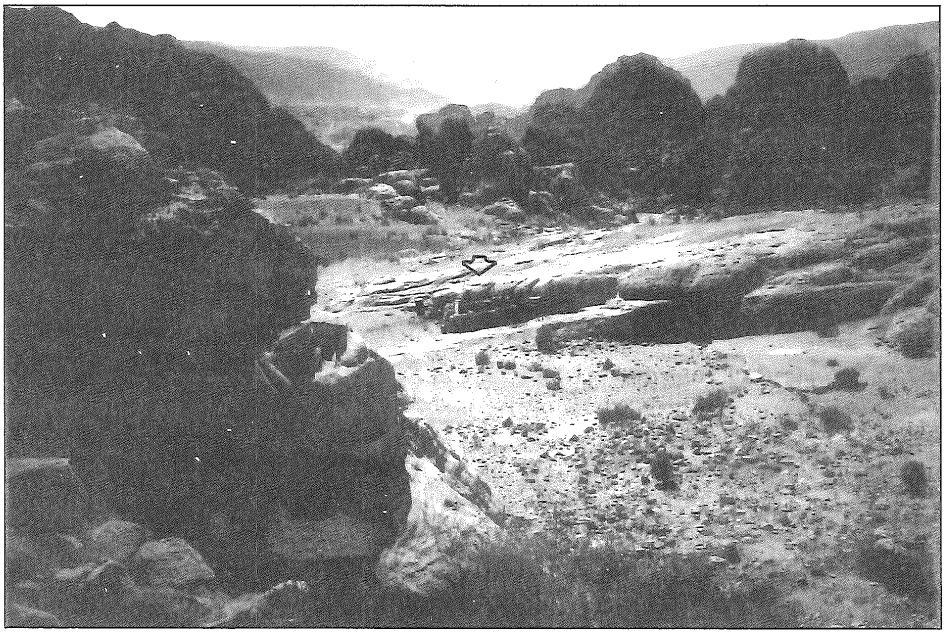
of no archaeological significance. Much disturbed ashlars of supposed rectangular houses below the southeastern cliff seem to be mixed with stone material fallen or taken from above. There were no ashlars with oblique (diagonal) trimming (**Figs. 7, 8, 9**). Obviously, the Rock was used as a defensive tower. In emergencies it might have protected a community from invaders. Ruins of houses to the southwest of the Rock seem to have been added to the defense. An undatable ashlar, with holes for a game, laying at the foot of the rock shows how people at Shammāsa passed their time.

Winepresses

Viticulture played an important role at Shammāsa. In a rock-cut installation below the western cliff, some liquid ran through a pipe into a rectangular basin of 0.82x0.82m, and from there into a reservoir of 1.09m Ø (**Fig. 10**). First regarded as a water collecting device, it was probably a winepress (A) with the treading-floor hidden under an avalanche of debris and ashlars tumbled from the western cliff. At 220m to ESE, in the proper center of the plain, a second winepress (B) was found dug into an outcrop of almost white Ordovician rock (**Fig. 11**). Size and architecture of this in-



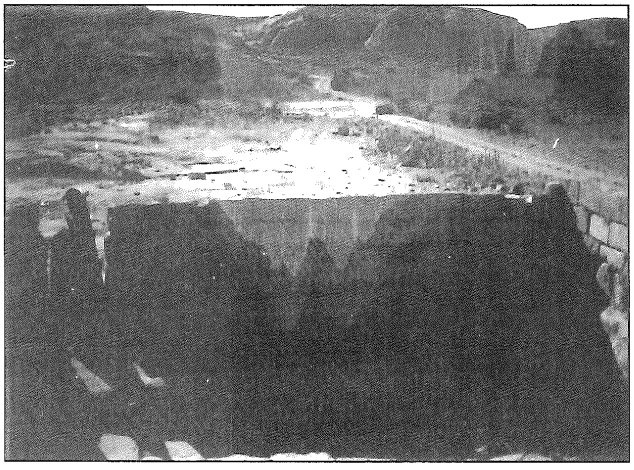
8. *Originally substructed rim of the Rock.*



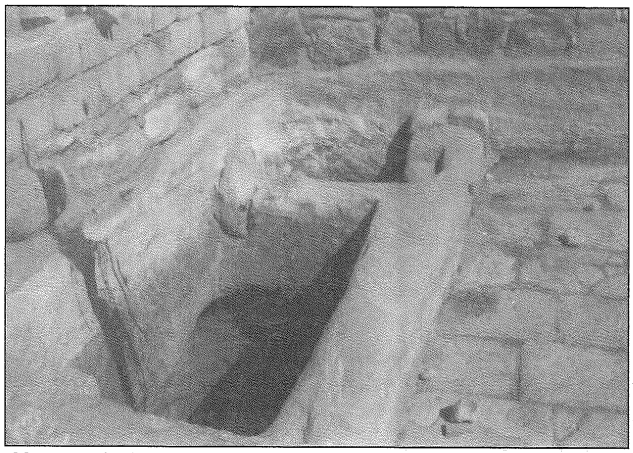
9. *Southwestern edge of the Rock. Location of modern reservoir in center (arrow).*



10. *Supposed small winepress (A) at the western foot of the Rock.*

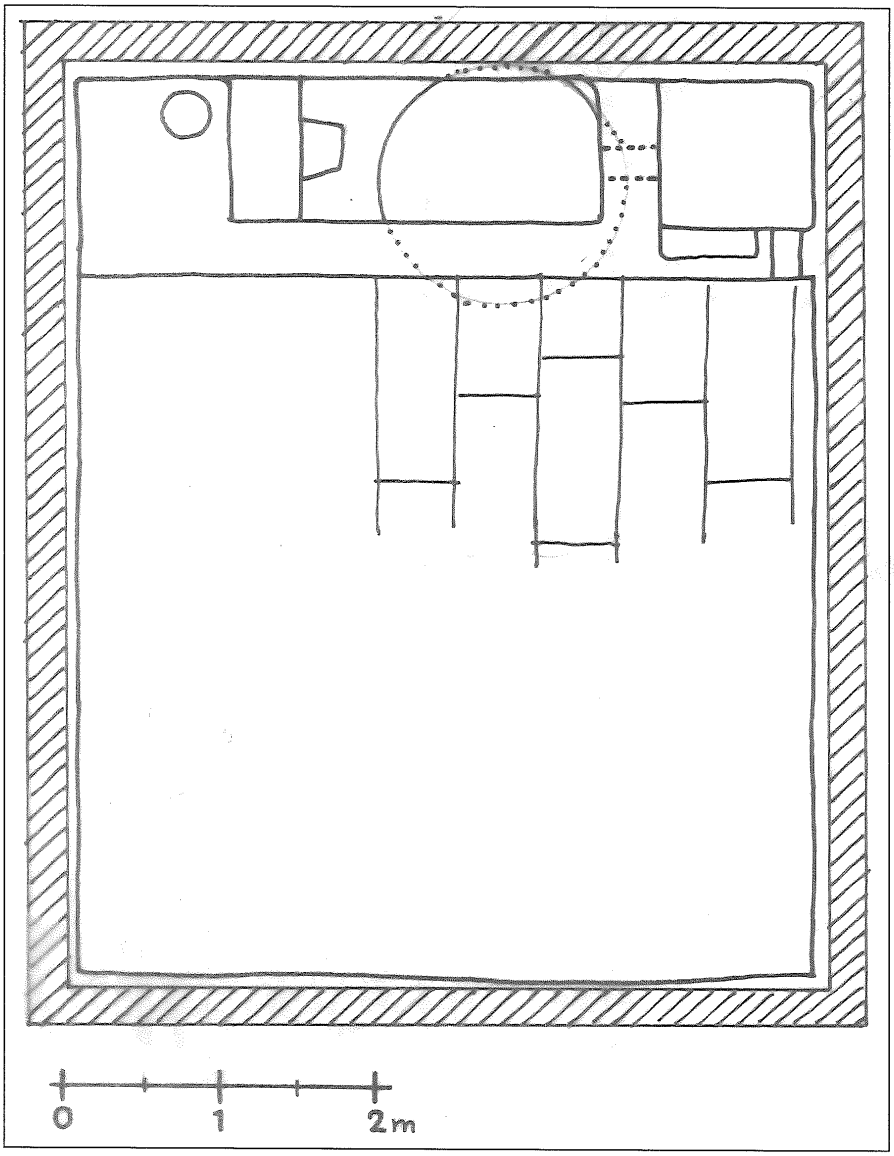


11. *Large winepress (B) of Shammāsa.*

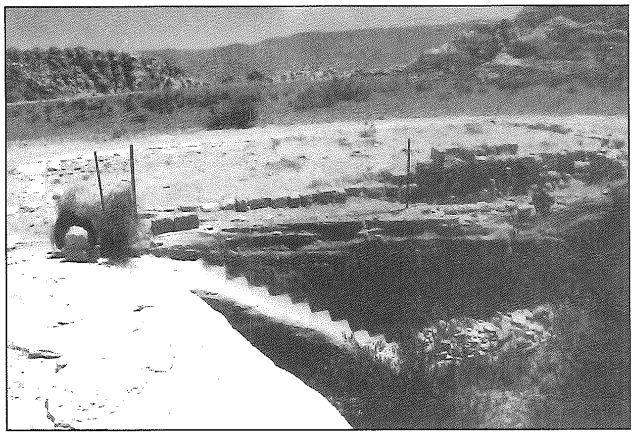


12. Detail of large winepress with vat and clearing basin.

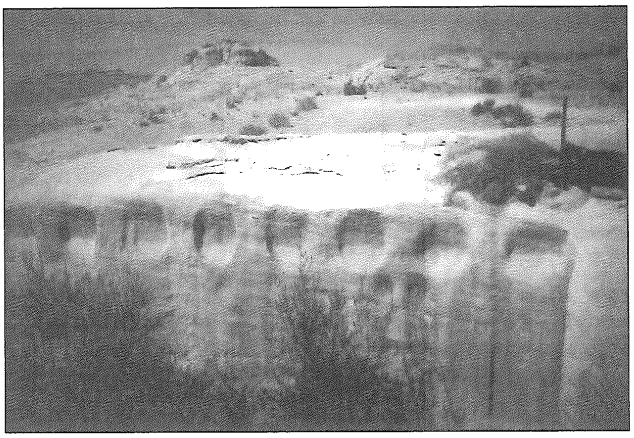
stallation are outstanding among the many others in the Petra region. The treading-floor of 4.55x4.70m is paved with seven rows of carefully hewn rectangular limestone slabs of up to 1.30x0.51m and a thickness of 0.10m. The durable whitish stone material was probably not quarried and finished on site, but rather taken from a quarry working for temples, roads or a temenos in antiquity (**Fig. 12**). Out of the treading-floor, the grape-juice ran through a large hole into a clearing basin of 1x1m and a depth of 0.84m. From there it was conducted into a rectangular bed-rock opening of ca. 2x1m. Into the latter, ca. 0.50m deeper, a fermenting vat of 1.60m Ø was hewn. The depth between limestone slabs and the fermenting vat was covered with rough hydraulic mortar. Two roughly hewn narrow steps allow one to reach the bottom of the vat. For setting down a jar, another circular flat hole was cut where the steps begin (**Fig. 13**). In 2000, the winepress was surrounded by ancient ashlars underneath modern building stones and was used for storing fodder sacks. Clotted blood at the inner rock wall bears witness to slaughtering. A third winepress (C) was discovered ca. 300m to the west of the ridge above the "Cow shed" (see be-



13. Winepress B (E. Gunsam).



14. Large cistern (1) with steps and remnants of a building in the background.



15. Buttresses of arches in the large cistern (1).

low): Treading floor 2.80x3.10m, clearing basin 0.90x1.20m, vat 1.60x1.60m. Four steps lead to the bottom.

Cisterns

It was easy to find out where the inhabitants got their drinking water from. At 165m to the east of the large winepress, trees and bushes (peach trees, olives and grapevine) betray the activities of a Bedouin of today who uses a large Nabataean-style rock-cut cistern (1) as an orchard (**Figs. 14, 15**). The same use of an ancient cistern was noted at Khirbat an-Nawāfla (خربة النوافلة) ('Amr *et al.* 2000: 234, 238). In Shammāsa anchorage cuts show that eleven arches originally covered the reservoir of 13.50x10.0m, installed in an east-western direction. Its size is only paralleled by the cave cistern of Bayḍā (بيضا) and the arched-over cisterns on Jabal Hārūn (جبل هارون) and Jabal al-Khubtha (جبل الخبثه) . Over a nicely made (and preserved) flight of 16 steps, the cistern could be entered to a current depth of 3m at the staircase and 1.80m deeper beyond it. A building originally adjoined the cistern on its eastern side. To the west, a fourth winepress (D) was carved out of the same rock as the cistern. The treading-floor of 2.60x2.80m may have been used for producing smaller quantities of wine. The combination of cistern and winepress on the same rock is unique in the Petra region (**Figs. 16, 17**).

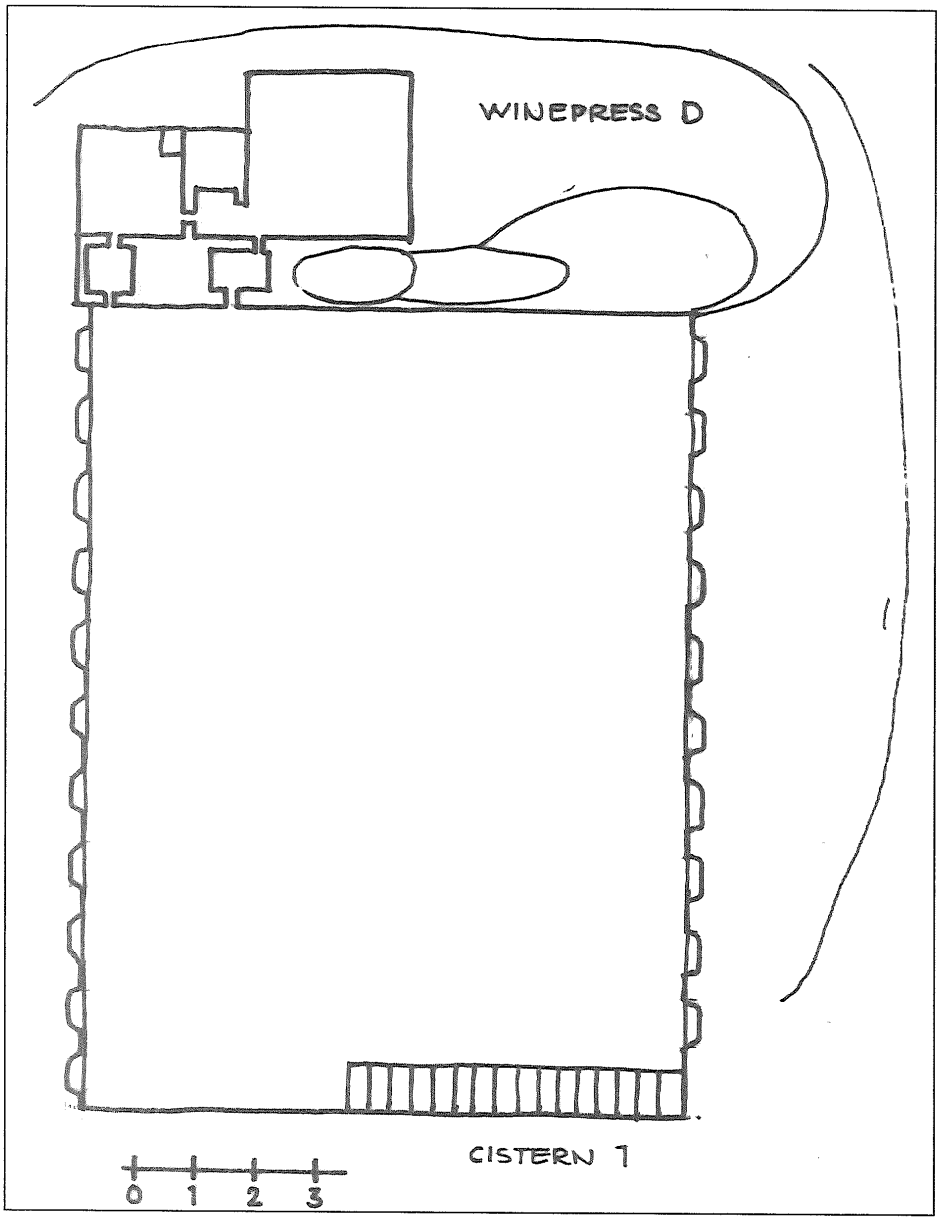
Another rock-cut cistern (2) of 3.70x4m, its inside covered with rough hydraulic mortar, was found at 44m to the southeast of the 11-arches-cistern. The cavity stretches with an upper opening of 4x3.30m widening into an ca. 5.5x5m excavation (in total) in the rock (**Figs. 18, 19**). Thus, in spite of its size, according to its anchorage cuts, it needed only three covering arches. Rock-cut grooves at the side show the cistern was entirely covered with slabs laid upon the arches. Through a channel of 1.20m length, water ran from a settling basin of 3.50x2.10m into the cistern. Both cisterns, now dry, were filled with rainwater from a run-off field in antiquity (and in June 2001) through now hardly noticeable flat gutters with minute differences of depth.

A "Cow Shed"

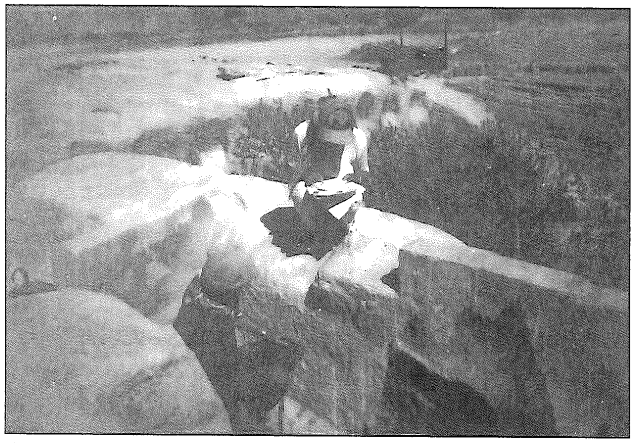
In the shelter of a rocky Ordovician outcrop, a cave room of 3.50x3.50m and a height of (now) 1.80m was lately inhabited and its entrance opening toward the southeast partly walled up. The inner walls show rough pickaxe strokes. Four double holes in the ceiling were perhaps used for hanging a protective cloth. The right wall has been worked into two niche-like excavations, one of them equipped with a bench of 0.40m (**Fig. 20**). One of the surveyors had the idea that two calves or small cows could have been held in this shed, and there would have been room for a cowhand. A rounded water basin and a double hole for tethering an animal mark the entrance. A rhombus *(wasm?)* is inscribed to the right of the entrance. Nearby, a circular flat basin was cut into the rock floor. A smaller hole in the centre made it possible to also collect the rest of the liquid fill. Located in front of a rock wall with a flat niche-like though conical recess, it might have been used to water animals, unless somebody insists on explaining it as a cultic font.

A "Dushara" Sanctuary

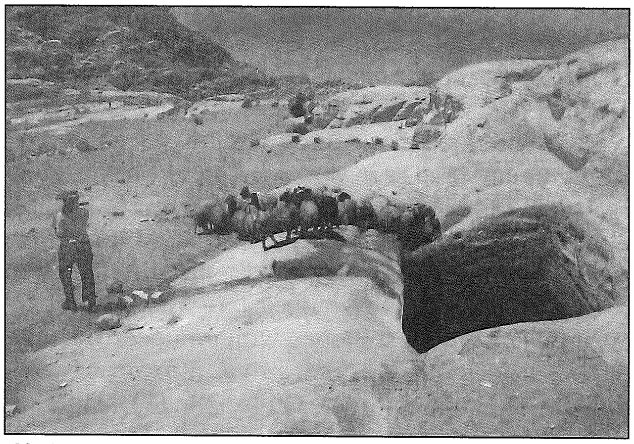
At 400m to the SSE of the southwestern corner of the Rock and orientated roughly to the east, a sophisticated niche for a (missing) betyl is hewn from a grey sandstone wall of Rās Darmaq (راس درمق) . Two rounded boulders of 14m and respectively 34m length, the right one with steps leading to the top, and a few steps between them allow and enhance an entrance to the sanctuary of 4.50x14m. An old well-trodden path leads from Shammāsa to the sanctuary and from there into uninviting Wādī Darmaq (وادي درمق) (**Figs. 21, 22**). In 1998, a group



16. Cistern 1, winepress D (E. Gunsam).



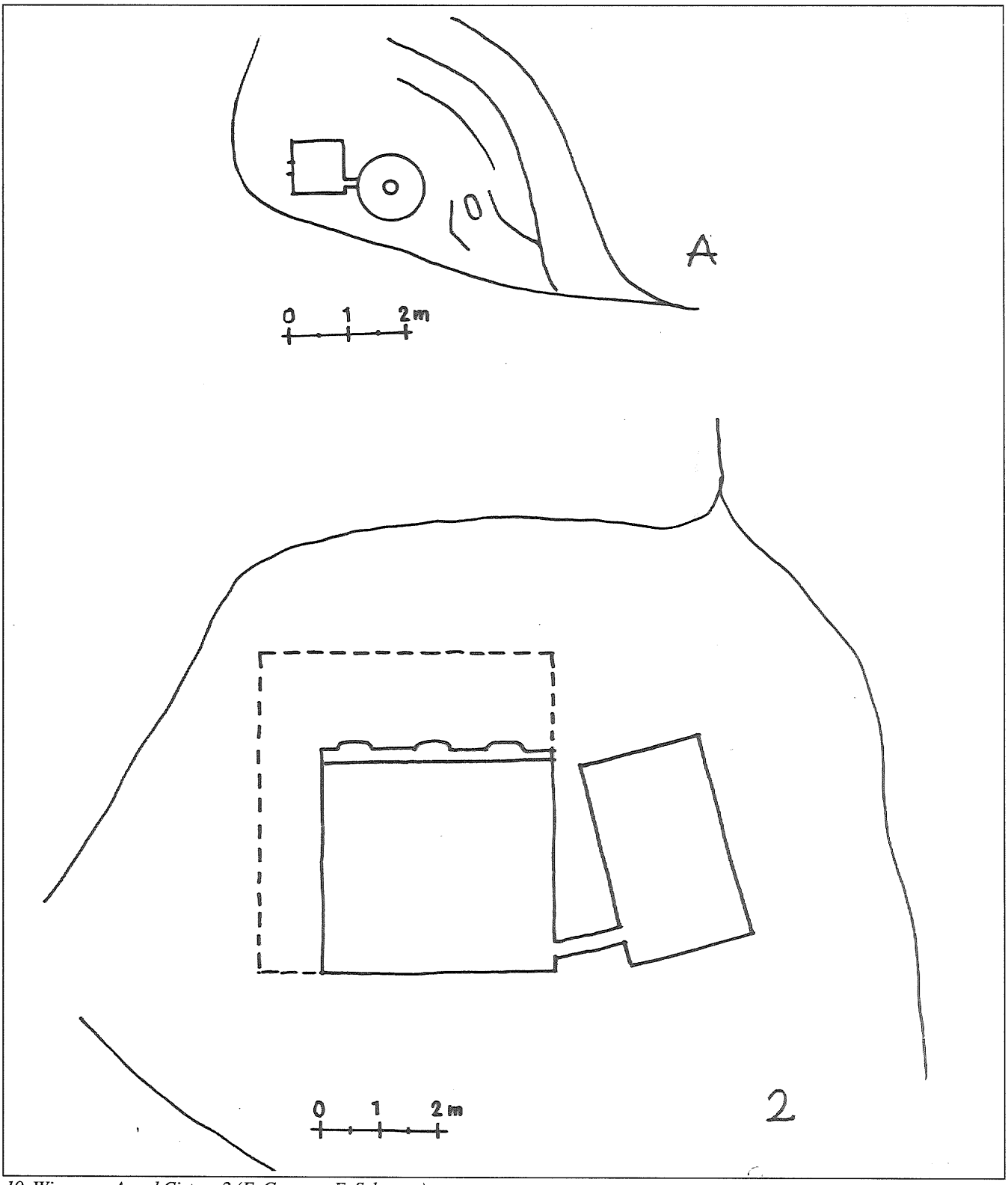
17. Small winepress (D) attached to the large cistern (I).



18. Cistern 2 with three arches. Note grooves for the covering slabs.

of NHG led by an intrepid young Bedouin had literally stumbled into the sanctuary on their (bad) way, and after passing it had detected the front of a huge rock with steps and a worn triclinium on its top.

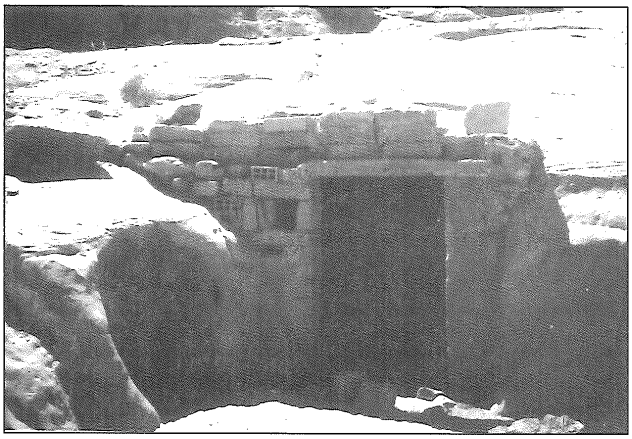
The niche of the Shammāsa sanctuary of



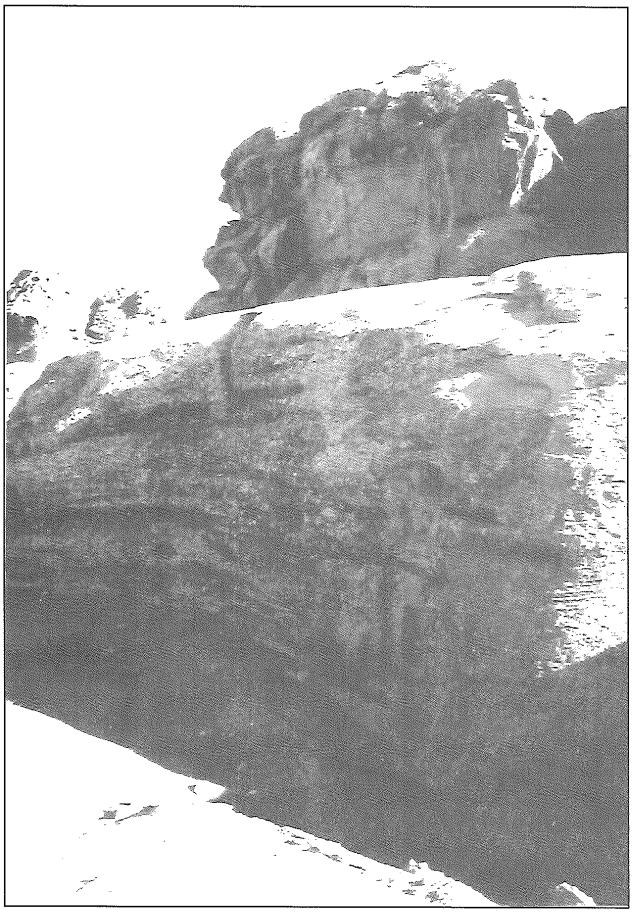
19. Winepress A and Cistern 2 (E. Gunsam, E. Schreyer).

1.03x1.20m in the finely worked rockwall is, together with a rock-cut basin to its right, the center of a smoothed rockwall of 1.75x3.23m. The betyl could have measured 0.45x0.75m but was probably smaller (**Figs. 23, 24**). Following the superstition that treasures are buried by *nefesh* and niches, some treasure hunter might have half-heartedly and unsuccessfully tried to excavate in front of the niche, unless it was an archaeologist who tried to measure the exact height of the sanctuary.

What the sanctuary actually meant, at different times, for the people of Shammāsa can only be

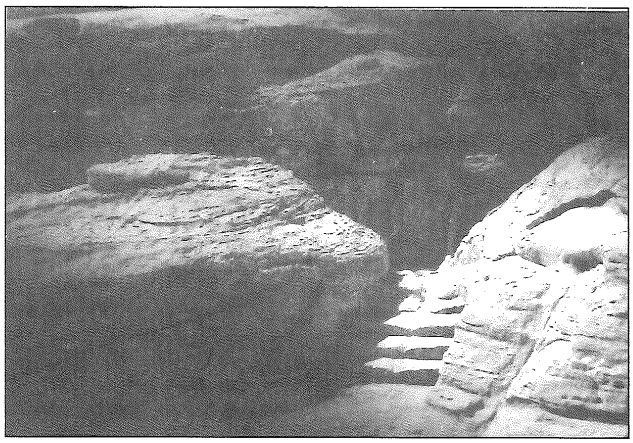


20. "Cow shed" with newly developed entrance and large basin.



21. "Dushara" sanctuary of Shammāsa.

conjectured. Located at a pathway it may have been a station in a cultic passage. With quarries nearby and on the way to additional quarries, it may have had more meaning for the stone masons and stonecutters than for settled people. On the other hand it was perhaps a place for regular "Services" or for seasonal offerings. It has also to be thought of that it was perhaps the sanctuary for/of a



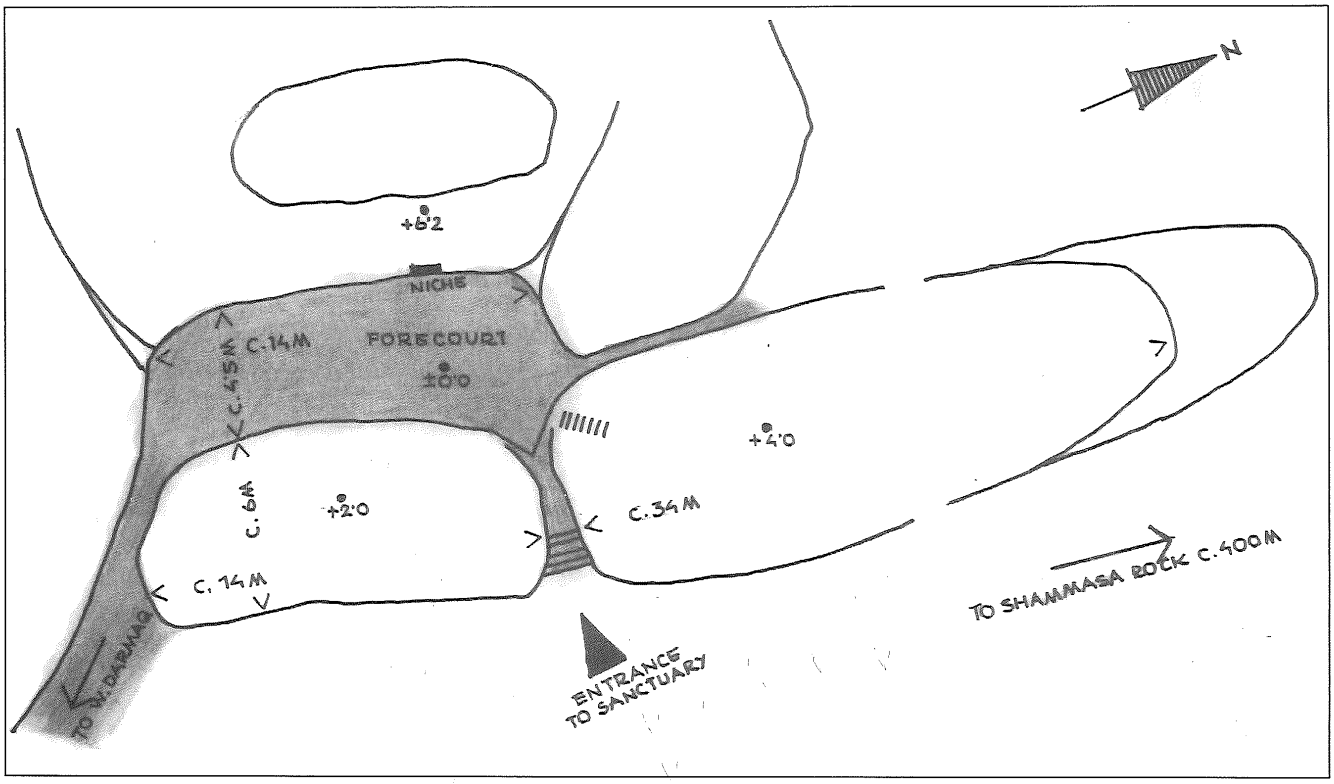
22. Entrance to the sanctuary.

family or clan living outside Petra proper, and being visited at certain times (Knauf 1998: 93; Lindner 1990/91: 145-155; Wenning 1997; Dalman 1908: 62). In an adequate illumination, a cross becomes visible where the betyl used to be. Either the cross was only to "depaganize" the heathen idol or it allowed a use for Christian services.[2]

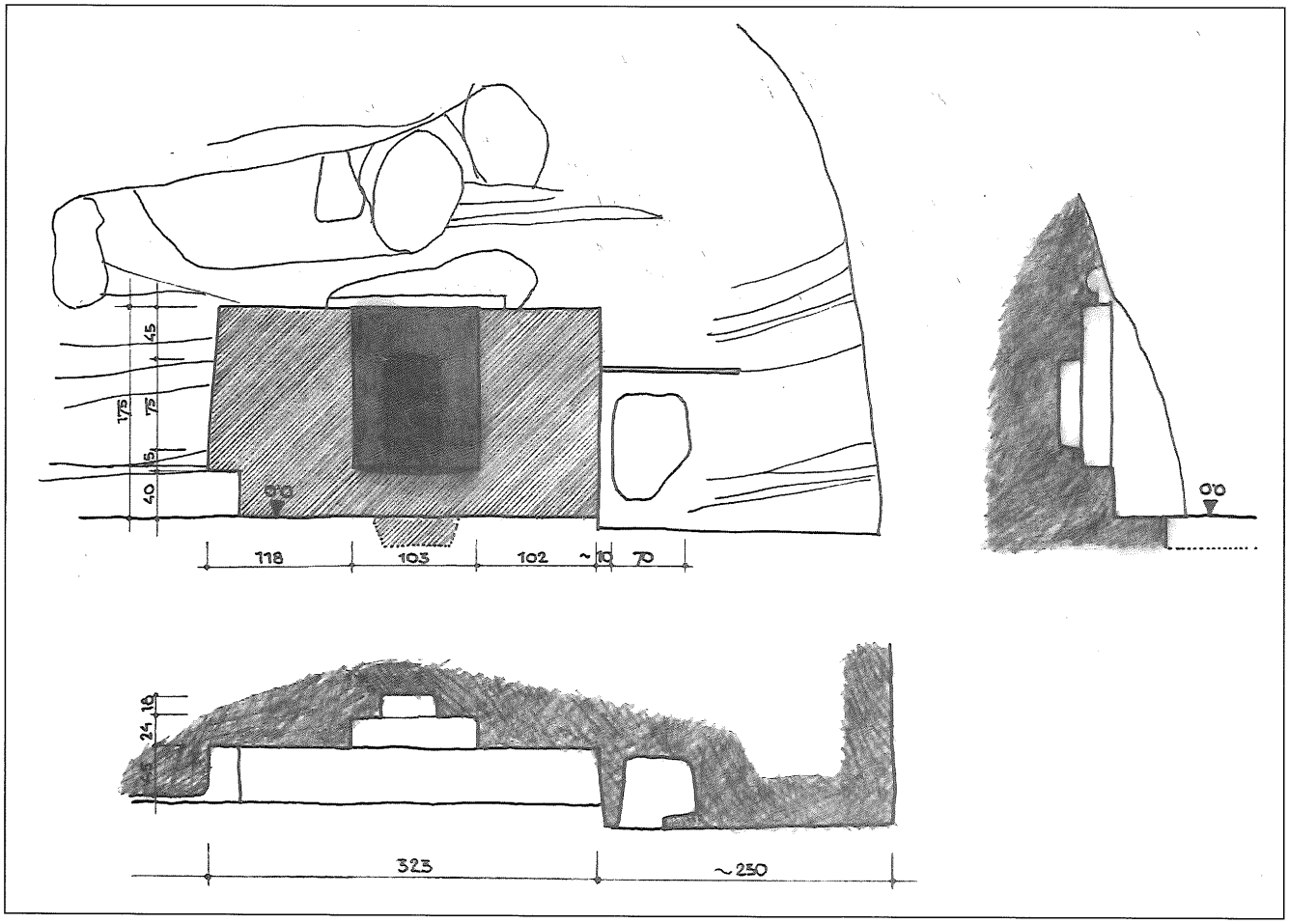
Quarries at Shammāsa

Other ancient activities left conspicuous traces in the surrounding mountains to the southeast of the Rock. At different elevations and in three different ways, i.e. in steps, from walls and in slabs from the ground, mostly whitish-yellowish Ordovician sandstone was quarried in antiquity. Four step-shaped working places in the Disi formation are all that is left of Quarry I. After an ascent of 200m at the second quarry (II), the beginning of the Cambrian sandstone is marked by a worked rock-wall of ca. 10m height. The herring-bone pattern shows how always a single worker alternated his strokes with the double-ended pickaxe. As noted similarly before at the road from Umm Ṣayḥūn (أم صيحون) to Mughur an-Naṣārā (مغر النصارى) in Petra, the stone at Shammāsa was taken in steps of 0.45-0.75m height and 1.50m width (**Fig. 25**). Further on toward Wādī Darmaq, the biggest of the Shammāsa quarries (III) can be climbed. There, Disi sandstone was quarried in large slabs from the ground. With grooves separating them, they were prepared for being splitted by water-soaked wedges (**Fig. 26**). Beside them, others were apparently quarried in smaller sizes. There, they look like steps for the workers or like a stone not yet taken away. Similar to other quarries, e.g. by the road from Umm Ṣayḥūn to the north, the unfinished quarries might give the impression of High Places,

2. About inscribed crosses at Nabataean sanctuaries see Lindner (1976: 99) and "Von Isis zu Aaron" (in preparation). For R. Wenning, it can only be supposed that the sanctuary was dedicated to Dushara (pers. comm.).



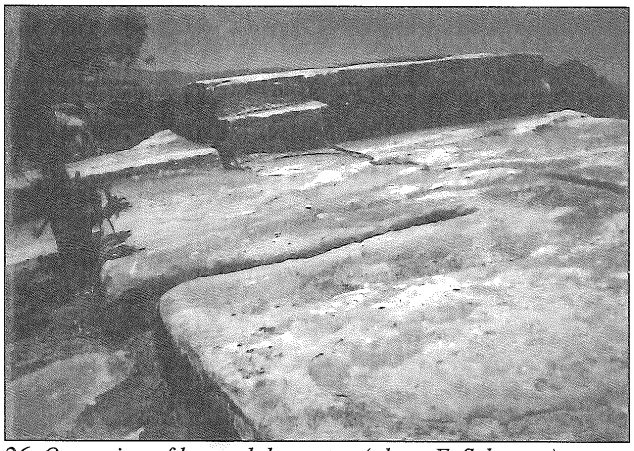
23. Ground plan of the sanctuary (E. Gunsam).



24. Overall view of the sanctuary (E. Gunsam).



25. *Detail of the Shammāsa quarries (photo U. Hübner). Note three different ways of producing ashlars.*



26. *Quarrying of large slabs on top (photo E. Schreyer).*

yet that was never proved.[3]

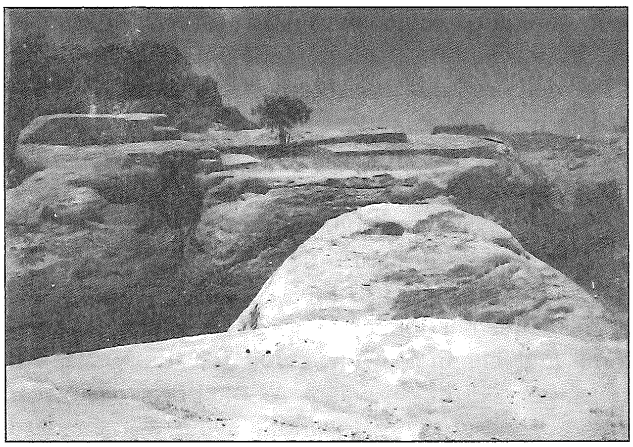
However, around a rocky knoll in Quarry III, rock-cut steps are running spirally to the top where no quarrying was possible. A warder or guard might have used the place on top as well as a praying stonemason (**Fig. 27**). The cross on another worked boulder is no cultic sign. For some unknown reason, it was prepared for the water-soaked wedges, but never splitted (**Fig. 28**). Where the stone material had been taken in 11 steps, sherds of a thin, painted bowl (first century AD) were found. Similar unexpected fine ware was seen before in the quarries of Ṣabrā (صبرا) (Lindner 1992: 196, fig. 3). A column fragment, found nearby by U. Hübner seems to indicate that architectural pieces were worked on the spot. The sheer side of an abandoned quarry (IV), 200m to the southwest of the rock on the way to Umm Saysabān (أم سيسبان) symbolizes a deity, this time as a "horned" stylized altar of 0.43x0.45m incised at ca. 3.20m above ground (Dalman 1908: 56, 83) (**Figs. 29, 30**). A show of reverence or of an expiatory dedication may be seen in the petroglyph (pers. comm. R. Wenning). After all, tons of stones had been removed from the substantial outcrop. What was definitely not found at Shammāsa were inscriptions and burials. Apparently the place was not worthy enough to write on its rock walls that this or that man had been here and wanted to recommend himself to a deity. The lack of burials may be explained by the nearness of Petra where it was customary to be interred. A layer of almost purely white stone was recently exploited by two enterprising Bedouins.

Pottery

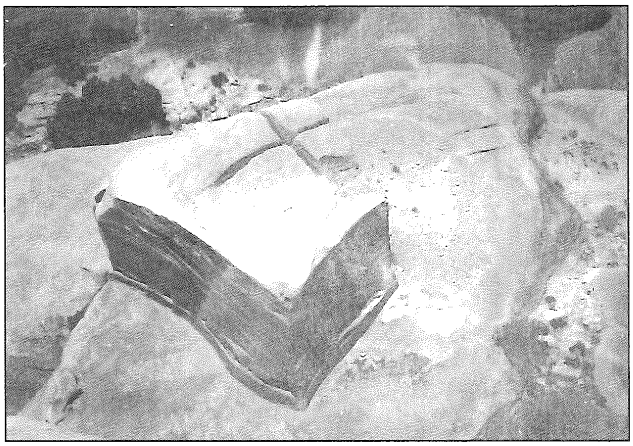
The collected surface pottery from the area of the Rock:

- From the top of the Rock: 5 Nabataean-Roman sherds with the fragments of a fine base and one (1) thin piece of a bowl or platter with an eye design (first/second century AD).
- From the top of the Rock: 55 body sherds from

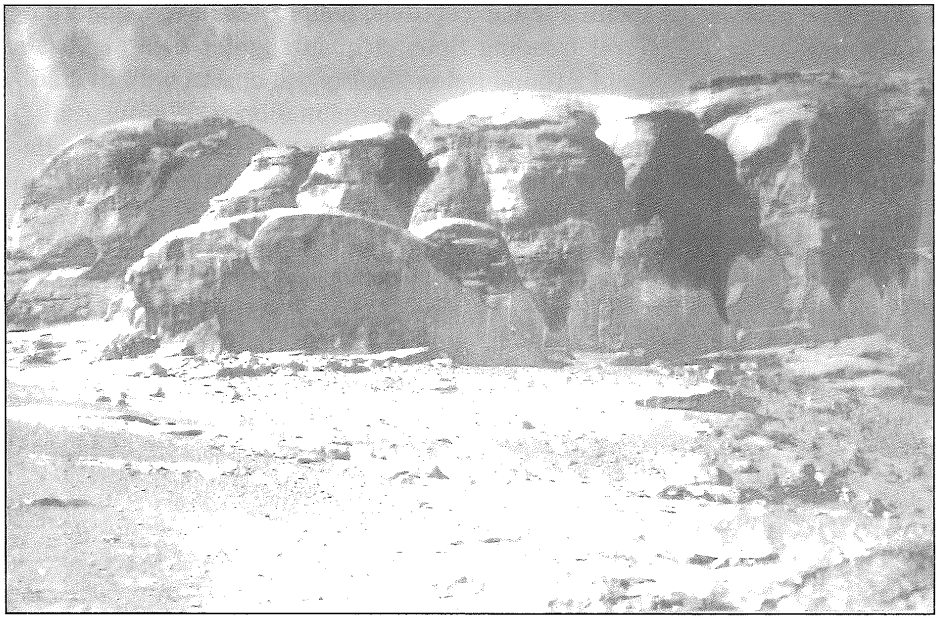
3. Nothing much seems to have been published on the technique used in the sandstone quarries of Southern Jordan. A few comparisons can be made with the Ṣabrā quarries (Lindner 1992: 196)."Informations on the used technology from scholars are very sparse", admits the hand-book *Paulys Realencyklopädie der Altertumswissenschaft.* Stuttgart 1929 (Spalte 2288). Shortly before finishing this article, a paper from Abdel Sami Abu Dayyah (2001) came to my attention. Unfortunately the author deals only with limestone quarries, omitting thereby the subtleness of sandstone work as e.g. at Ṣabrā and Shammāsa. Muhammad Murshed Khadija, former Inspector of the Petra region, has been working on the sandstone quarries of the Petra region, however his thesis has not been published yet (pers. comm.). See also Shaer and Aslan 1997: 219-229.



27. Rock-cut steps spiraling to the top of a rounded hill (photo E. Schreyer).



28. Grooves waiting to be spliced by water-soaked wedges (photo E. Schreyer).

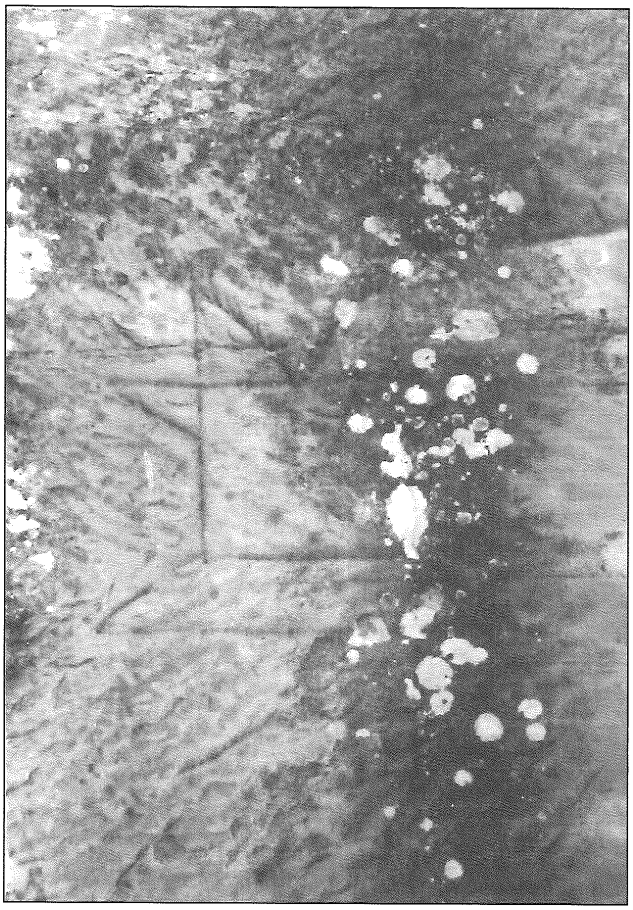


29. Sheer wall of an abandoned quarry. Herring bone patterned finish where a stylized altar was incised.

wheel-turned large storage jars, some of them almost flat, one with wave decoration, clay deep-red, generally ca. 1.5cm thick, extremely homogenous and hard, with grey slip on a few of them. 16 body sherds, probably of one (1) water jug with handle, wheel-turned, rills interior and exterior, one piece with an incised notch.

- From the top of the Rock :11 Late Islamic body sherds, coarse, hand-made, with one ledge handle and a base fragment. 1 piece of modern tile or pipe.
- At the foot of the Rock, among ruined houses and ashlars tumbled from the Rock: 1 very thin bowl fragment, 7 deep-red body sherds of the same kind as collected on the top, and 1 Late Islamic body sherd.
- Where the rocky slope behind and to the southeast of the Shammāsa rock reaches its summit, the foundation of a house or of two houses revealed 7 body sherds of Late Roman type and 5 Late Islamic sherds.
- Where someone had illegally excavated in front of the "Dushara" sanctuary, in the excavated rubble, a few painted sherds (first century AD) and a couple of Byzantine body sherds of a large vessel were found.
- During the inspection of the quarry to the southwest of the Rock: 5 thin sherds of bowls (1 base, 2 painted first/second century AD) were found. They remind the authors of similar fine Nabataean ware from the ground of quarries at Ṣabrā (Lindner 1992: 196).

The generally meagre yield of surface pottery at Shammāsa attests to a first occupation or use in the first/second century AD. The dating is confirmed by the "Dushara" sanctuary, and by the altar engraved in the abandoned quarry to the southwest of the Rock. The Late Roman-Byzantine period is represented by fragments of a water jug and of large

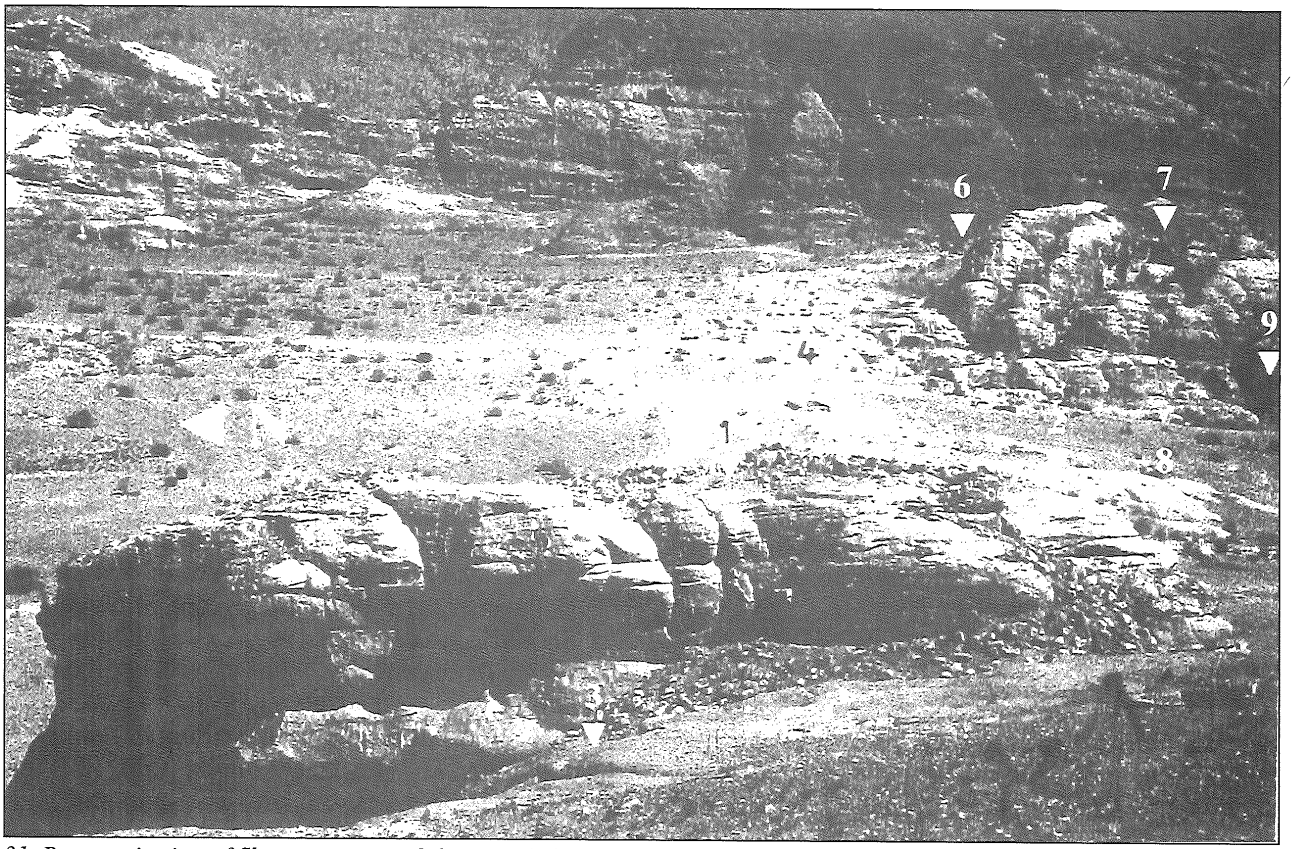


30. *The incised altar.*

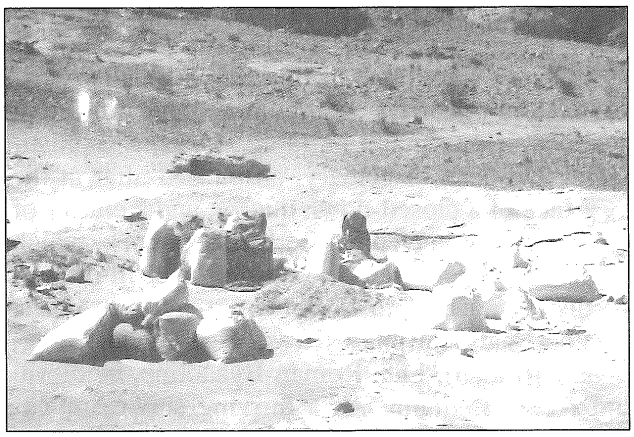
storage and/or water jars on top of and at the foot of the Rock. From the Late Islamic period (11th/ 12th century and later) are the fragments of a coarse hand-made pottery.

Shammāsa: Past and Present

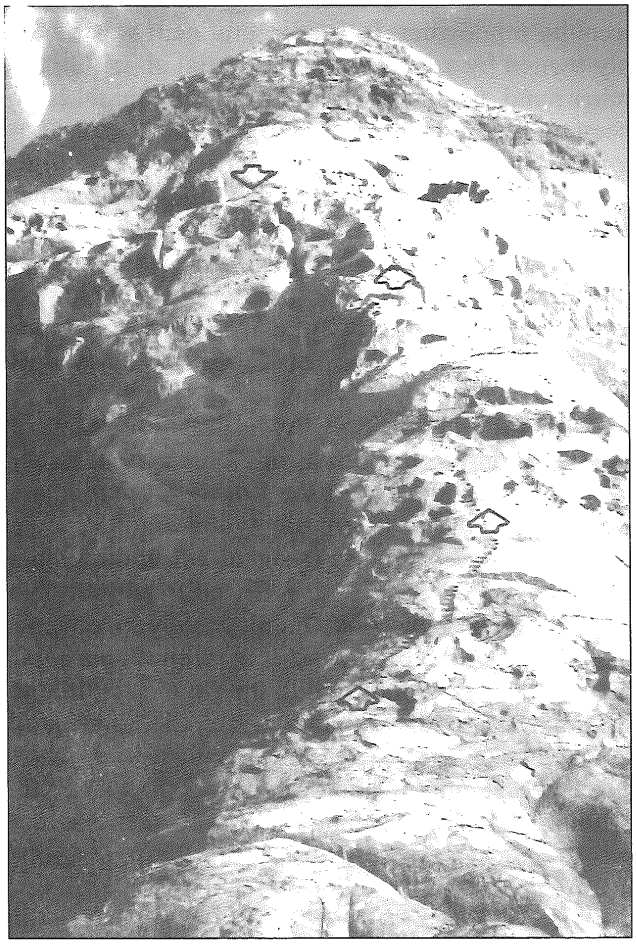
Shammāsa as a thriving suburb of ancient Petra was, at least at certain times, inhabited by settlers from the Nabataean to the Byzantine period, perhaps somewhat longer (**Fig. 31**). As long as cisterns and channels were cared for, there was no shortage of drinking water. As the presses show, it was a wine-growing location, using the standard techniques and procedures of the Nabataean-Roman-Byzantine viticulture around Petra. There, with a few exceptions, the presses have a quadrilateral treading-floor, a quadrangular clearing basin and a round pylon shaft or vat coated with hydraulic mortar. Warm fermentation ("Warmgärung") was possible in the sun-heated Ordovician installations. "In the Middle East heat" (but comparable to conditions around Petra), " juice slowly pressed from grapes would have begun to ferment before the jar was filled" (McGovern 1996: 30). Supposedly, the lower temperature during the night stopped the fermentation (Irmscher and Johns 1971/77: 609/10; Forbes 1956: 135).



31. *Panoramic view of Shammāsa toward the east: 1. fortified rock; 2. ruins of houses; 3. supposed wine press; 4. large wine press; 5. cistern-wine press; 6. three-arches cistern; 7. quarries; 8. new reservoir; 9. "Dushara" niche Rās Darmaq.*



32. Remaining crop and chaff were filled in sacks after threshing (photo K. Hofmann).



33. Steps leading to a look-out at the road to Shammāsa (1992).

No sherds of vessels usable for storing wine were found around any of the presses. For carrying wine away, skins may have been used; but experts state that skins "do the wine no good". It is said the islanders in the Levant pour it into leathern budgets and from there in caskets or earthen jars (Seltman 1957: 77). As soon as the wine was drinkable and before it turned into vinegar, it may partly have been consumed during communal, cultic or profane, drinking sprees.[4] The area to the east of the Rock, partially submerged now by sand, though virtually extending almost on a watershed level, is now mostly fissured by uncontrolled floods. Using local run-off water there might have been corn fields, vineyards, olive and fruit gardens in antiquity. Areas to the east, north and west are being tilled even now. In June 2001 threshing machines were seen working after the corn had been manually taken in bushels and cut with sickles. Crop and remaining chaff were carried away in sacks (**Fig. 32**). Areas with a meager yield were fed to horses and donkeys tethered to stakes. Taking into account the numerous remnants of expert water management in the Petra region, it has to be surmised that much more land was tilled and harvested in antiquity than today.

Where a dirt road turns away from the ancient and new road between Wādī Mūsā (وادي موسى) and Namala (نملة) toward Shammāsa, a steep conical rock is equipped with a steep flight of more than a hundred steps. On the summit, a large and deep depression shelters a number of *'ar'ar* (juniper) trees and a lookout (**Fig. 33**). A few unidentified ceramic sherds were found there by two fearless NHG surveyors who suggested the steps might have also conducted water to an (undetected) cistern at the foot of the rock. Such lookout control added to the protection through the fortified Rock was putatively necessary from the Late Roman time to the Islamic periods. In fact, raids and lootings by nomadic tribes, as stressed again lately by Parker (2000: 383), constantly threatened the settlers since the Iron Age.

In view of the great significance attributed to the Crusader works around Petra by Vanini and Desideri (1995), Crusader presence might also be revealed at Shammāsa. Specifically, it is reported that Queen Melisandis enfeoffed the Viscount of Nablus with al-Wu'ayra and the surrounding country in 1150 (Mayer 1990: 189/90). The identification of an-Naq'a II (النقعة) as another Crusader installation (Hormuz), far away from the generally accepted Crusader forts at al-Ḥabīs الحبيس, al-Wu'ayra الوعيرة and possibly Zibb'Aṭūf عمود عطوف (?) (Lindner 1999), was a special incentive. However, nothing tangible was found at Shammāsa.

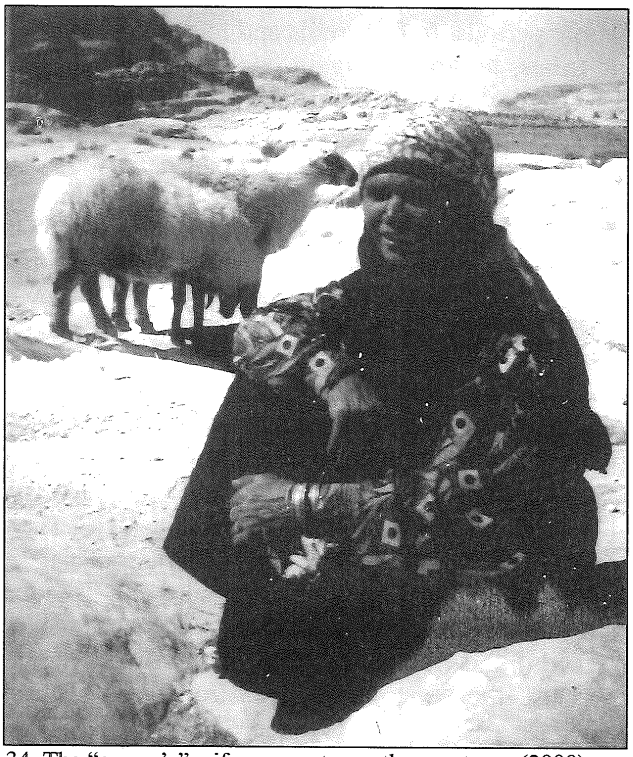
The people of today are probably of Bedouin stock. They are living in the 'Ammārīn عمارين (Bayḍā) and Bdūl بدول (Umm Ṣayḥūn) "housings", and use the winepresses occasionally as cisterns,

4. Forbes (1956: 137) suggests the possibility that "every Christian parish tried to produce its ritual wine", a view very much in contrast with the idea of "drinking sprees".

when they are filled during the winter. The cave in the Rock and the "cow shed" are right now being developed for storing and shelter as they were similarly used by settlers in antiquity. The large cistern-winepress shows development by using modern artificial ashlars. The fields are sown with wheat or barley; the crops, however, are totally dependent on winter rainfall. Between Shammāsa and Umm Saysabān, an olive garden was installed a few years ago. A man who lives in the Bdūl Housing at Umm Ṣayḥūn and drives a four-wheel Toyota, has a newly made reservoir to the southeast of the Rock at the site of an ancient cistern filled from a tank in order to water a herd of sheep which are fed from fodder sacks. As in most cases of Bdūl "property" the ownership is not entirely clear. The "owner's" wife was met near the "Dushara" niche, sitting under a wind-blown tent ("the children are at school") with a few goats, two sheep, four hens, a cock and two puppy-dogs. She changed her dress before offering freshly made tea (**Fig. 34**).

Summary and Conclusions

The area called Shammāsa by the local people is a site less than three kilometres distant from and to the NNW of central Petra. It was explored by teams of the Naturhistorische Gesellschaft (NHG) Nürnberg (Germany) in 1999, 2000 and 2001. Its eccentrically located center is a fortified Ordovician range of ca. 40x15m thrusting out of a plain ringed by Cambrian sandstone mountains. The particularities of Shammāsa are, beside the fortified Rock, a large arable and even now partly cultivated extent of good land, four winepresses, two cisterns, four quarries combining three different methods of producing building stones, a sophisticated "Dushara" sanctuary, an incised altar at the rock face of a closed-down quarry, and a cluster of house ruins protected by the fortified Rock, which might have been used as a castle tower in periods of distress. Through architecture and ceramics, four occupational phases were ascertained: Nabataean (-Roman), Late Roman-Byzantine, medieval and recent Bedouin. As a thriving suburb of ancient Petra, Shammāsa was in antiquity a composite apt to meet, with different strategies, the exigencies of a large freeholding family or of a wealthy landowner. In later centuries it was possibly owned by a member of the curial class. On the other hand, the economy of Shammāsa might have been diversified with the returns of the quarries belonging to one owner and the agricultural yield to another. The standard procedures of Petraean wine-making were also observed at Shammāsa. As generally no sherds of vessels for storing wine are being found by the Petraean presses, it is suggested that wine was additionally consumed during communal, profane or cultic drinking sprees as soon as it was drinkable.



34. The "owner's" wife was met near the sanctuary (2000).

Obviously, protection by fortification was not necessary during the floruit of Nabataea but rather toward or after the end of the Roman-Byzantine era when nomadic tribes increasingly harassed the sown land. There was nothing seen at Shammāsa that could be traced back to the Crusader period. The present populace have been settled lately by governmental order, and they stay in their "housings" most of the year, preferring to their previous life the beatitudes of roads, running water, electricity and the advantage to own the land. With its variety of subsites Shammāsa should be regarded as an interesting archaeological composite to be seen and assessed as a whole, notwithstanding the probability that parts of it were previously reported on.

M. Lindner
Naturhistorische Gesellschaft (NHG)
Nürnberg - Germany

E. Gunsam
Salzburg - Austria

Bibliography

Abu Dayyah, A.S.
2001 Selected Roman Stone Quarries in Central Jordan: A Cultural Resource. Pp. 521-530 in *SHAJ* 7. Amman.

'Amr, K., al-Momani, A., Al-Nawafleh, N. and Al-Nawafleh, S.
2000 Summary Results of the Archaeological Project at Khirbat an-Nawafla/Wadi Musa. *ADAJ* 44: 231-255.
Bignasea, A. *et al.*
1996 *Petra. Ez-Zantur I. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen 1988-1992*. Mainz.
Dalman, G.
1908 *Petra und seine Felsheiligtümer*. Leipzig.
Forbes, R.J.
1956 Food and Drink. In C. Singer *et al., A History of Technology*. Vol. II. Oxford.
Hübner, U., Knauf, E.A. and Wenning, R. (eds.)
1998 *Nach Petra und ins Königreich der Nabatäer. Notizen von Reisegefährten. Für Manfred Lindner zum 80.* Geburtstag. Bonner Biblische Beiträge Bd. 118 (PHILO). Bodenheim: Philo Verlagsgesellschaft.
Irmscher, J. and Johns, R. (eds.)
1971/77 *Lexikon der Antike*. Wiesbaden.
Knauf, E.A.
1998 Götter nach Petra tragen. Pp. 93-101 in Hübner, Knauf and Wenning (eds.) 1998.
Lindner, M.
1990/91 Ein nabatäisches Heiligtum oberhalb der Nischenklamm (Sidd el-Ma'agin) von Petra (Jordanien). *ZDPV* 106: 145-155.
1992 Survey of Sabra (Jordan) 1990. Preliminary Report. *ADAJ* 26: 193-216.
1999 Late Islamic Villages in the Greater Petra Region and Medieval "Hormuz". *ADAJ* 43: 479-500.
Mayer, E.
1990 *Die Kreuzfahrerherrschaft Montred (Sôbak). Jordanien im 12. Jahrhundert*. Abhandlungen des Deutschen Palästinavereins. Bd 14. Wiesbaden.
McGovern, P.E.
1996 Vin Extraordinaire. Archaeochemists sniff out the oldest wine in the world. *The Sciences* Nov./Dec.
Parker, S.T.
2000 The Defense of Palestine and Transjordan from Diocletian to Heraclius. In: *The Archaeology of Jordan and Beyond. Essays in Honor of James A. Sauer*. Winona Lake, Indiana.
Seltman, Ch.
1957 *Wine in the Ancient World*. London.
Shaer, M. and Aslan, Z.
1997 Architectural Investigation on the Building Techniques of the Nabataeans with Reference to Tomb 824. *ADAJ* 41: 219-229.
Vanini, G. and Desideri, A.V.
1995 Archaeological Research on Medieval Petra: A Preliminary Report. *ADAJ* 39: 509-540.
Wenning, R.
1997 Bemerkungen zu Gesellschaft und Religion der Nabatäer. Pp. 177-201 in R. Albertz (ed.), *Religion und Gesellschaft* AOAT 248. Neukirchen.

LA CHAPELLE D'OBODAS À PÉTRA
RAPPORT PRÉLIMINAIRE SUR LA CAMPAGNE 2001

Laïla Nehmé

Une campagne de fouilles d'un mois, en avril-mai 2001, a été menée sur le sanctuaire dit de la Chapelle d'Obodas à Pétra. Cette campagne, réalisée dans le cadre de la mission archéologique intitulée "Occupation de l'espace et chronologie dans le Grand Pétra", dirigée par Christian Augé et financée par le Ministère des Affaires Étrangères français, a bénéficié du soutien logistique du Département des Antiquités de Jordanie et de sa délégation à Pétra[1]. Qu'ils en soient ici remerciés.

Présentation

La Chapelle d'Obodas est le nom donné à un sanctuaire rupestre nabatéen situé dans le massif d'an-Numayr (النمير), à environ 1km au sud du Théâtre et à 1,7km à vol d'oiseau au sud-est du Qaṣr al-Bint (قصرالبنت) (**Fig. 1**). Cette chambre rupestre porte le n° 290 dans le volume 1 du *Provincia Arabia* de Brünnow et Domaszewski. Le nom "Chapelle d'Obodas", Maqām 'Ubādah (مقام عباده) en arabe, est celui qui lui est donné sur la carte touristique de Pétra au 1/5 000, dont la première édition a été publiée en 1988 par le *Royal Jordanian Geographic Center* de 'Ammān. Si on en croit G. Dalman, elle portait au début du XXe siècle le nom de *"Hrābet an-Nmayr"* (Dalman 1908 : 214). On y accède aujourd'hui soit depuis le Wādī an-Numayr (وادي النمير), par un sentier aménagé qui comprend une centaine de marches partiellement taillées dans le rocher (**Fig. 2**), soit depuis le Haut-Lieu du Jabal al-Madhbaḥ (جبل المذبح), en quittant, pour aller vers le sud, le sentier reliant ce dernier au Wādī Farasa (وادي فرسه) au point où il fait un virage à 90° vers la droite, c'est-à-dire vers le nord. La Chapelle d'Obodas se trouve au débouché du sentier provenant du Wādī an-Numayr, à l'extrémité sud d'une terrasse entourée de massifs rocheux (**Figs. 3-4**). Quelques monuments, aménagés le long de ce sentier qui remplit la fonction de voie processionnelle, ont été décrits et photographiés au cours de la campagne 2001 et seront publiés dans le rapport final consacré au sanctuaire d'Obodas.

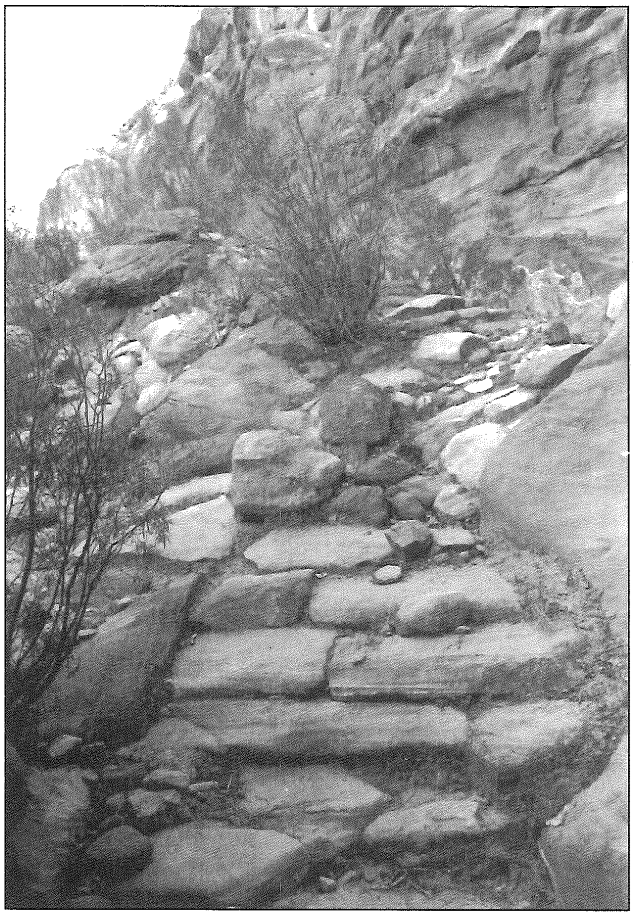
Le site est connu depuis 1862, date à laquelle il a été découvert par le pasteur suisse Jacques Ehni, lors d'un voyage qu'il a fait à Pétra avec un groupe d'Anglais et d'Américains (Ehni 1894 : 114). Depuis, il a été visité par plusieurs archéologues et épigraphistes, parmi lesquels le père Lagrange, Julius Euting ainsi que R.E. Brünnow et A. von Domaszewski au XIXe siècle (Lagrange 1898 : 170-173; Brünnow et Domaszewski 1904-1909 : 283), G. Dalman entre 1904 et 1906 (Dalman 1908 : 213-214), J.T. Milik et l'abbé J. Starcky en 1955 et 1974 (Starcky et Milik 1957; Milik 1959 : 559-560), enfin Robert Wenning dans les années 1990; ce dernier réalisé l'ébauche d'une exploration archéologique, par l'examen des vestiges visibles, de la Chapelle et de ses environs (Wenning 1997).

L'intérêt porté à la Chapelle d'Obodas s'explique par la présence, à l'intérieur, sur un ressaut du plafond formant poutre, de l'une des plus longues et des plus intéressantes inscriptions nabatéennes de Pétra, *CIS* ii 354 (**Fig. 5**). Elle est datée de l'an 29 d'Arétas IV, donc de 20 de l'ère chrétienne, et mentionne la "statue d'Obodas le dieu", *ṣlm' 'bdt 'lh'*. Une étude complète de ce texte, dont la lecture ne pose guère de problèmes mais dont le commentaire appelle de nombreuses remarques, sera présentée dans la publication finale. Cette inscription constitue l'une des rares attestations épigraphiques, à Pétra et en nabatéen, du culte du dieu Obodas en qui il faut, très probablement, voir l'un des trois rois nabatéens du même nom, divinisé après sa mort. Ce dieu, qui possédait un sanctuaire à Oboda/'Abdah dans le Néguev (voir entre autres Negev 1996), est bien connu grâce à des sources grecques, à la fois épigraphiques (Negev 1981 : nos 1d, 1f, 3-6, 13) et littéraires (Ouranios cité par Étienne de Byzance, *s.v.* Oboda). Il est également mentionné dans le *Ad Nationes* de Tertullien (II, 8) où il figure, à côté de Dusarès, en tant que dieu des Arabes. Il est enfin mentionné dans deux (Dalman 1912 : n° 73 = *RÉS* 1423 et Negev 1986) et peut-être trois inscriptions nabatéennes (dans la troisième, *RÉS* 527, il n'est pas certain que *'bdt* soit le *dieu* Obodas). On peut ajouter que l'élément *'bdt*

1. Outre l'auteur, ont participé à la fouille Steve Glisoni (archéologue) et Mehdi Abdelaziz (épigraphiste). Le relevé topographique a été réalisé par Laurent Borel. L'inspecteur des Antiquités était Mohammad Ismaïl Salamin.



1. Carte du secteur d'an-Numayr.



2. Une partie de l'escalier d'accès au sanctuaire d'Obodas depuis le Wādī an-Numayr.

est utilisé en nabatéen dans de nombreux noms composés dont il reste à déterminer s'il s'agit de noms théophores ou basiléophores.

Aucune fouille de la Chapelle et de ses abords n'ayant jamais été entreprise, il a paru judicieux, dans le cadre d'un projet ayant pour thème "Occupation de l'espace et chronologie dans le Grand Pétra", d'entreprendre, parallèlement à la fouille du Qaṣr al-Bint, un grand sanctuaire du centre urbain, l'exploration archéologique d'un sanctuaire rupestre de la périphérie urbaine, moins soumis que le Qaṣr aux influences extérieures et donc peut-être plus "authentiquement nabatéen", si tant est que l'expression ait une signification, ce qui reste à démontrer. L'intérêt pour la Chapelle était d'autant plus grand que 133 graffiti nabatéens, rassemblés en groupes de un à plus de quarante textes, lui sont plus ou moins clairement associés (**Fig. 1**). Ces graffiti sont soit les signatures des membres des confréries religieuses qui fréquentaient le sanctuaire soit celles de fidèles isolés.

Description de la Chapelle (Fig. 6)

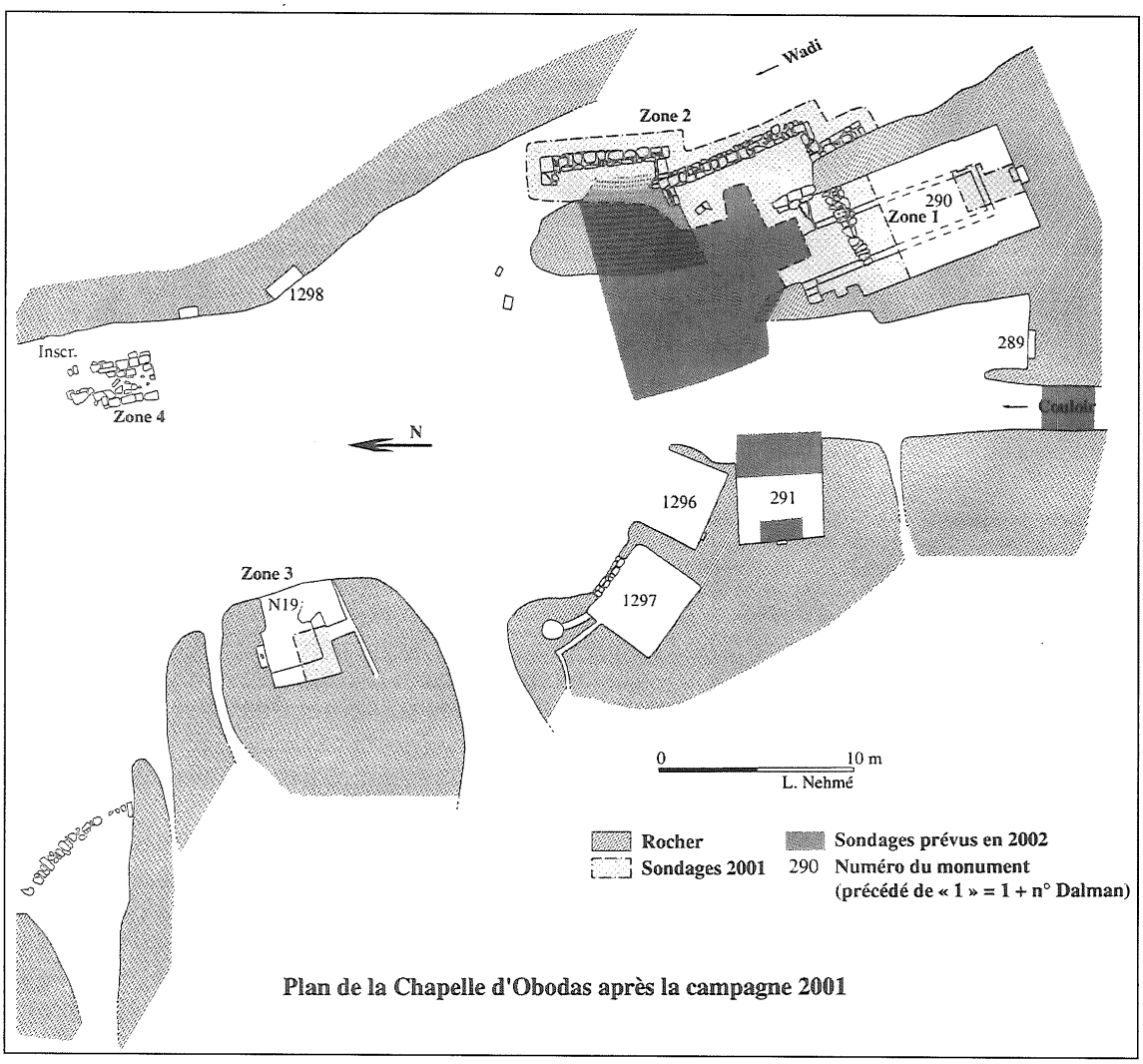
La Chapelle d'Obodas est une chambre rupestre de 6m de large, 12,50m de profondeur et de plus de 4m de haut (l'auteur a oublié en 2001 de mesurer la hauteur exacte de la pièce !). Ses parois intérieures étaient à l'origine assez soigneusement brochées, comme on peut encore le constater dans la partie postérieure de la paroi de gauche, tandis que le plafond a été laissé brut de taille par les maçons. Les quelques blocs épars visibles sur le sol avant fouille sont peut-être ceux que le pasteur Ehni avait empilés en 1862 afin de se rapprocher de l'inscription pour la copier (Ehni *in* de Vogüé 1897 : 200). La chambre est largement ouverte (pas de porte) et le rocher au-dessus de l'ouverture a été partiellement taillé de manière à obtenir une paroi verticale (**Fig. 7**), selon un dispositif très similaire à celui que l'on peut observer ailleurs à Pétra, par exemple autour de la chambre Brünnow n° 250 dans le Wādī Farasa ouest. On peut dès lors suggérer que l'installation comportait un étage, partiellement rupestre (paroi du fond) et partiellement construit en maçonnerie d'appareil (parois latérales et sol). On peut d'ailleurs noter que des éléments de dalles de couverture ont été retrouvés dans les couches de destruction du sondage réalisé devant la Chapelle.

La partie postérieure de la chambre, sur 2,30m de long, est légèrement moins haute et moins large que la partie antérieure. Le décrochement, qui mesure 75cm de haut sous le plafond, et qui résulte de cette différence, forme un ressaut sur la face antérieure duquel, à égale distance des murs, est gravée la grande inscription nabatéenne *CIS* ii 354.

Une rangée de cinq, ou peut-être six groupes de trois trous disposés en triangle[2], occupe la partie supérieure de la paroi du fond (**Fig. 6**). Ces trous servaient sans doute à accrocher des éléments de décor, selon un schéma attesté dans de nombreuses chambres rupestres de Pétra (Brünnow n°'s 40, 291, 465, 633, 717, etc.). Le milieu de la paroi du fond contient une niche d'environ 0,90m x 1,86m et 0,42m de profondeur dans sa partie basse, creusée à 1,30m au-dessus de la banquette (**Figs. 8-9**). Un trou en forme de cône tronqué, de 0,70 x 0,89m et de 0,14m de profondeur[3], est creusé approximativement à mi-hauteur de la niche tandis qu'on distingue, dans sa partie supérieure et sur le même plan (pas en creux), une trace de forme patatoïde de couleur plus foncée. Une rainure horizontale, de

2. Le sixième se serait trouvé à la place du trou causé par l'érosion dans l'angle postérieur gauche de la pièce. La symétrie (trois trous de part et d'autre de la niche) plaide en faveur d'une hypothèse à six groupes.

3. Les dimensions donnés dans ce paragraphe sont plus récentes et remplacent celles qui sont données dans la chronique archéologique du *AJA* 2002.



3. Plan de la terrasse d'Obodas.

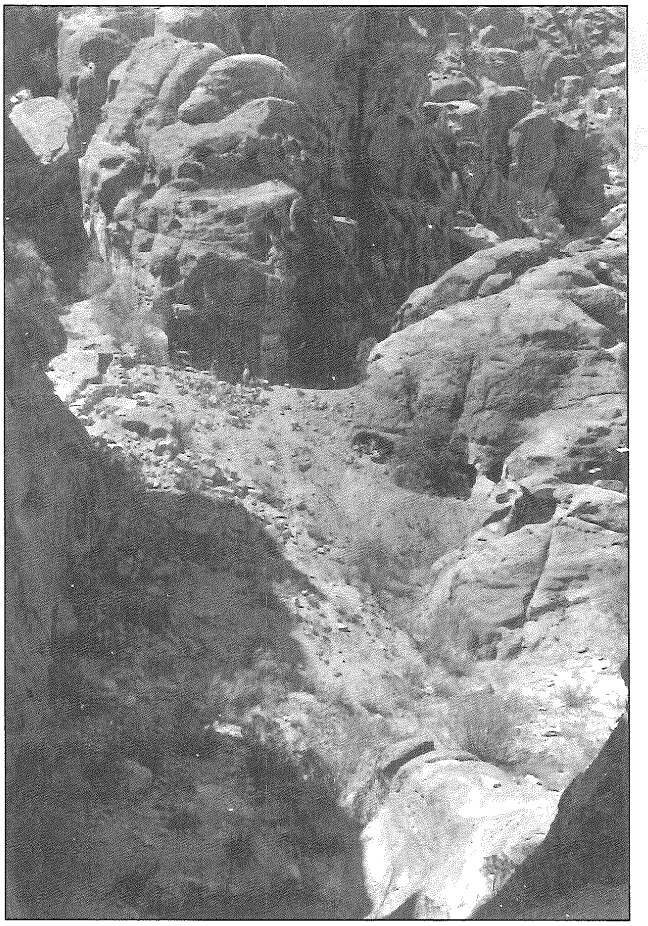
1,40m de large et environ 0,18m de haut, est aménagée au-dessus de la niche. Deux petits trous sont par ailleurs creusés au-dessus de la rainure, à égale distance de chacune de ses extrémités. Le trou de gauche contient encore les restes d'un élément métallique, crochet ou clou.

Campagne 2001, la zone 1

Les travaux sur le terrain se sont déroulés du 24 avril au 20 mai 2001. Deux sondages ont été réalisés à l'intérieur de la Chapelle (zone 1, **Fig. 3**). Le premier a été ouvert à 7m du fond de la pièce et occupe toute la largeur de celle-ci sur une longueur de 4 à 5m. Le second, de 1,5 à 2,20m de large et de 3m de long (il a été élargi vers le nord afin de permettre le dégagement de l'angle sud-est de la banquette), a été ouvert au pied de la niche qui occupe le milieu de la paroi du fond. Les deux sondages ont été descendus jusqu'au rocher, à environ 1,55m en dessous du sol actuel vers le fond et à 1,73m du sol actuel dans la partie antérieure de la chambre.

Le premier sondage est stratigraphiquement pauvre. À une épaisse couche de sédiments submodernes dus à l'utilisation de la pièce par les bédouins et leurs troupeaux (cendre et déjections animales) succède une épaisse couche d'abandon ponctuée d'occupations limitées à des poches cendreuses difficiles à dater car elles ne contiennent quasiment pas de matériel céramique. La fouille a rapidement révélé la présence, le long des parois latérales de la chambre rupestre, de banquettes à rebord directement taillées dans le rocher. À l'extrémité de la banquette droite, côté nord, un escalier à quatre gradins permet d'accéder aux banquettes depuis le sol de la pièce, 0,80m plus bas.

Le second sondage est encore plus pauvre. Il est composé d'une épaisse couche de sable et de cendre mêlés, surmontée d'une croûte formée de déjections animales desséchées, le tout dégageant une poussière difficile à supporter dans cette partie peu aérée du chantier. Il a révélé la présence d'une troisième banquette, taillée dans le rocher le long de la paroi du fond, elle aussi précédée d'un rebord. La



4. La terrasse d'Obodas depuis le nord.

présence, au milieu et solidaire de la banquette, d'un dispositif pouvant ressembler à un piédestal, de forme irrégulière et légèrement décalé par rapport à la niche de la paroi du fond, intrigue et sa fonction reste indéterminée (visible sur la **Fig. 8**).

Au pied de la banquette, donc devant la niche, face contre terre, a été retrouvée la tête d'une statue en grès, endommagée dans sa partie inférieure (**Fig. 10**). Un buste, découvert peu de temps après par les ouvriers dans les déblais devant la Chapelle, pourrait appartenir à la même statue (**Fig. 11**) mais l'existence d'un hiatus entre la tête et le buste rend le rapprochement des deux éléments incertain. Les dimensions de la tête (36,5cm de large et 27cm de haut) et du buste (largeur conservée 60cm, restituée de 67 à 70cm, hauteur 40cm et épaisseur maximum 27cm), sont tout à fait compatibles avec celles de la niche. Tout laisse à penser que nous avons affaire, au moins pour la tête, à la statue du dieu Obodas mentionnée dans la dédicace de la Chapelle, qui aurait été placée dans la niche. Il s'agit de la première représentation figurée d'Obodas et je transcris ici les remarques aimablement transmises par Jacqueline Dentzer après examen des photographies[4] : il s'agirait d'un homme imberbe à chevelure bouclée mi-longue, donc une figure de "dieu-jeune". Les traits du visage sont très abrasés et, hormis les yeux en amande, on n'en distingue pas bien les traits. La présence de deux trous

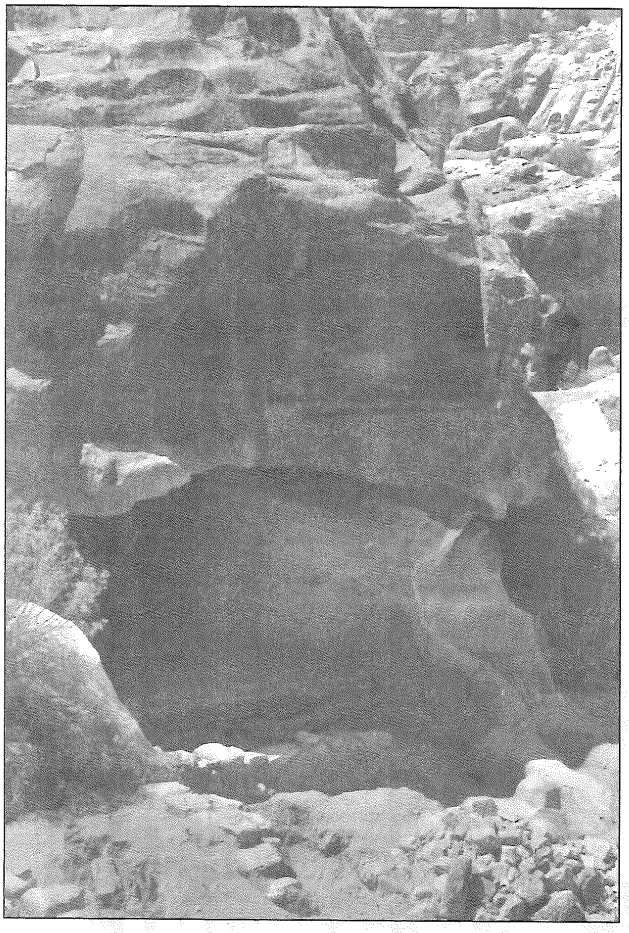


5. Inscription nabatéenne CIS ii 354.

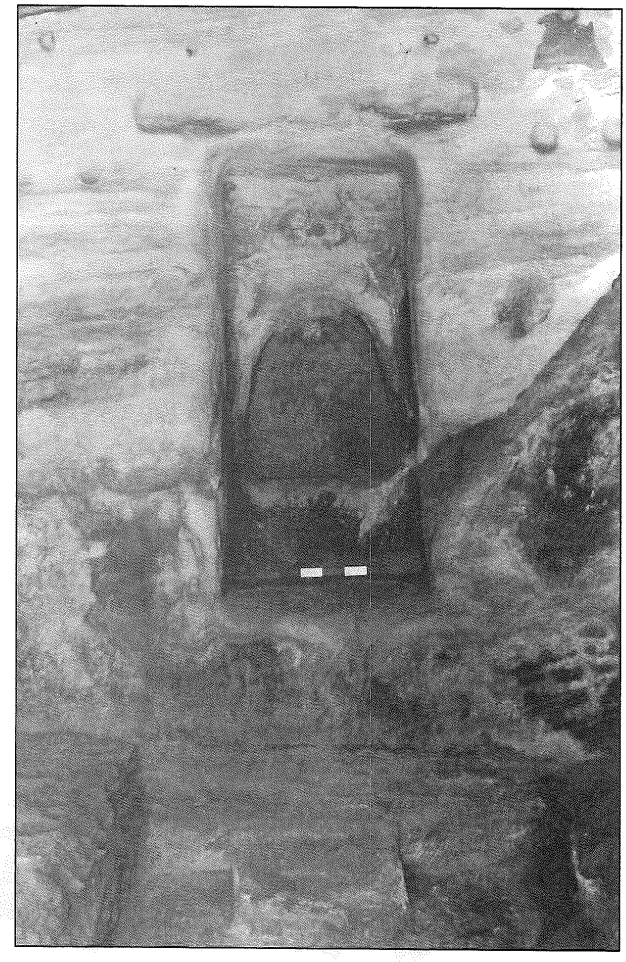
4. Dans une note écrite à l'auteur en novembre 2001.



6. La Chapelle d'Obodas avant fouille.

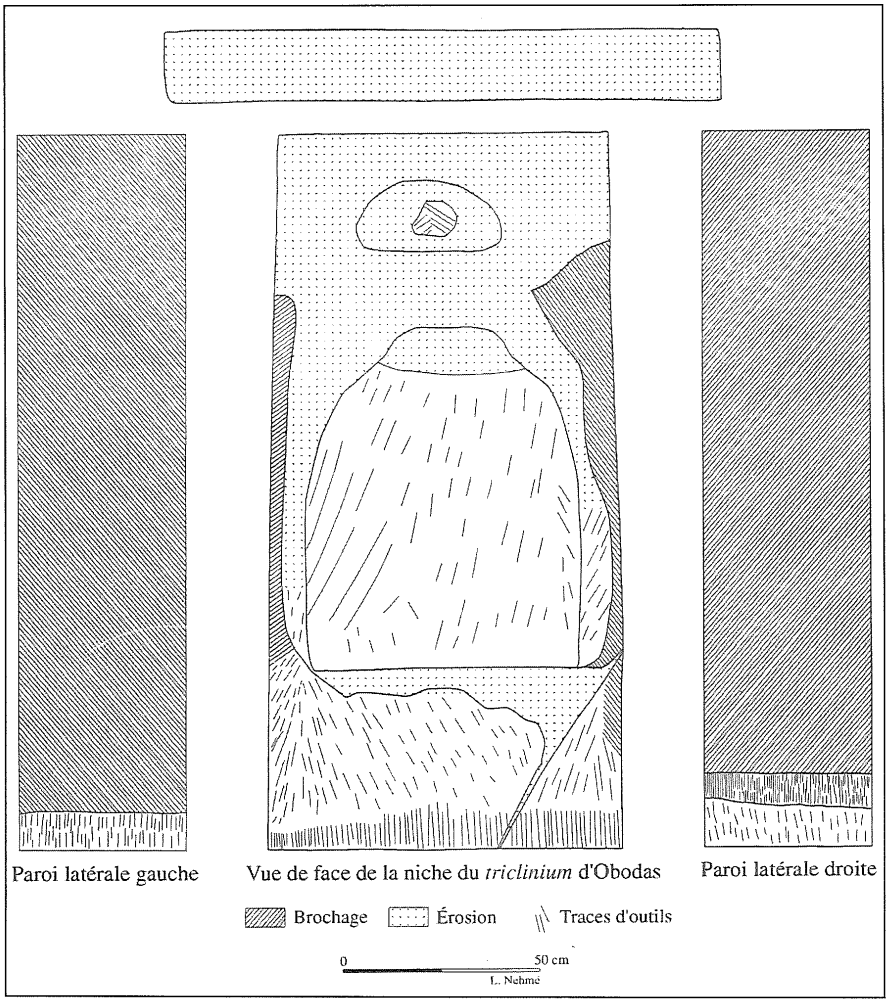


7. Vue générale de la Chapelle d'Obodas en cours de fouille.

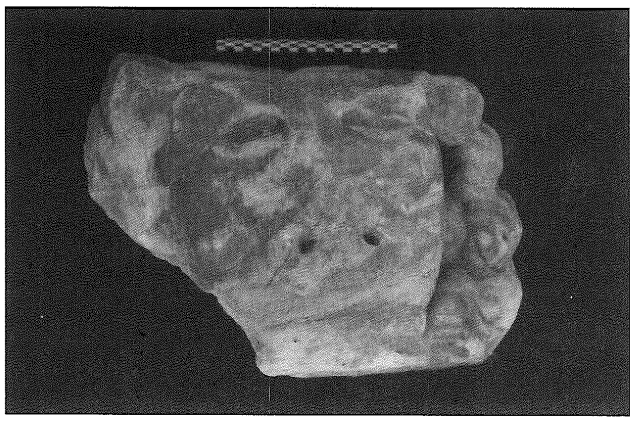


8. Niche dans la paroi du fond de la Chapelle d'Obodas.

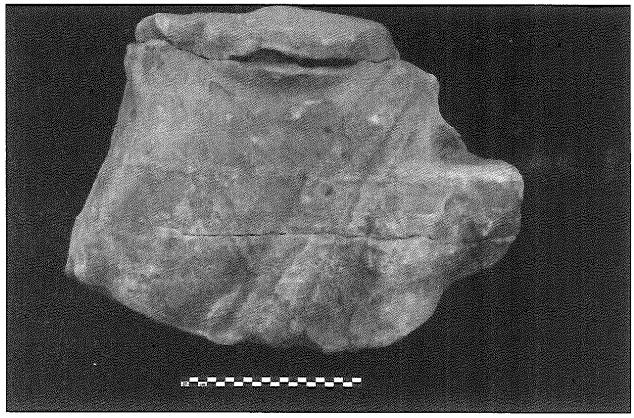
au niveau de la bouche est difficile à expliquer (s'agit-il d'une réparation ?). Les parallèles les plus évidents, en particulier pour la chevelure bouclée en colimaçon, sont les diverses représentations des dieux acolytes Aglibôl et Malakbêl à Palmyre (par exemple Dentzer-Feydy et Teixidor 1993 : 143 = Louvre AO 19799 et 144-145 = Louvre AO



9. Dessin de la niche, vues de face du fond et des parois latérales.



10. Tête de statue en grès.



11. Buste de statue en grès.

19801). Sur ces reliefs cultuels, les yeux sont également en amande et les visages sont pleins et assez plats. Aucun d'eux n'est précisément daté mais ils pourraient être antérieurs à 50 de notre ère. On peut rappeler à ce propos que la chevelure épaisse et mi-longue à boucles en colimaçon ne peut pas être considérée comme un critère de datation sûr car on la retrouve à l'époque sévèrienne sur les hommes en costume parthe, à la fois sur des reliefs et en ronde-bosse. Il s'agirait donc d'un caractère stylistique plus culturel que chronologique. Dans le domaine nabatéen lui-même, les boucles en colimaçon apparaissent sur des barbes (par exemple Glueck 1965 : pl. 41-42, 130 à Khirbat at-Tannūr) et des chevelures courtes (Gluek 1965 : 131 et 145 à Tannūr, pl. 149 à Pétra ; Nehmé et Villeneuve 1999 : fig. 69 à Khirbat adh-Dharīḥ). On trouve aussi un exemple de buste radié à chevelure mi-

longue à boucles en colimaçon à Qaṣr Rabbah (Glueck 1965 : pl. 137), une tête du même type à Tannūr (Glueck 1965 : pl. 147) et un dieu à barbe et chevelure mi-longue bouclée à Pétra (Glueck 1965 : pl. 151). Enfin, bien que très éloigné stylistiquement, on peut signaler les deux têtes barbues à longues chevelures (ou perruques) à boucles en colimaçon et coiffe pointue (Weber et Wenning 1997 : 116, fig. 128 a et b).

Pour ce qui est du vêtement visible sur le buste, on ne distingue pas de ligne indiquant la présence d'une tunique au ras du cou. Il est possible que le rebord se trouve au niveau de la cassure mais, si ce n'est pas le cas, il faut imaginer que le personnage était torse nu, avec le pan de son manteau sur l'épaule gauche et une courroie (un baudrier ?) croisant sur l'épaule droite, comme sur un relief de Karak (Glueck 1965 : pl. 155), un autre de Mā'īn (Glueck 1965 : pl. 157 b) ou un troisième de Pétra (McKenzie 1990 : pl. 61a).

La présence de banquettes le long de chacune des parois de la Chapelle permet de corriger définitivement l'interprétation de celle-ci : il ne s'agit pas d'une chambre cultuelle mais d'un *triclinium,* une salle de banquet à trois banquettes, dans laquelle pouvaient se réunir plus de vingt convives, membres du thiase qui se réunissait en l'honneur du dieu Obodas. Il s'ajoute à la quarantaine de *triclinia* couverts déjà connus à Pétra. L'existence de ce thiase, ou plus vraisemblablement d'un autre thiase également consacré au dieu Obodas, est attestée à Pétra par une inscription nabatéenne gravée au-dessus d'une niche cintrée encadrée de pilastres, Dalman n° 456, taillée à une centaine de mètres au nord — nord-ouest d'ad-Dayr (الدير), sur le même versant de massif que ce dernier (Dalman 1912 : n° 73 = *RÉS* 1423) : *dkyr 'bydw br wqyh'l / wḥbrwhy mrzḥ / 'bdt /'lh'*, "Que soit commémoré 'Ubaydū fils de Waqīh'el et ses compagnons [du] thiase de 'Ubdat le dieu". Les dimensions des banquettes latérales, qui mesurent 11,45m de long, font de cette salle l'une des plus grandes salles de banquet de Pétra. En raison de la longueur de la banquette du fond, six mètres seulement, la Chapelle est cependant deux fois plus longue que large, une proportion nulle part égalée à Pétra (par comparaison, les banquettes de la Maison de Dorotheos, au pied d'al-Khubtha (الخبثه), Brünnow n° 717, mesurent 8,80m de long sur les côtés et 6,40m au fond). La banquette du fond mesure 2,10m de large, dont 33cm de rebord placé 12 à 15cm plus bas (pour poser les plats ?) tandis que les banquettes latérales mesurent seulement 1,70m de large, dont un rebord de 25 à 30cm.

Campagne 2001, les zones 2-4

En dehors de la Chapelle elle-même, la campagne 2001 a fait porter son attention sur trois autres zones. La zone 2 se limite à un mur, visible avant fouille à une dizaine de mètres au nord-est de la Chapelle et dont les contours suggéraient la présence, à cet endroit, d'un bâtiment maçonné. La fouille a montré qu'il s'agissait en réalité d'un mur de dérivation, édifié dans la précipitation, comme en témoigne la mauvaise qualité de la construction **(Fig. 12).** D'une longueur totale de plus de 17m, il subit sur son parcours deux décrochements, ce qui est surprenant pour un mur de retenue/dérivation. Il ne fait cependant aucun doute qu'il était destiné à protéger la Chapelle — on dira désormais le *triclinium* — d'Obodas des eaux de ruissellement provenant de l'amont.

La zone 3 est une pièce très ruinée, située à une quarantaine de mètres au nord-ouest du *triclinium,* dont le plafond s'est partiellement effondré **(Fig. 13)**. Elle n'avait été enregistrée ni par Brünnow ni par Dalman et elle porte désormais le n° N19 dans l'inventaire archéologique de Pétra. Un dégagement partiel de l'intérieur a révélé la présence de deux banquettes, sans rebords, une au fond de 3,40m de long et n'excédant pas 1m de large et une



12. Mur de dérivation au nord-est de la Chapelle (zone 2).

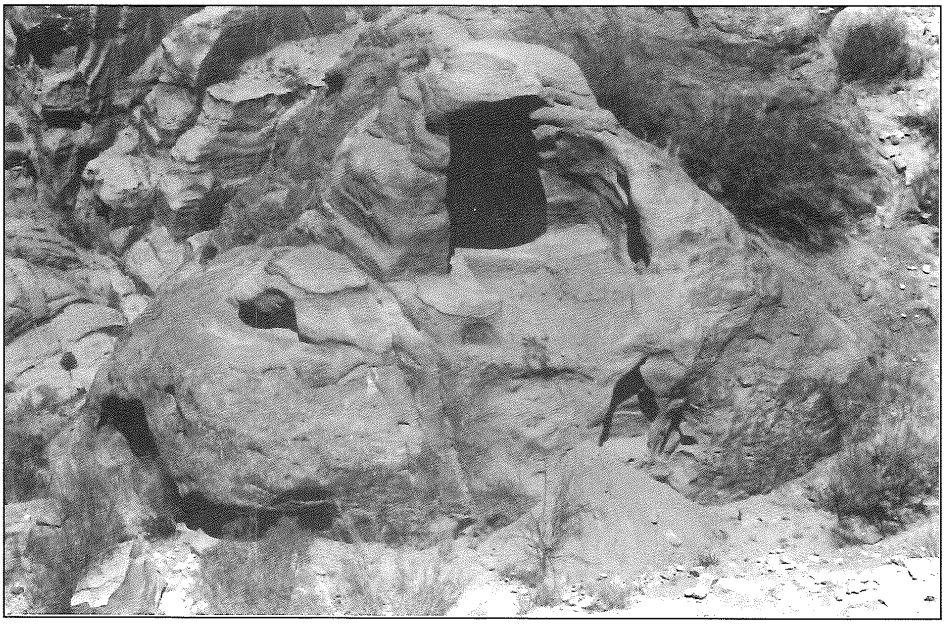
à gauche de 3,30m de long n'excédant pas 0,70m de large. Dans la paroi de droite est creusée une niche contenant un bassin à ablutions. N19 est donc un *biclinium* couvert comme il en existe une quinzaine d'autres à Pétra.

Le dégagement du pourtour d'un petit massif maçonné de 2,50 x 3,40m, construit à 40m au nord de la Chapelle (zone 4), n'a pas permis d'en comprendre la fonction (**Fig. 14**). Ses assises, trois au maximum, ne semblent pas fondées sur le rocher mais posées directement sur le sable.

Tous les autres monuments construits sur la terrasse du *triclinium* d'Obodas ont été relevés et photographiés au cours de la mission et certains d'entre eux feront l'objet de sondages en 2002. Il s'agit des deux niches Brünnow n° 289, d'une autre "chapelle", Brünnow n° 291 (**Fig. 15**), d'une pièce presque entièrement remplie de sable, Dalman n° 296 (**Fig. 16**), d'une citerne-chambre, Dalman n° 297 (**Fig. 17**), de deux bassins en forme de niche, parmi lesquels Dalman n° 298 et enfin d'une niche à trois bétyles, Dalman n° 298,1, qui n'est pas reportée sur le plan.

Les inscriptions nabatéennes

Le second volet de la campagne 2001 a été consacré à la vérification de la lecture des 133 graffiti nabatéens gravés dans un périmètre de 150 mètres autour du *triclinium* d'Obodas. On peut rappeler ici que les inscriptions de Pétra ont été enregistrées au



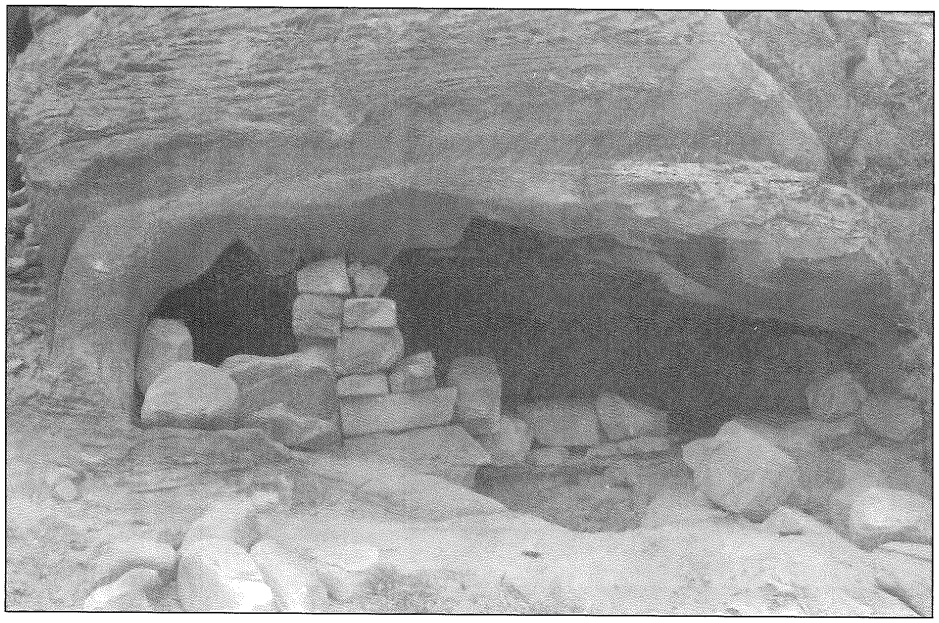
13. Biclinium N19 (zone 3).



14. Massif maçonné de la zone 4.



15. "Chapelle" Brünnow n° 291.

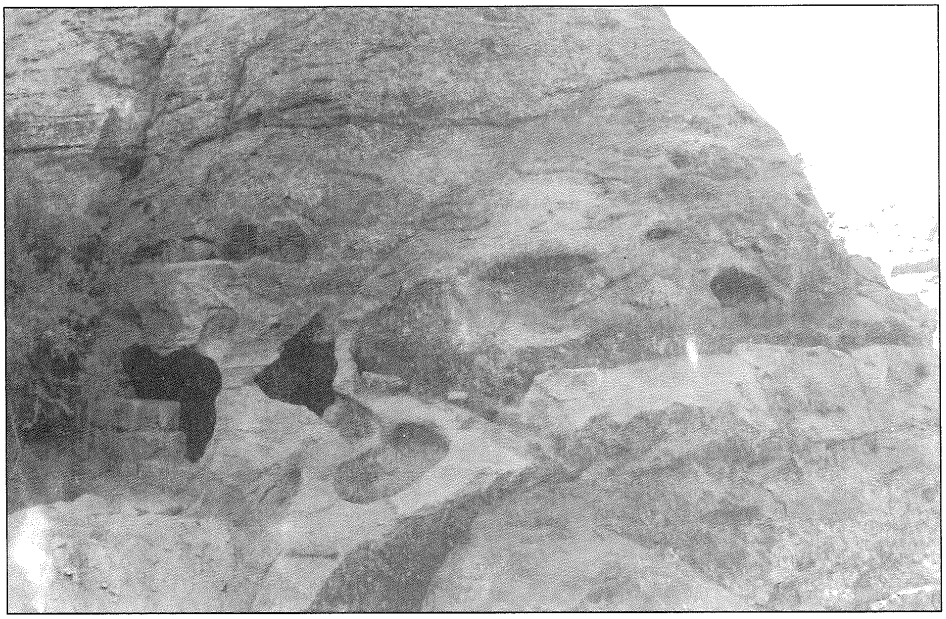


16. Chambre Dalman n° 296.

cours de plusieurs missions sur le terrain, en 1955 et en 1974, par J. Starcky et J.T. Milik. En 1988, elles ont été saisies, par l'auteur et sous la dictée de J.T. Milik, dans une base de données informatisée. Les inscriptions associées à la Chapelle d'Obodas sont celles dont l'édition, avec l'accord de M. Milik, devrait avancer le plus rapidement tout en servant de test à une méthode de traitement des données entièrement informatisée (de la saisie des textes à la création des index en passant par la numérisation des images et le fac-similé des inscriptions)[5]. La vérification des lectures des inscriptions d'an-Numayr a bénéficié, en 2001, du concours de M. Mehdi Abdelaziz dont la perspicacité a été très utile sur le terrain.

Le premier nid de graffiti (**Fig. 1**), se trouve sur le côté sud de la carrière n° 289, au-dessus d'un ravin, dans une sorte d'anfractuosité de la roche dessinant plusieurs panneaux. Il comporte trente-cinq inscriptions dont quatorze inédites (Dalman 1912 : n°'s 1-23). Le second se trouve sur la paroi qui borde à l'est la plate-forme dessinée par la carrière n° 289. Il s'agit de dix signatures inédites, de lecture difficile, gravées sur cette paroi à peu de dis-

5. La publication de toutes les inscriptions de Pétra devrait aboutir dans les prochaines années avec l'accord de principe, donné en novembre 2001 par l'Académie des Inscriptions et Belles-Lettres de l'Institut de France, de lancer, sous la direction de l'auteur, une collection consacrée à la publication d'un inventaire des inscriptions nabatéennes, héritier du *CIS* mais bénéficiant des nouvelles techniques d'analyse et de publication.



17. Citerne Dalman n° 297.

tance les unes des autres. Le troisième nid se trouve à environ 50m au nord de la Chapelle, le long de la haute paroi rocheuse qui borde la terrasse sur son côté est. Il comporte plus de vingt textes dégradés par l'érosion, dont quinze inédits (*CIS* ii 386-387). Au-delà de ce groupe vers le nord, la terrasse du *triclinium* d'Obodas se poursuit en se rétrécissant peu à peu jusqu'à atteindre une faille par laquelle, en escaladant avec difficulté rochers et éboulis, on parvient, à gauche (ouest) de la faille, à une plateforme dominée par une paroi rocheuse recouverte d'une patine foncée sur laquelle se trouve le quatrième nid de graffiti. Il comporte plus de quarante signatures dont douze inédites (*CIS* ii 355-384). Les auteurs de deux d'entre elles indiquent leur métier. Le cinquième nid de graffiti est situé en contrebas de la Chapelle, au sud, dans une faille étroite accessible par un escalier (Milik et Starcky 1975 : 119-120). Il comprend quatorze inscriptions dont douze inédites dans la faille elle-même et une inédite au pied de l'escalier qui y mène. L'ensemble des inscriptions des environs du *triclinium* figurera, avec lecture, commentaire, photos, fac-similés et index, dans la publication finale du sanctuaire.

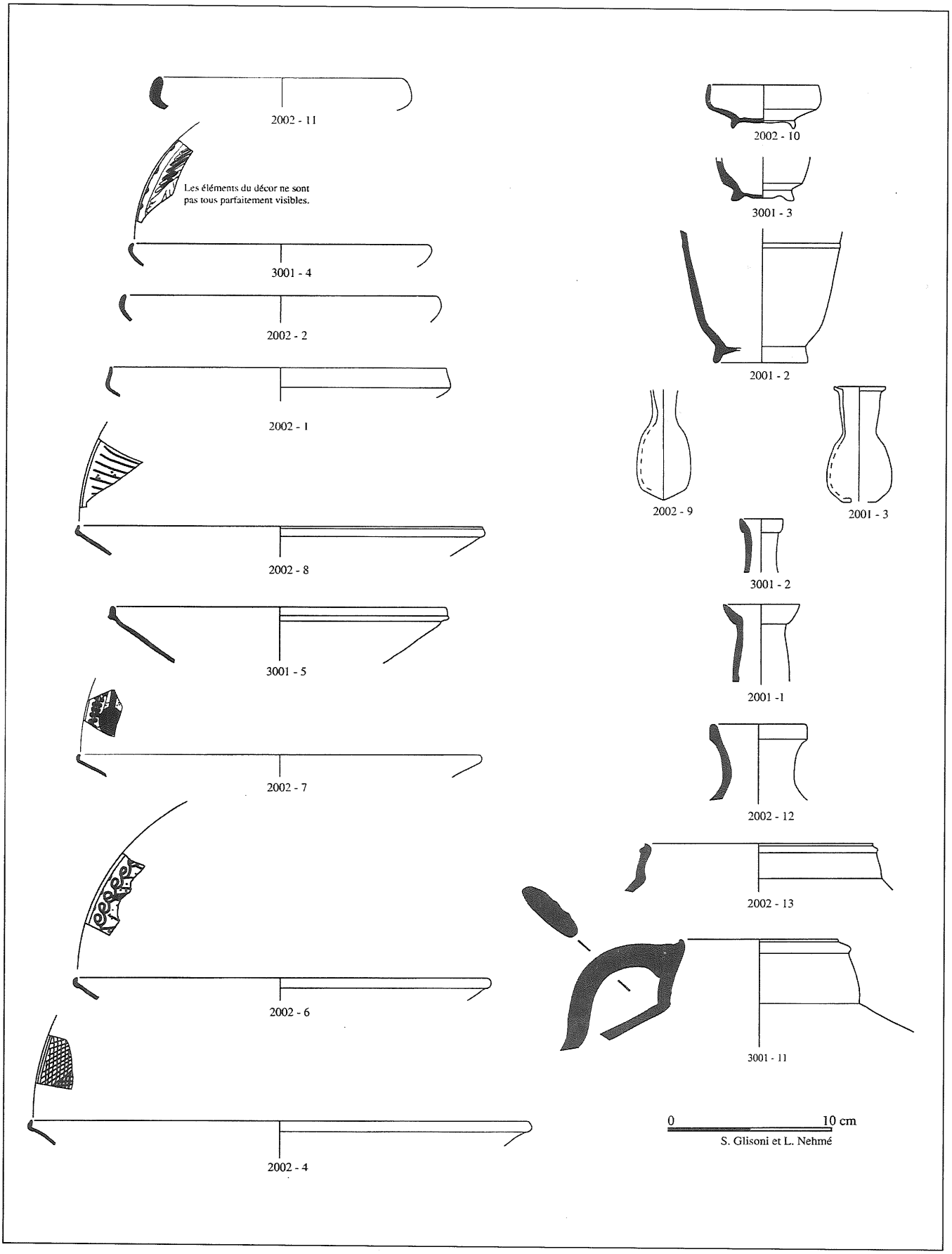
Les parallèles

Le triclinium d'Obodas a pour plus proches parallèles les deux autres salles de banquet de Pétra dont les divinités sont identifiées par des inscriptions : Brünnow n° 21 à Bāb as-Sīq (باب السيق) d'une part, consacré à Dūsharā (Dalman 1912 : n° 90 et Zayadine et Farajat 1991 : 275-278) ; Dalman n° 398 dans le Wādī aṣ-Ṣiyyagh (وادي الصيّغ) d'autre part, consacré à al-Kutbā (Milik et Teixidor 1961 : 22-23). Il peut par ailleurs être rapproché soit d'autres salles de banquet associées à des sanctuaires dont la divinité est connue, par exemple Dalman n° 440 à Qaṭṭār ad-Dayr (قطّار الدير), soit de salles de banquet qui contiennent une niche dans la paroi du fond, nombreuses à Pétra : Brünnow n° 21 (niche à bétyle), 40 (niche à bétyle), 235 (grande niche vide), 697 (niche à bétyle), 704 (niche vide), 717 (bétyle), 729 (niche vide), Dalman n° 398 (niche vide), 487 (niche vide), etc. On peut supposer que certaines des niches vides de ces monuments contenaient à l'origine des représentations divines que des fouilles permettraient peut-être de retrouver.

Interprétation

Les résultats obtenus par cette première campagne sont encourageants. Ils jettent tout d'abord le doute sur l'hypothèse de travail formulée il y a quelques années (Nehmé 1997 : 1037-1038) selon laquelle toute chambre rupestre contenant au moins un élément cultuel de type bétyle ou autel, gravé ou taillé en relief, dans une niche ou directement dans la paroi rocheuse, serait une chapelle, l'équivalent plus élaboré des oratoires de plein air aménagés le long des voies processionnelles et surtout le lieu où pouvaient se retrouver plusieurs personnes, dans un cadre familial ou autre. En appliquant ce critère, trente-trois chambres cultuelles avaient été dénombrées sur le site. À la lumière des découvertes d'an-Numayr, on peut désormais raisonnablement supposer que le dégagement de ces pièces révèlerait la présence de banquettes dans un certain nombre d'entre elles, augmentant ainsi considérablement le nombre de salles de banquets de Pétra.

L'exploration de ce sanctuaire isolé, qui possède sa propre voie processionnelle, montre ensuite le mode d'aménagement et de fonctionne-



18. Échantillon de céramique de la Chapelle d'Obodas.

ment d'un lieu de culte nabatéen au début du Ier siècle. Les méthodes de construction n'étaient pas très bien maîtrisées, les matériaux de construction étaient extraits sur place dans des carrières toutes proches et les besoins en eau étaient remplis par une citerne en forme de chambre protégée de l'évaporation.

Enfin, indépendamment des découvertes de cette année et en guise de conclusion, voici, tel qu'on peut le restituer aujourd'hui, à titre d'hypothèse grâce à la grande inscription *CIS* ii 354, le schéma d'occupation de la terrasse d'an-Numayr. On a souvent dit, en raison du texte de la dédicace, "Ceci est la statue d'Obodas le dieu qu'ont faite les fils de Ḥunaynū fils de Ḥuṭayshū/Ḥiṭṭīshū fils de Peṭamūn {fils de} ---- [2] {qui est avec/auprès de} Dūtad/rā le dieu de Ḥuṭayshū/Ḥiṭṭīshū, qui se trouve sur la terrasse de Peṭamūn leur bisaïeul" que le sanctuaire d'Obodas est un sanctuaire de type tribal. Il me semble cependant que l'expression "les fils de", ici comme ailleurs en nabatéen, est à prendre au sens littéral, "les enfants de (non expressément nommés)", plutôt que "la tribu de". Le schéma de fondation des sanctuaires du Numayr pourrait donc être le suivant : Peṭamūn, l'arrière grand-père des fondateurs, s'était, quelques dizaines d'années plus tôt (donc dans le courant du Ier siècle av. J.-C.) installé sur la terrasse du Numayr. Son fils Ḥuṭayshū/Ḥiṭṭīshū avait fondé un premier sanctuaire, consacré à une divinité appelée "son dieu" (le dieu de Ḥuṭayshū), dont l'épithète, Dūtarā, difficile à interpréter, signifie vraisemblablement (Milik 1959 : 560, n. 1) "dieu du lieu", non nommé dans la dédicace de fondation de la Chapelle d'Obodas, ce qui est philologiquement possible. Il n'est guère surprenant que le nom de ce dieu ne soit pas mentionné explicitement dans une dédicace qui consacre le culte d'un nouveau dieu. La topographie de la terrasse de la Chapelle d'Obodas suggèrerait de voir, dans la petite chapelle annexe (n° 291 sur le plan), ce sanctuaire initial de Ḥuṭayshū.

Les objectifs de la prochaine campagne, prévue au printemps 2002, sont les suivants :

1) poursuivre la fouille de la partie antérieure de la Chapelle afin de confirmer l'existence d'un étage et de déterminer la nature des structures construites devant la Chapelle (cour ? portique ?)[6] ;
2) déterminer le niveau de circulation antique dans le couloir d'accès à la Chapelle et vérifier l'hypothèse de la présence d'une porte ou d'un arc matérialisant l'entrée dans la terrasse ;
3) déterminer si la "chapelle" annexe, n° 291 sur le plan, est une chapelle ou une salle de banquet. Cette information est essentielle, non seulement pour interpréter le sanctuaire d'Obodas lui-même mais aussi pour comprendre comment fonctionne l'espace cultuel nabatéen. La question qui se pose en effet est celle du rapprochement du sanctuaire d'Obodas avec d'autres sanctuaires du site: appartient-il à la catégorie des sanctuaires consacrés à une divinité particulière et dont le plus proche parallèle à Pétra serait le Qaṭṭār ad-Dayr (Dalman n° 427-440) ou bien s'agit-il d'un "quartier" cultuel, expression qui peut être appliquée au secteur d'al-Madras (المدرس) en raison du nombre important de salles de banquet cultuelles qui y sont aménagées (six au total) ?
4) éventuellement dégager une petite partie de la chambre n° 1296, très remblayée ;
5) compléter le relevé topographique en vue de la publication.

Enfin, l'étude du matériel céramique, jusque-là peu abondant dans les couches d'occupation, devrait permettre d'affiner la datation des séquences d'occupation et d'abandon de la terrasse d'Obodas, actuellement fixée, pour les secondes, dans le courant du IIe siècle de l'ère chrétienne **(Fig. 18).** Cette date, encore provisoire, est à rapprocher des dates proposées par Y. Gerber pour le sanctuaire d'Isis dans le Wādī aṣ-Ṣiyyagh (Merklein et Wenning 2001 : 427).

L. Nehmé
nehme.ouzoulias@wanadoo.fr

Bibliographie

Brünnow, R.E. et Domaszewski, A. von
1904-09 *Die Provincia Arabia. Auf Grund zweier in den Jahren 1897 und 1898 unternommenen Reisen und der Berichte früherer Reisender* (3 volumes). Strassburg.

Dalman, G.
1908 *Petra und seine Felsheiligtümer.* Leipzig.
1912 *Neue Petra-Forschungen und der heilige Felsen von Jerusalem.* Leipzig.

Dentzer-Feydy, J. et Teixidor, J.
1993 *Les Antiquités de Palmyre au Musée du Louvre.* Paris.

Ehni, J.
1894 Souvenirs du Mont Hôr et des ruines de Pétra. *Le Globe. Journal Géographique* 33, 5e série t. 5 : 108-125.

Étienne de Byzance / Meineke, A.
1849 *Stephani Byzantii Ethnicorum quae supersunt.* Berlin.

6. Outre des dalles de couverture, les couches de destruction de la partie antérieure de la Chapelle contiennent des tambours de colonne et des chapiteaux.

Glueck, N.
1965 *Deities and Dolphins. The Story of the Nabataeans*. New York.
Lagrange, M.J.
1898 Recherches épigraphiques à Pétra. Lettre à Monsieur le Marquis de Vogüé. *RB* 7 : 165-182.
McKenzie, J.S.
1990 *The Architecture of Petra*. British Academy Monographs in Archaeology 1. Oxford.
Merklein, H. et Wenning, R.
2001 The Veneration Place of Isis at Wadi as-Siyyagh, Petra : New Research. With a contribution [p. 427, 429-432] by Y. Gerber. P. 421-432 in *SHAJ* 7. Amman.
Milik, J.T.
1959 Notes d'épigraphie et de topographie palestiniennes. *RB* 66 : 550-575, pl. 13-14.
Milik, J.T. et Starcky, J.
1975 Inscriptions récemment découvertes à Pétra. *ADAJ* 20 : 111-130, pl. 37-47.
Milik, J.T. et Teixidor, J.
1961 New Evidence on the North-Arabic Deity Aktab-Kutbâ. *BASOR* 163 : 22-25.
Negev, A.
1981 *The Greek Inscriptions from the Negev*. Studium Biblicum Franciscanum. Collectio Minor 25. Jerusalem.
1986 Obodas the God. *IEJ* 36 : 56-60, pl. 11B.
1996 Oboda - The City of Obodas the God. P. 219-251 in K. Fittschen et G. Foerster (éds), *Judaea and the Greco-Roman World in the Time of Herod in the Light of Archaeological Evidence*. Acts of a Symposium Organized by the Institute of Archaeology, The Hebrew University of Jerusalem and the Archaeological Institute, Georg-August-University of Göttingen at Jerusalem November 3rd-4th 1988. Abhandlungen der Akademie der Wissenschaften in Göttingen. Philologisch-historische Klasse. Göttingen.
Nehmé, L.
1997 L'espace cultuel de Pétra à l'époque nabatéenne. *Topoi* 7 : 1023-1067.
Nehmé, L. et Villeneuve, F.
1999 *Pétra. Métropole de l'Arabie antique*. Paris.
Starcky, J. et Milik, J.T.
1957 Chronique archéologique. Nabatène. *RB* 64 : 223-225.
Tertullien / Guilielmus, J. et Borleffs, Ph.
1913 *Ad Nationes*. Leiden.
Vogüé, M. de
1897 Notes d'épigraphie araméenne (suite). *JA* 9e série 10 : 197-217.
Weber, Th. et Wenning, R.
1997 *Petra. Antike Felsstadt zwischen arabischer Tradition und griechischer Norm*. Sonderhefte der Antiken Welt. Mainz am Rhein.
Wenning, R.
1997 Bemerkungen zur Gesellschaft und Religion der Nabatäer. P. 177-201 in R. Albertz et S. Otto (éds), *Religion und Gesellschaft. Studien zu ihrer Wechselbeziehung in den Kulturen des Antiken Vorderen Orients*. Alter Orient und Altes Testament, 248. Münster.
Zayadine, F. et Farajat, S.
1991 The Petra National Trust Site Projects. Excavation and Clearance at Petra and Beida. *ADAJ* 35: 275-311, pl. 1-16.

THE INTERNATIONAL WĀDĪ FARASA PROJECT (IWFP) PRELIMINARY REPORT ON THE 2001 SEASON

Stephan G. Schmid

I. Introduction

The 2001 field season of the International Wādī Farasa Project (IWFP) lasted from September 23 to October 18. The IWFP 2001 was carried out by the Association for the Understanding of Ancient Cultures (AUAC), based in Basel (Switzerland) and the Palestine Exploration Fund (PEF, London).[1] We would like to thank the director general of the Department of Antiquities, Dr. Fawwaz Al-Khraysheh, for his support and for granting the working permit as well as Dr. Fawzi Zayadine (ʿAmmān) and Prof. David Graf (Miami) for their continuous interest in the project. The IWFP is grateful to Cyprus Airways (Larnaca) for assisting in transport, to Kodak International S.A. (Lausanne) for providing photographic material under generous terms and to Sylvia Bernasconi (Zug) for supporting the project.

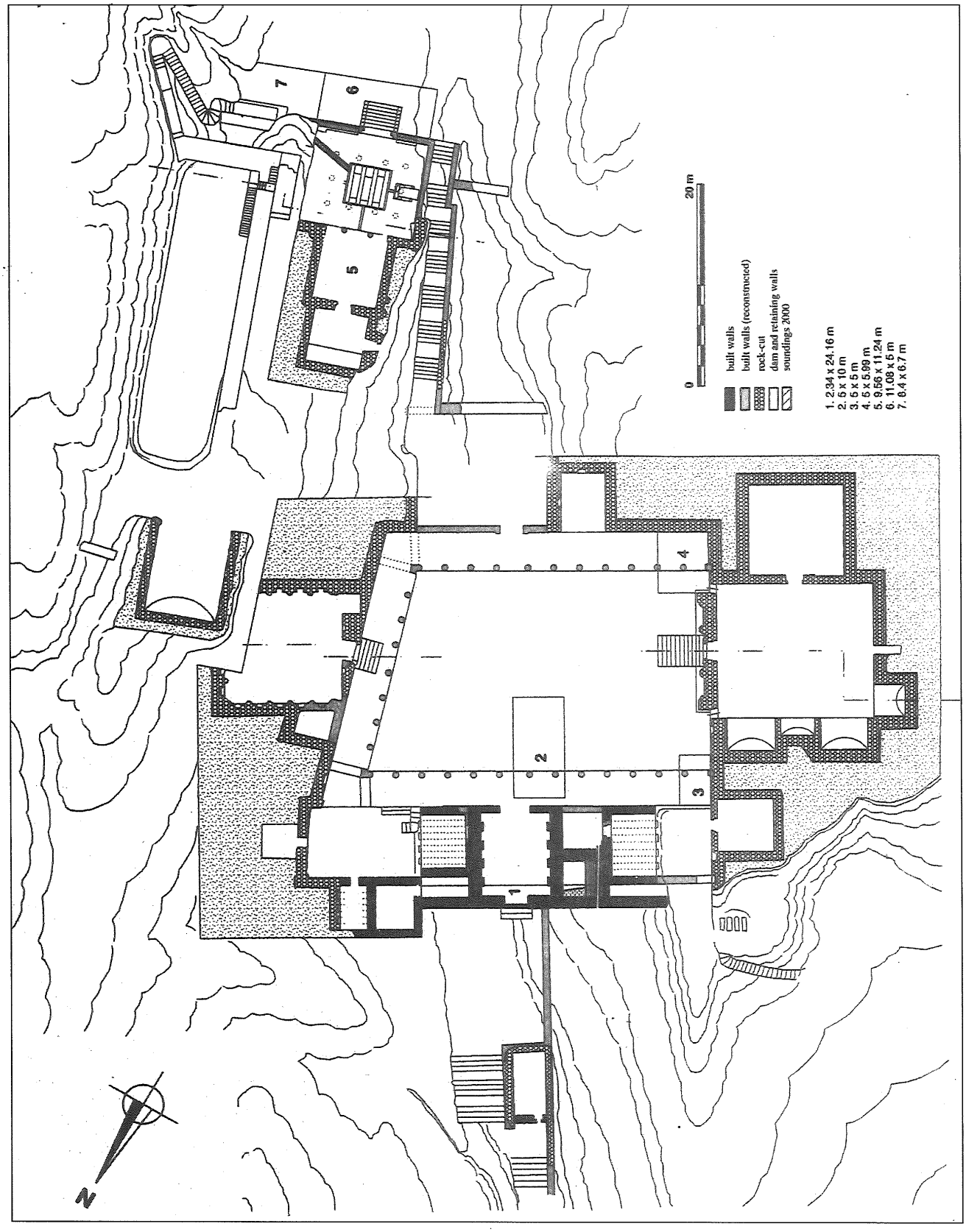
Beside the writer, the following persons participated in the 2001 season of the IWFP: Caroline Huguenot, MA (Lausanne), Dr. Martin Seyer (Vienna), Khalil Hamdan, MA (representative of the Department of Antiquities) whose help and advice were much appreciated. Sixteen workmen from the Bdūl and ʿAmārīn tribes were employed. Further, the IWFP 2001 season would not have been possible without the friendly cohabitation in the John Lewis Burckhardt Centre (Nazzal's Camp) with the team from Basel University carrying out the Swiss-Liechtenstein excavations at az-Zanṭūr; the practical advice of Dr. Bernhard Kolb (Basel) did much advance our campaign. We would also like to thank IFAPO ʿAmmān for lodging the team during our stay in ʿAmmān. The Swiss School of Archaeology in Greece provided technical support for which we would like to thank its director, Prof. Pierre Ducrey (Lausanne). Finally, Markus Peter (Augst) analysed the coins and Robin Brown (Boston) provided helpful comments on medieval pottery. During the field season 2001 H.E. Dr. Rolf Bodenmüller, Swiss ambassador to Jordan, visited the IWFP as well as Dr. Konstantinos Politis, member of the executive committee of the PEF.

After the results of the 2000 season (cf. Schmid 2001a; 2001c) work on the upper and lower terraces of the Wādī Farasa East (وادي فرسة) continued with the following soundings and trenches (**Fig. 1**): On the upper terrace, work in trench 7 in front of the big cistern was continued in order to completely clean the two water basins partially excavated last year and to understand their connection to the so-called Garden Triclinium. For this purpose and to find out more about its proper function, the space in front of the "Garden Triclinium" was cleaned as well (trench 5 on **Fig. 1**). On the lower terrace, sounding 2 was extended towards the centre of the courtyard between the so-called Soldier Tomb and the opposite *triclinium* (**Fig. 1**). Further, trench 1 was opened in order to gain a better picture about the condition of the big main retaining wall of the lower terrace, which has missing stones in its middle part and therefore may be in danger of collapsing. Trench 4 towards the southern corner of the complex was only partially opened.

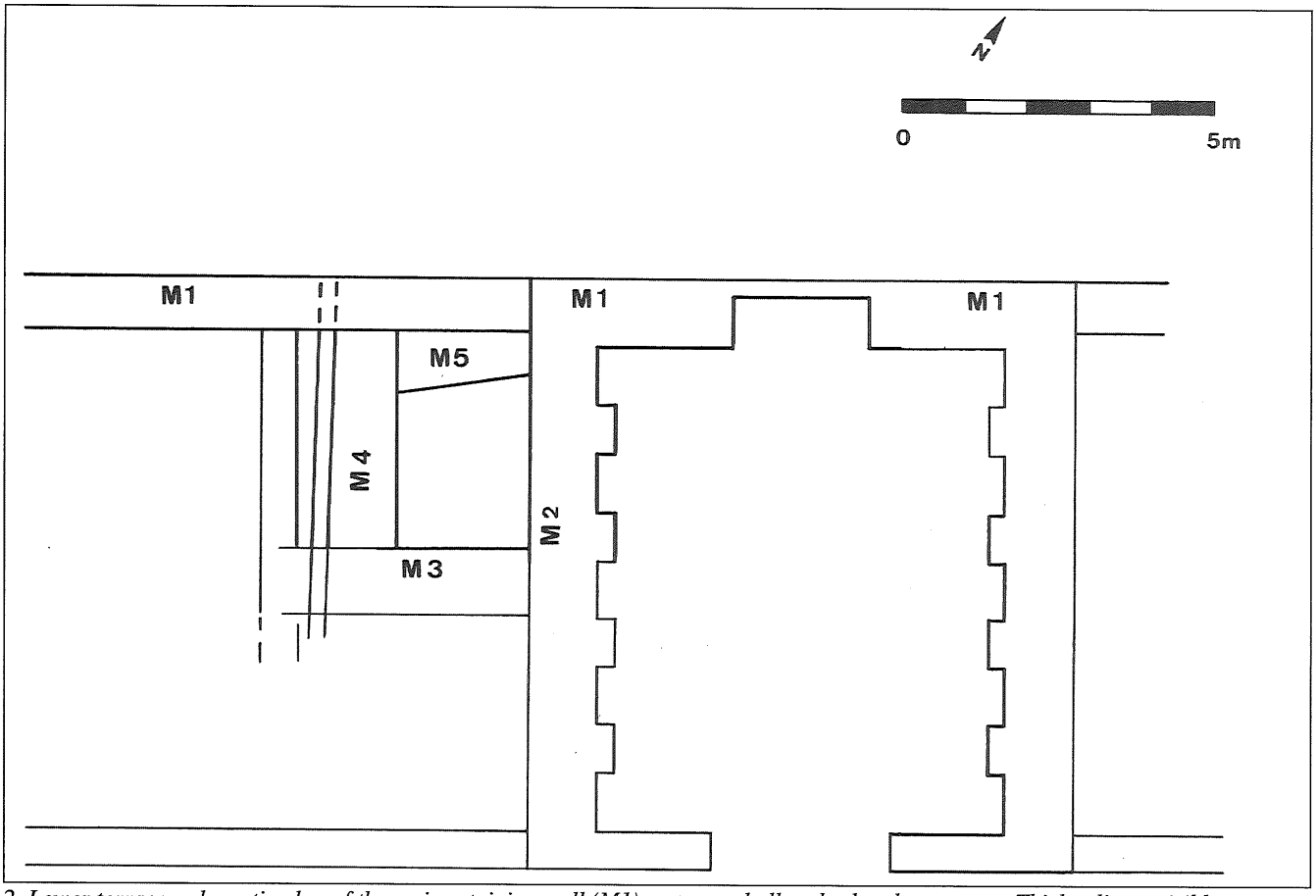
II. Lower Terrace

In trench 1 the main entrance to the entire complex was discovered (**Figs. 2, 3**), consisting of a huge threshold, showing the holes for placing a double door. This threshold was covered with only a little amount of earth and it is possible that in the early 20th century it was still visible, as Bachmann, Watzinger and Wiegand did locate it correctly (cf. **Fig. 1**), that is a few meters to the East of the modern path leading to the complex of the "Soldier Tomb" (Bachmann, Watzinger and Wiegand 1921: 75ff.). In antiquity the access to the complex was made possible by a wall that allowed the construction of some steps leading from the bedrock to the door. The door led to a huge entrance hall of about 6 meters width and 9 meters depth that gave access to the peristyle courtyard. The already excavated parts together with some still visible remains allow a first reconstruction of this impressing entrance hall (**Fig. 2**). The area of the entrance hall had a floor consisting of big limestone slabs measuring approx. 40cm x 80cm. Some of these slabs were found in the destruction debris (cf. also below **Fig. 41**). As was stated during last

1. On these two institutions see also www.home.tiscalinet.ch/iwfp and www.pef.org.uk.



1. General plan of the main installations in Wādī Farasa East, based on Bachmann, Watzinger and Wiegand 1921, digitized and modified by S. Fachard (Lausanne).



2. Lower terrace, schematic plan of the main retaining wall (M1), entrance hall and related structures. Thicker lines: visible or excavated parts; thinner lines: reconstructed parts (Schmid).



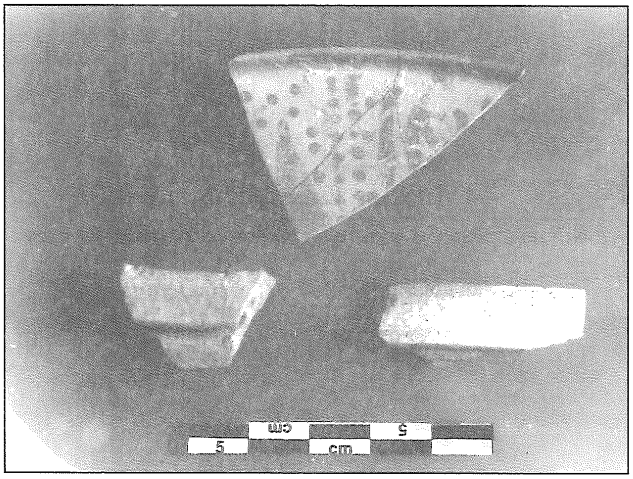
3. Lower terrace, trench 1, main entrance and foundations for the floor slabs of the entrance hall (Schmid).

year's excavation, the foundations for these slabs consist of smaller slabs, broken into pieces and bedded into a layer of clay containing earth (Schmid 2001a: 169; 2001c). The level of the foundation is at 930.45m asl, while the original floor level including the huge limestone slabs was at 930.60m asl.

On a spot 1.5m behind the main entrance, some of the big slabs were missing but the foundations were still intact. Therefore, the pottery found in a



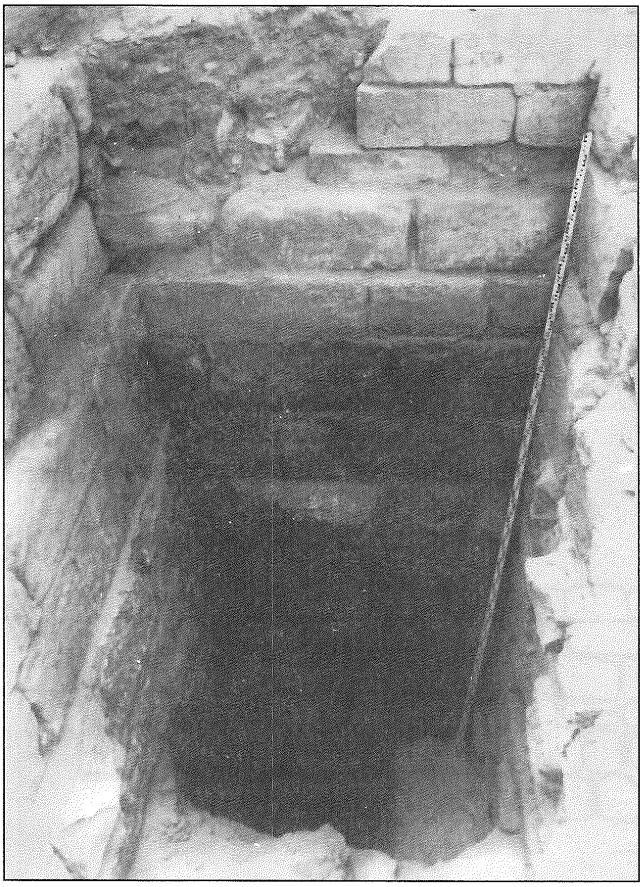
4. *Lower terrace, trench 1, small sounding beneath the level of the floor foundations; cf. hatching on Fig. 8 (Schmid).*



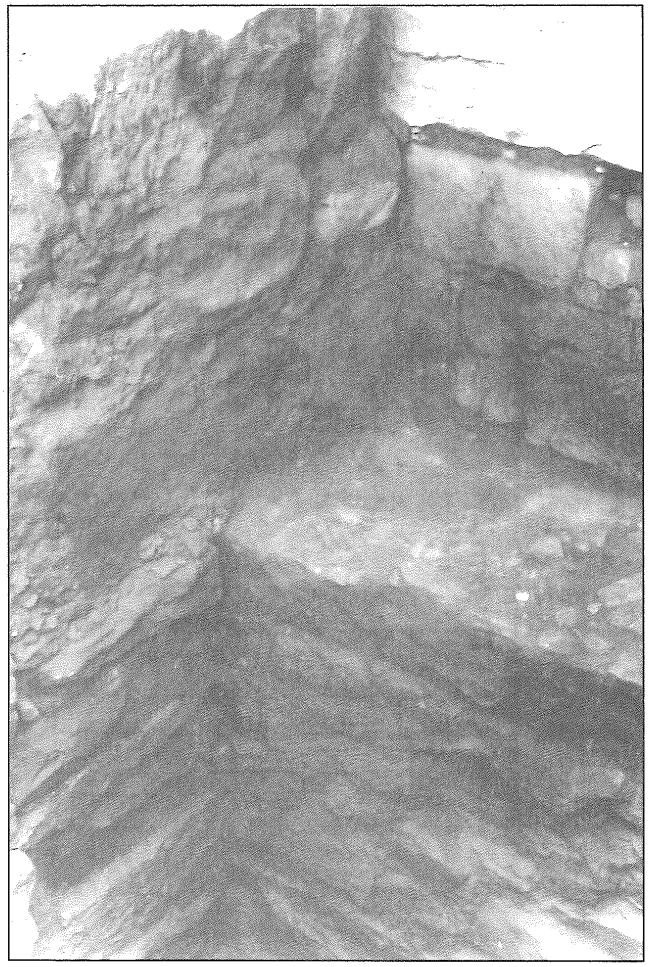
5. *Lower terrace, Nabataean pottery from the small sounding beneath the floor foundations in trench 1 (Schmid).*

small sounding dug below the level of the foundations (**Fig. 4**; hatching on **Fig. 8**) should give a reliable *terminus* for the construction of the complex. As on similar occasion during last year's campaign (Schmid 2001a: 176f.; 2001c), the few sherds found in this sounding belong exclusively to phase 3a of Nabataean pottery (**Fig. 5**), dating ca. AD 20-70/80 and in this case especially to the second quarter of the first century AD (Schmid 2000a: 25, 38 and figs. 52, 89, 90, pl. 2.5). To the east of the entrance hall a construction was found that initially was supposed to be a room. However, no floor level was found and the foundations of the deepest wall were reached at six (!) meters below the floor level of the neighbouring entrance hall (**Figs. 6-8**; M2 on **Fig. 2**). The analysis of the different walls in that area led to a somewhat puzzling picture. Wall 2 (M2 on **Fig. 2**) is the earliest of these walls, not counting — for the moment — the main retaining wall of the entire complex (M1 on **Fig. 2**). As wall 3 (M3 on **Fig. 2**) is built against wall 2 but not bonded with it, it has to be at least slightly later than the former. The same relationship occurs between wall 3 and wall 4 (M4 on **Fig. 2**), i.e. the latter is built against the former and therefore chronologically later. Wall 4 in his turn is not connected to the main retaining wall but just "leaned" against it (**Fig. 7**). The latest of all these walls is wall 5 (M5 on **Figs. 2, 8**) that is built against both, wall 4 and wall 2, while its relationship to wall 1, the main retaining wall, remains unclear for the moment (cf. **Fig. 7**).

The explanation for this somewhat strange arrangement is related to the construction of the main retaining wall of the entire complex (**Figs. 8-10**). The careful analysis of the outer surface of the wall showed that precisely at the point where it started collapsing, five consecutive layers of the wall are levelled vertically, while a small sounding showed that this orientation continues further downwards (**Fig. 10**). This orientation corresponds perfectly with the limits of the outer wall of the entrance hall, that is wall 2 (M2 on **Fig. 2**; cf. **Fig. 8**) and, as no intelligent engineer or architect would construct such a huge wall with five consecutive layers of vertically aligned stones, this must mean that originally the main retaining wall did not continue at this point but turned at a right angle towards the south. Only later was it decided to built the additional part of the wall. This is further confirmed by the fact that the original part (left on **Figs. 9, 10**) is built exclusively with high quality lime stones

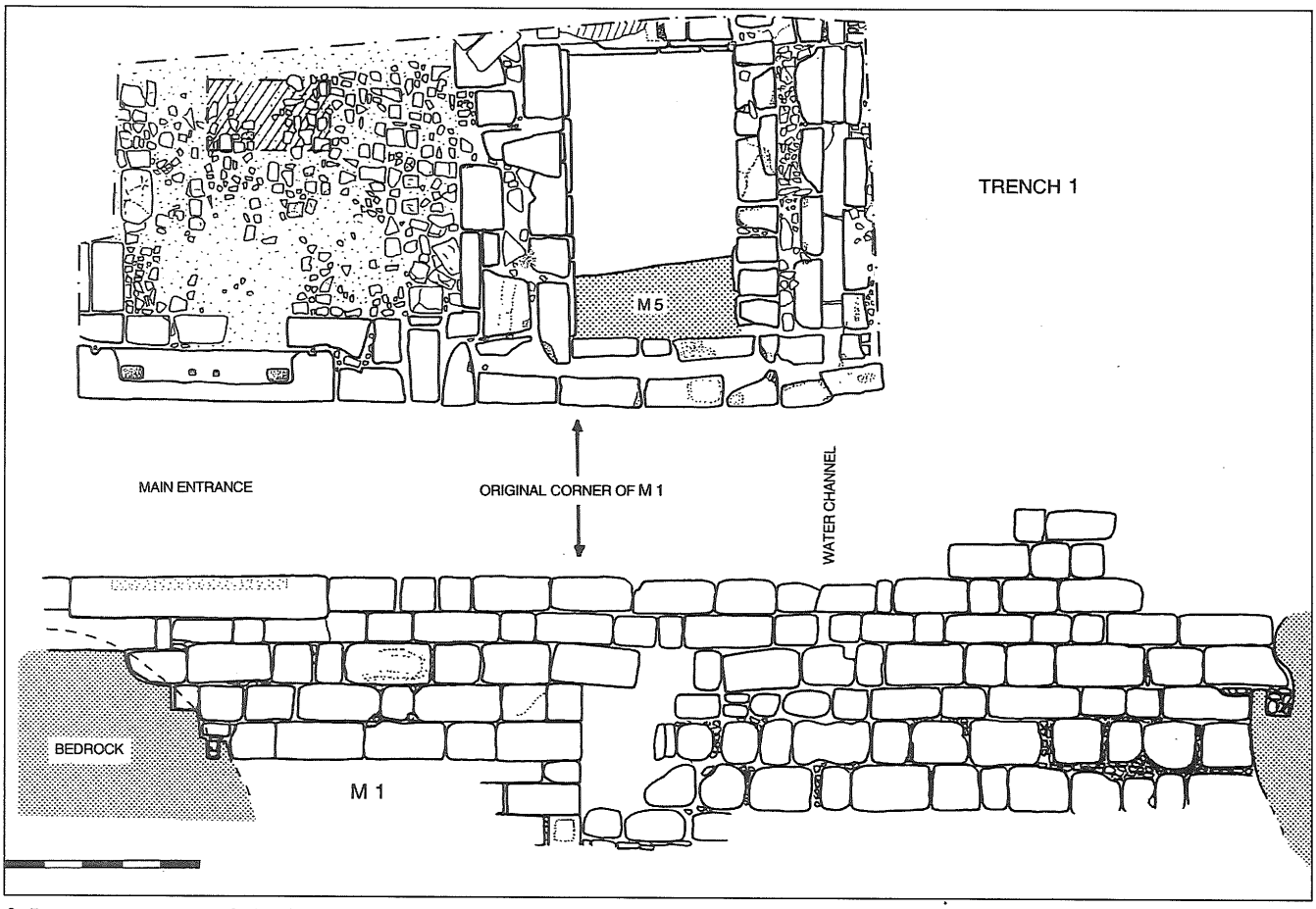


6. Lower terrace, trench 1, wall 2 (left), wall 3 (centre) and wall 4 (right) from NW (Schmid).



7. Lower terrace, trench 1, wall 4 (left), wall 1 (top right) and wall 5 (bottom right) from E (Schmid).

while the later addition (right on **Figs. 9, 10**) is built from local sandstone that erodes much faster than the limestone. This, together with the poor joins between the earlier and the new part, led to the collapse of the central part. As an ancient repair a second wall (M5 on **Figs. 2, 8**) behind the main retaining wall was constructed in order to close the collapsed part. Although the relative sequence of these phases is clear, their absolute chronology is still rather vague. Below the foundation of the original wall 2, that is at 6m depth below the floor level in the entrance hall, Nabataean pottery of the later first century BC was found in layers strongly recalling river alluvia (**Fig. 11**; cf. Schmid 2000a: 38, 60 and figs. 220, 394, 395). However, it is not clear whether this pottery should be seen in connection with the construction of the first wall or whether it simply belongs to seasonal alluvia brought in before the construction of the complex. In the layers above the foundation of the first wall (M2) but still below the foundation of the second wall (M3), pottery of the first quarter of the first century AD was found (**Fig. 12**; cf. Schmid 2000a: 24, 38, figs. 49-51, 88, pl. 1) but again we should be careful in order not to over-interpret the chronological value of this pottery as it may belong to dumped material. However, the same loci did contain other interesting material, namely large quantities of *tubuli* (**Fig. 13**) and hypocaust fragments. This means that at some moment in the history of the complex of the Soldier Tomb, one or more of the rooms behind the main retaining wall were used as a luxurious bathing installation with a floor and wall heating system. This can be seen as further confirmation for the multifunctional aspect of that big complex that was far more than just a funeral installation (on these aspects see also Schmid 2001a: 188-191; 2001b: 398f.). Also, the fact that this installation could have been heated points to regular use during all periods of the year. One of the goals of a next field season would be, therefore, to locate and excavate that installation. The types of *tubuli* and hypocaust fragments found so far correspond very well to examples found in the rich mansion of az-Zanṭūr (الزنطور), some few hundred meters to the north of our site and dated there to *ante* AD 363 (Kolb and Keller 2000: 361-363 fig. 8). In the material dumped after the construction of the latest wall (M5) that was supposed to support the col-



8. Lower terrace, trench 1 (above) and corresponding view of the main retaining wall (M1, below) (M. Seyer and Schmid).

lapsed parts of the additional part of the main wall, coins of a possible Roman date were found but they need cleaning in order to be precisely dated. Together with one of the later walls (M4 and possibly M5) a water channel was built, apparently in order to avoid water flow and therefore erosion and pressure from reaching the repaired main retaining wall (**Fig. 14**; cf. **Fig. 8**).

Outside the main retaining wall, cleaning of the area immediately in front resulted in some observations concerning the construction of the wall. Towards the sides of the valley, the foundations were put directly on the bedrock that was cut in the form of steps in order to allow a better placement of the blocks (**Fig. 15**). Precisely at this point, that is towards the northeastern side, the main retaining wall did cut off a previous rock hewn water channel of rather small size. The same sequence was observed at the other end of the main retaining wall, where another rock hewn water channel was cut by the later additions of the main wall (**Fig. 16**). As this is one of the two main channels that follow the lower parts of Wādī Farasa East on its banks, this means that the construction of the later parts of the main retaining wall resulted in some important changes within the water supply of the lower parts of that area of the city.

In trench 2, the foundations for the original floor slabs were found (**Figs. 17, 18**) and, as last year, most of the slabs had already been removed in antiquity for reuse (cf. Schmid 2001a: 166-169; 2001c). However, the same foundations consisting of smaller slabs as described above apparently covered the entire area, and as in trench 1, they are at 930.45m asl. In a sounding below that level the same types of pottery belonging to the second quarter of the first century AD were found (**Figs. 18-20**), confirming the results of trench 1 and of last year's excavation regarding the chronology of the complex (Schmid 2001a: 176f.; 2001c). The stratigraphy of trench 2 showed that over a long period of time, the seasonal rain water brought only sand and no stones down the valley (**Fig. 21**), which means that the big retaining walls higher up must have prevented bigger stones from being carried down. Only the top stratigraphy layers contain pebbles.

Another observation may be worth mentioning. As stated above, the foundations of the original floor contain large quantities of small, mostly brok-



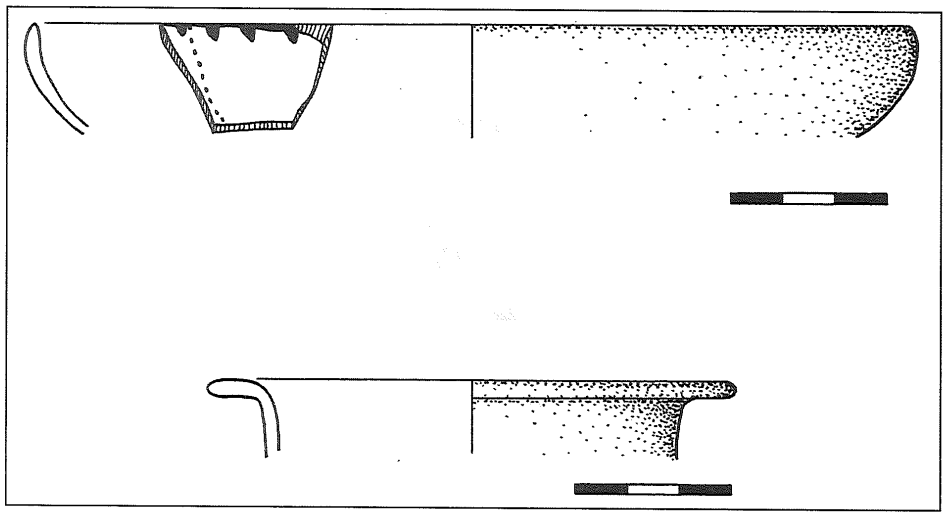
9. Lower terrace, main retaining wall of the lower terrace from N, showing the original part on the left, later additions on the right (Schmid).



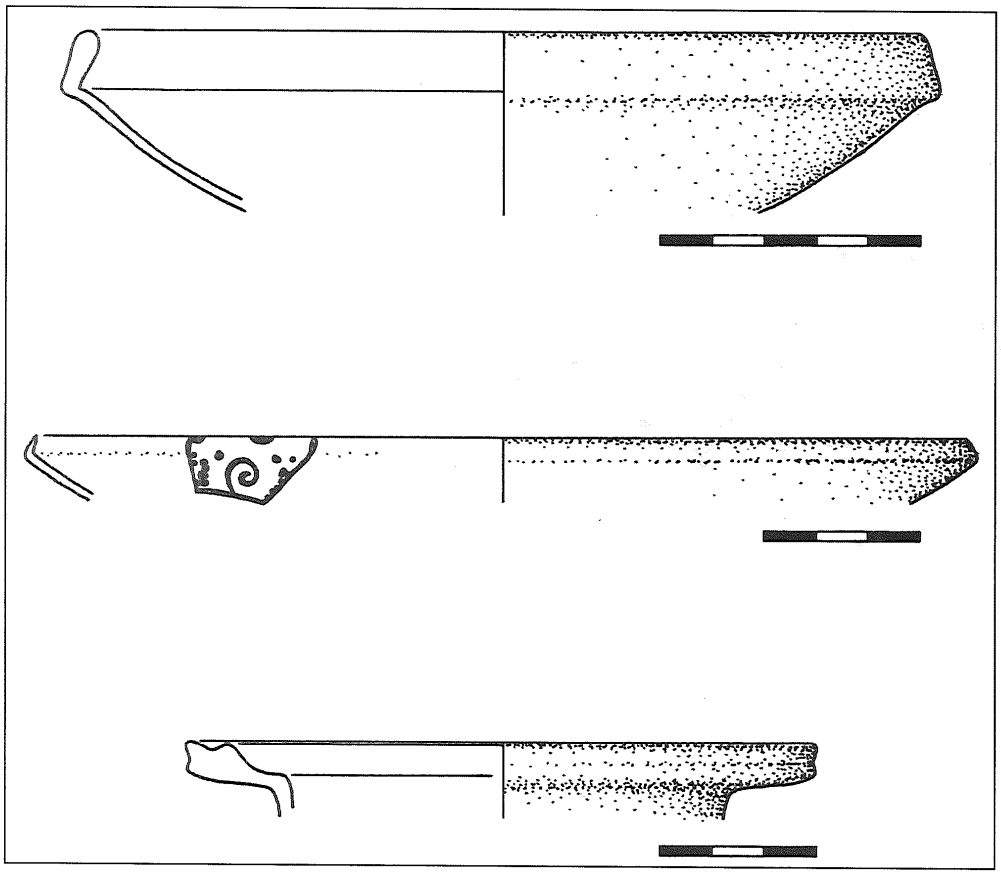
10. Lower terrace, main retaining wall from W, detail showing repair and broken out parts (Schmid).

en remains of slabs. Below these, in the small sounding that contained the pottery just described above, a fragment of a column drum was found as part of the foundations (**Fig. 18** bottom left), measuring 60cm in diameter and therefore being of the same size as the columns of the courtyard (Schmid 2001a: 169-171; 2001c). The question, therefore, is where did all these elements such as floor slabs and column drums come from? Were they simply defective elements that fell apart during the construction of the complex that we dated to about the middle of the first century AD, or do we have to reckon an earlier, probably smaller installation at this spot? For the time being it is not yet possible to give a convincing answer, but the observations made above on the subsequent walls built in the area of the main entrance, together with the early pottery from the lower levels of these walls (**Figs. 11, 12**), as well as the broken architectural elements beneath the floor of the courtyard, could point in favour of a predecessor of what has been considered so far the one and only complex of the Soldier Tomb.

Trench 4 was just partly opened and it was not excavated down to the ancient floor level. The goal of that small sounding was simply to verify whether it would provide the same rock-cuttings for placing a half column as were discovered in 2000 in



11. Lower terrace, trench 1, Nabataean pottery from below the foundations of wall 2 (Schmid).

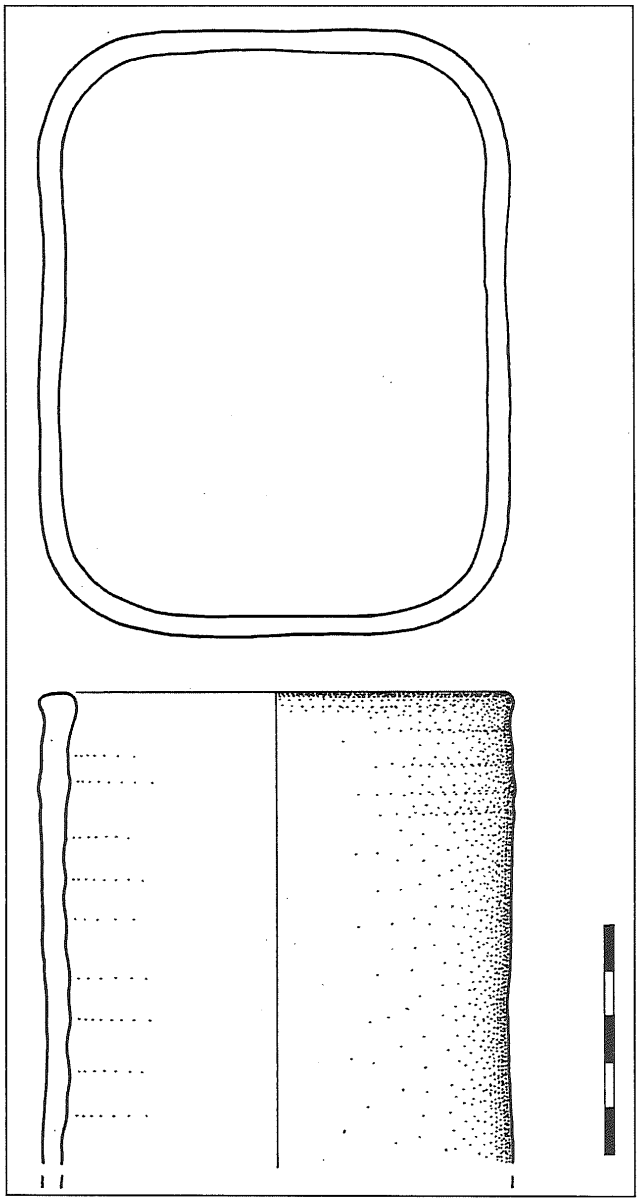


12. Lower terrace, trench 1, Nabataean pottery from fill below the foundations of wall 3 (Schmid).

trench 2 (Schmid 2001a: 169-171 fig. 14; 2001c). Indeed, although they suffered much more from erosion, the space for the capital and the beginning of the column are still visible (**Fig. 22**).

III. Upper Terrace

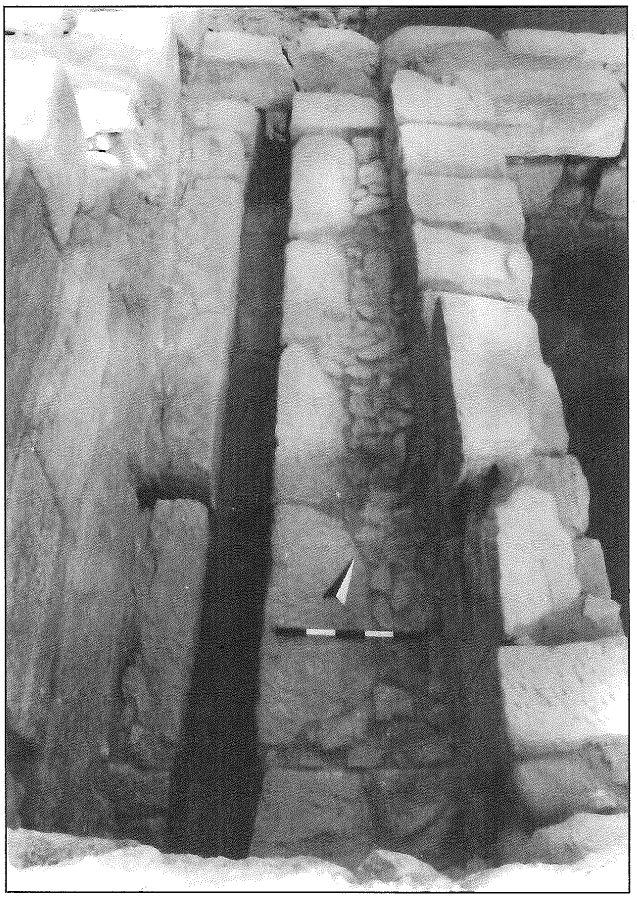
In trench 7, work continued in the two basins in front of the big cistern. In both installations the floor level was reached (**Figs. 23, 24**). The bigger basin, that is fed by two water spouts from the cistern, has three outlet channels. The main channel on the bottom of the rock-cut basin leads not to the smaller basin but further downwards, probably joining another channel bringing water to installations on a lower level and eventually to the lower terrace. A second smaller channel in the retaining wall of the first basin connects it to the small basin. Access to the smaller basin was given by a small podium-like structure that connects it with the "Garden Triclinium". A third channel, cut in the rock, brought water to a built channel that led to the area of the "Garden Triclinium" (see below). Both basins — and therefore the huge cistern as well — must have had a long history of use. On the



13. Lower terrace, trench 1, terracotta tubulus from fill related to the construction of wall 4 (Schmid).

one hand, a pottery fragment of the second or third quarter of the first century AD in the hydraulic mortar testifies to the initial construction of these installations in the Nabataean period (Schmid 2000b: 343f.; 2001a: 179-181). On the other hand, on the bottom level of both basins medieval pottery of the 11th to 13th centuries AD was found. Further, both basins show different layers of hydraulic mortar applied consecutively and testifying to different phases of maintenance.

As mentioned above, a channel connected the installations in front of the big cistern with the area of the "Garden Triclinium". This installation not only occupies a prominent place in the upper part of the Wādī Farasa East, it also remains a kind of an enigma, as its precise ancient function is not

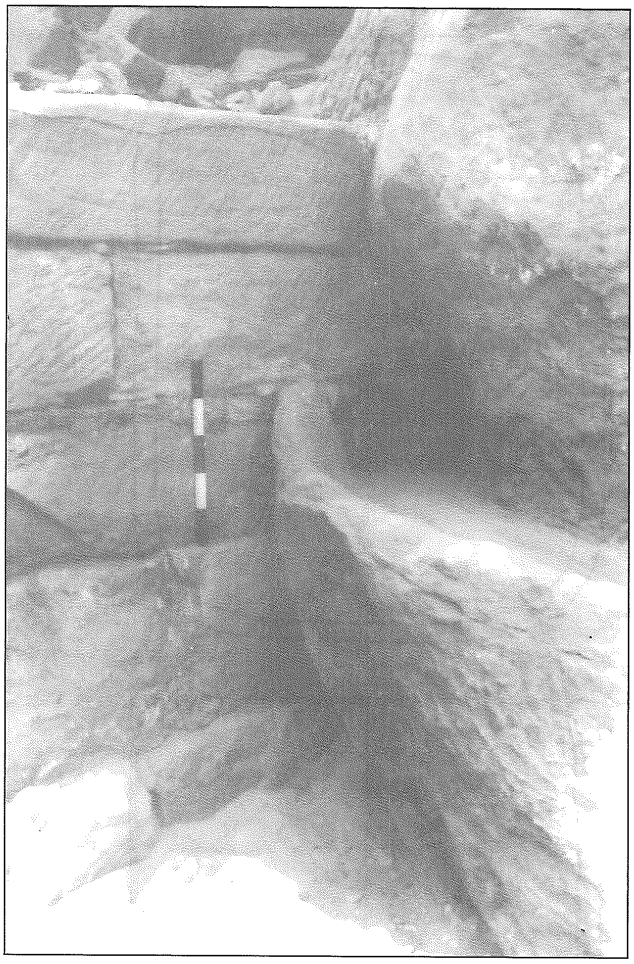


14. Lower terrace, trench 1, water channel built in later phase from S (Schmid).

known and, therefore, it has been called a temple, a tomb, or a *triclinium* (Schmid 2000b: 339; 2001a: 163f.; Wenning 1987: 252). In order to better understand this complex, during the 2001 season of the IWFP the area immediately in front of the two rock-cut rooms was cleaned (trench 5 on **Fig. 1**; **Figs. 25-27**). Ancient pictures of the area show that since the first modern visitors reached Wādī Farasa, this area was always covered with dumped sand and stones, as it did at the beginning of our 2001 season. Contrary to our estimation, important built structures started appearing directly below the sand (**Figs. 26, 27**). In fact, large walls were built, some of them on top of a refilled water installation (see below). These walls belong to the medieval period, as attested by the considerable amount of pottery from the 11th to 13th century that was found, including some handmade painted shards (**Fig. 28**) of what is usually called Ayyubid-Mamluk pottery (for similar pottery see Walmsley and Grey 2001: 153-159; Tonghini and Vanni Desideri 2001; Pringle 1984; 1985; on local aspects of Late Islamic pottery in central and southern Jordan see Brown 1987; 1988, 1991: 232-241; in general terms on that period in Jordan see Walmsley 2001). More neutral, that painted pottery can be called *Middle*



15. Lower terrace, details of construction and first cut-off water channel in front of the main retaining wall from NW (Schmid).



16. Lower terrace, second cut-off water channel in front of the main retaining wall from N (Schmid).

Islamic Hand-Made Geometrically Painted Ware (Johns 1998). Beside the painted pottery large quantities of plain hand made pottery were found (**Figs. 29, 30**), including a pottery lamp. Medieval household activities are attested for example by a stone mortar (**Fig. 31**). So far no wheel thrown and no glazed pottery was found. As previously suggested (Johns 1998) this could point to a rather local aspect of that medieval occupation. However, as remains of Red Sea parrot fish from the same layers confirm,[2] this community did maintain some supra-regional contacts. The general date of the 11th to 13th century AD of these walls is confirmed by a painted sherd that was actually found built into one of the walls (**Fig. 32**). So far, all of the motives of the handmade painted pottery seem to fit the known repertoire previously attested for Jordan (Homès-Fredericq and Franken 1986: 242f.).

A medieval occupation of that part of Petra was supposed since Brünnow and von Domaszewski found what they believed to be a Crusader tomb stone inside the "Garden Triclinium" (Brünnow and Domaszewski 1904: 275 fig. 307; Dalman 1908: 196 fig. 117; Brünnow 1909: 249f.; Lindner 1997: 104 and n. 10). Interestingly, we found five more tomb stones in the medieval structures, including one bearing a cross and others with a symbol of the tree of life (**Figs. 33, 34**). The tomb stones were dumped in that area and it was not possible so far to locate the spot of their primary use and, therefore, the cemetery of the medieval Wādī Farasa community. Rather difficult is also the precise connection and interpretation of these tomb stones. Both the cross and the symbol of the tree clearly belong to Christian funerary iconography (on these see *Dictionnaire d'archéologie chrétienne et de liturgie* 1, 2. Paris: Letouzey et Ané 1907: 2691-2709 s.v. arbres [H. Leclerq] and *Dictionnaire d'archéologie chrétienne et de liturgie* 3, 2. Paris: Letouzey et Ané 1914: 3045-3131 s.v. croix et crucifix [H. Leclerq] especially 3054 no.

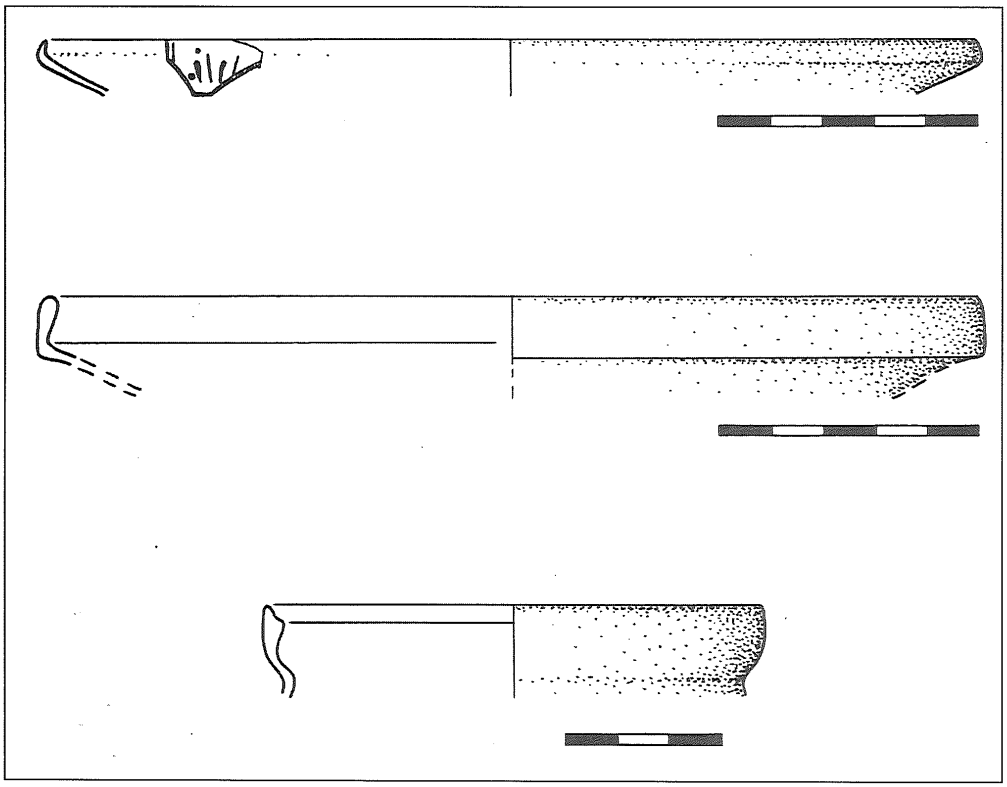
2. The identification of the animal remains was done by Dr. Jacqueline Studer (Geneva).



17. Lower terrace, trench 2, foundations for the floor slabs of the central courtyard from N (Schmid).

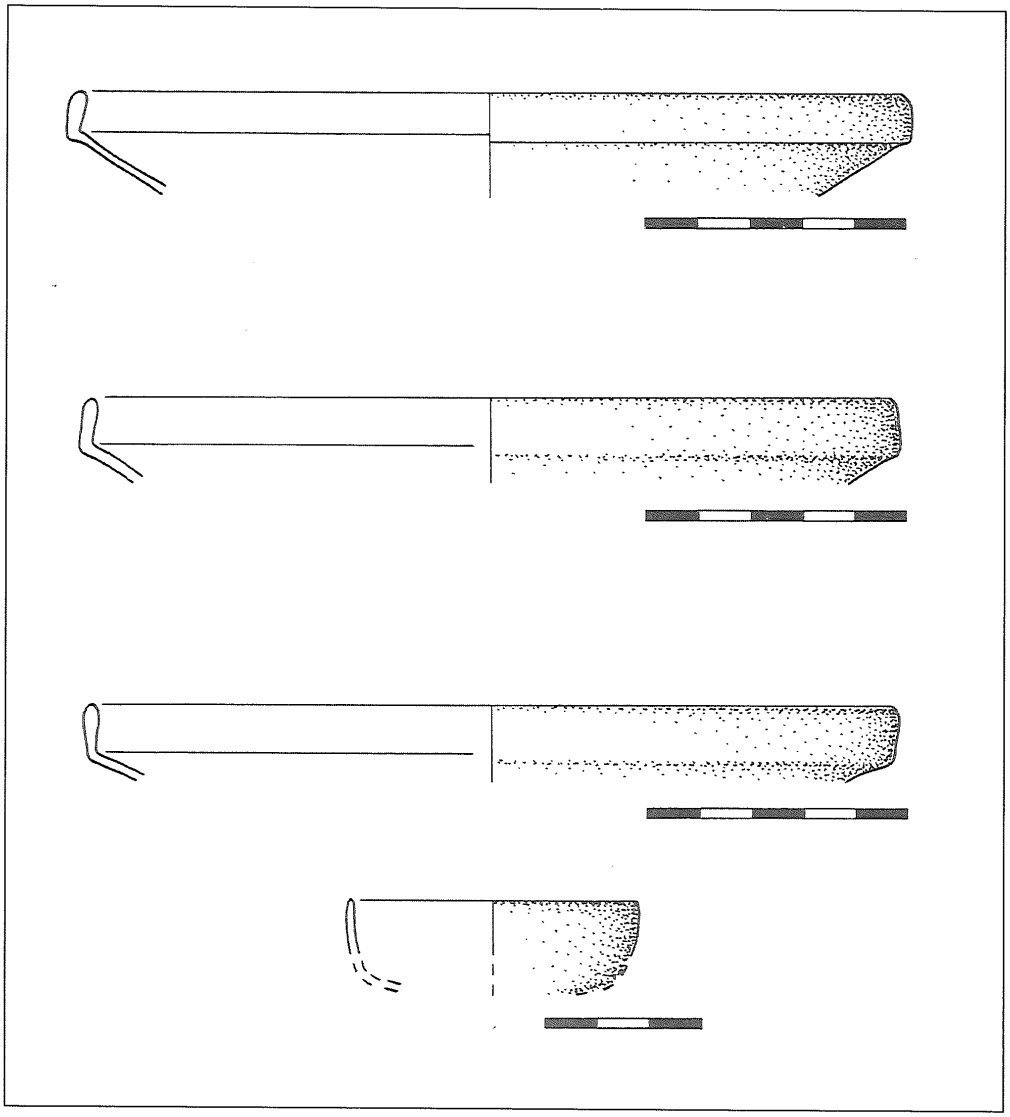


18. Lower terrace, trench 2, detail showing small sounding beneath the level of the floor foundations from NW (Schmid).

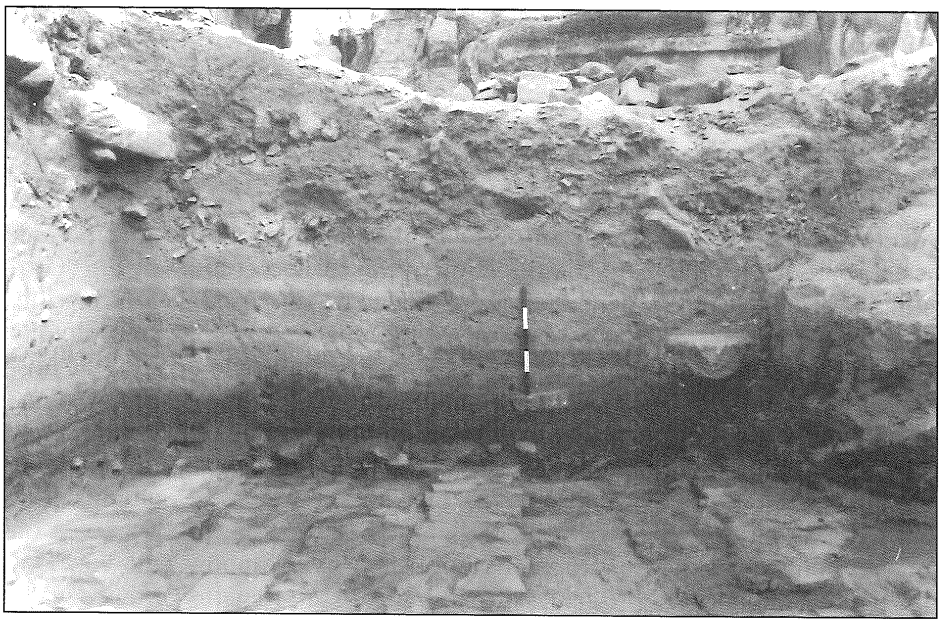


19. Lower terrace, trench 2, Nabataean pottery from the small sounding beneath the level of the floor foundations (Schmid).

3362 for a stylised tree as a symbol on a tomb stone). The question remains, however, whether we can connect them to a Crusader occupation or to a substrate of a local Christian community. The type of cross represented on the tomb stone **Fig. 33** does also occur on Crusader coins (Boas 1999: 183f.), but for the rest, unfortunately, the funerary iconography of the Crusaders has only been briefly analysed so far (in general cf. for example Boas 1999: 226-236). It becomes, however, all the more evident that an important medieval occupation has to be located in Wādī Farasa East, maybe connected with a crusader fortress on top of Jabal al-Madhbaḥ جبل المذبح (Vannini and Vanni Desideri 1995: 512). As the medieval wall in our trench 5 that contains a threshold and, therefore, most probably was the main entrance to the complex during that period, runs in direction of the eastern column of the "Garden Triclinium", it can be supposed that during this later occupation the space between the columns was closed by secondary walls and access was given just via a small corridor. This hypothesis is confirmed by a 19th century sketch of Linant de Bellefonds that shows the "Garden Triclinium" still with some remains of walls between the columns (Laborde and Bellefonds 1828/1994: pl. 30). Even on photographs published by Brünnow and von Domaszewski, and by Dalman, remains of these walls were still clearly visible (Brünnow and Domaszewski 1904: 276 fig. 308; Dalman 1908: 195 fig.



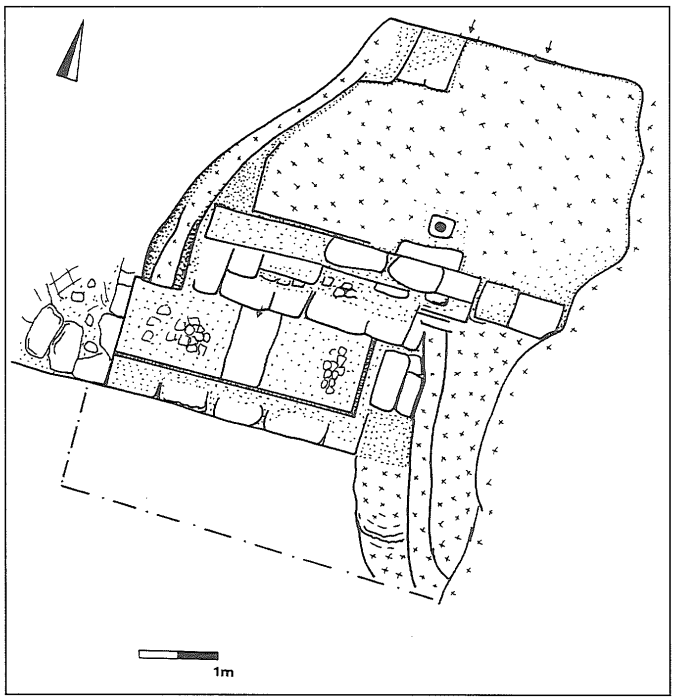
20. Lower terrace, trench 2, Nabataean pottery from the small sounding beneath the level of the floor foundations (Schmid).



21. Lower terrace, trench 2, S-profile showing alluvia and dumped material (Schmid).



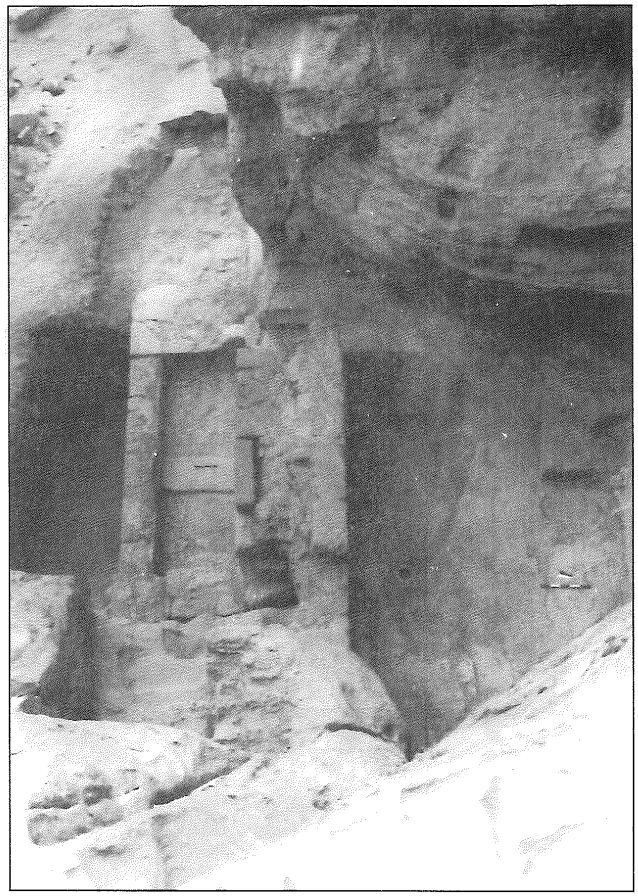
22. Lower terrace, trench 4 with rock carvings for half column from NE (Schmid).



23. Upper terrace, trench 7, showing larger (top) and smaller (below) basins in front of the cistern (Schmid).

116).

Below the medieval walls a water installation was discovered that was fed by a partially rock-cut and partially built water channel, bringing water from the basins discussed above (top left on **Figs. 35, 36**). Excavation of that structure revealed a cistern measuring 4 x 4.20m, covered by three massive vaulted arches and connected to a smaller water basin to the west of (right on **Figs. 35, 36**). Although excavation went down 1.60m from the top of the cistern, its original level was not reached. The covering of the cistern and its considerable depth show that drinking water in large quantities was needed for the "Garden Triclinium". The used water later returned to the cistern through a rock-cut channel starting immediately in front of the

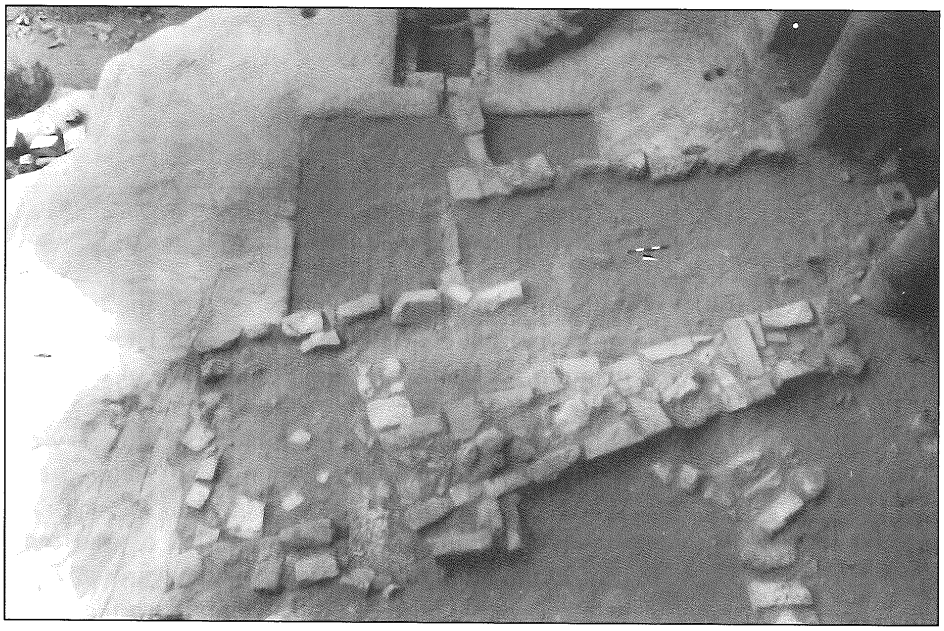


24. Upper terrace, trench 7, showing larger (right) and smaller (left) basins in front of the cistern (Schmid).

rock-cut façade, at its middle between the two columns (bottom centre on **Figs. 35, 36**). The clear indication for the use of large quantities of drinking water strongly points to a rather profane use of the entire complex and against a cultic or funerary aspect. Since the work of Bachmann, Wiegand and Watzinger, it has been known that the area of trench 5 was once at least partially covered by a roof in the manner of a peristyle courtyard, as indicated by rock-cuttings similar to those on the lower terrace (Bachmann, Watzinger and Wiegand 1921: 85-87; cf. arrows on **Fig. 37**). Furthermore, steps leading from above, i.e. the upper level of the huge cistern, towards the area once covered by a roof, as well as a door with a joining doorway that also shows rock-cuttings for a roof (arrows on **Fig. 37**), connecting the area of the roofed peristyle with the zone of the basins in front of the big cistern, indicate that we probably have to imagine a entire first floor above the small peristyle with the rock-cut cistern. With the first floor, the peristyle courtyard, the cistern hewn into the rock and the additional two rock-cut rooms, the entire installation becomes a very good parallel for rich Hellenistic houses like the ones known from Delos or for Roman villas as



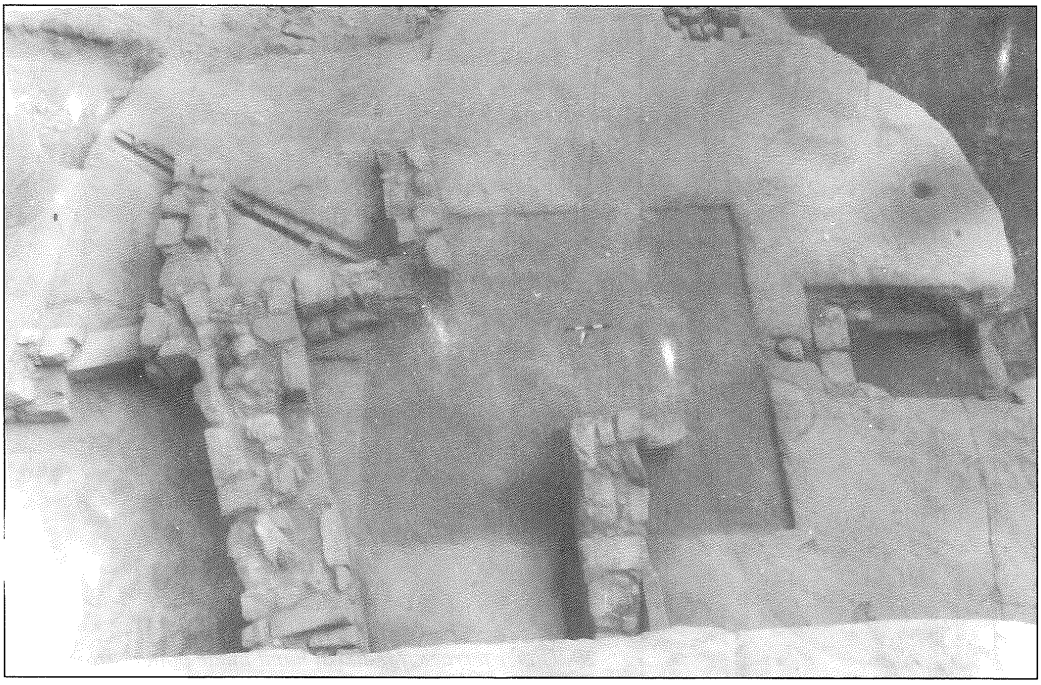
25. Upper terrace, trench 5 in front of the "Garden Triclinium" before cleaning from E (Schmid).



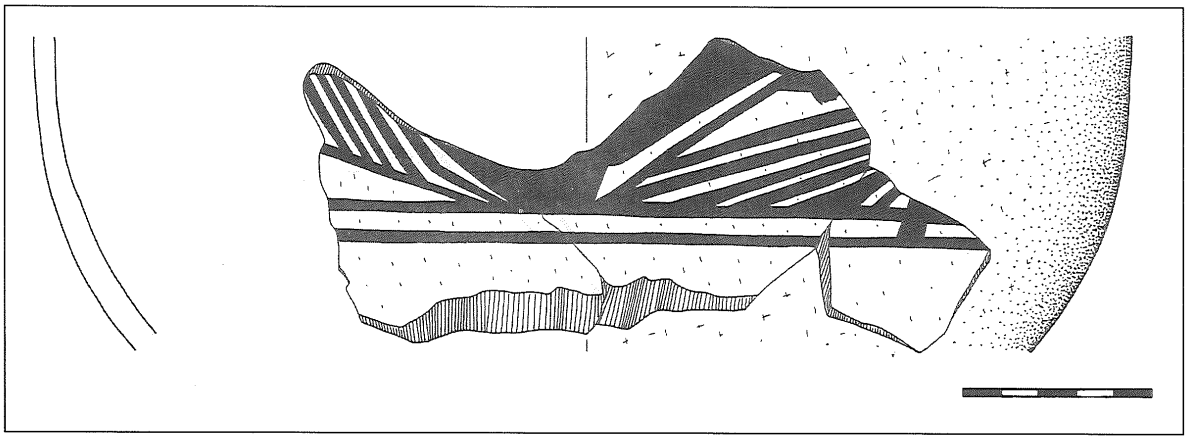
26. Upper terrace, trench 5 in front of the "Garden Triclinium" during cleaning from E (Schmid).

seen in Pompeii (for the Delian houses see for example Kreeb 1988; Trümper 1998; on Pompeii see Zanker 1995; and generally on Italian houses Clarke 1991). More specifically, a type of Roman house prominent in the western empire shows a strong axial alignment (Meyer 1999; Kreeb 1988: 99), that in our case, however, may be due rather to the specific circumstances of the partially rock-cut installation. The profane aspect of our complex is further supported by its opening towards the south. Such an orientation, combined with the courtyard in front, guarantees less heat in summer and less cold in winter. Therefore, according to Vitruvius, such was the location of the most important rooms in the Greek house, the *triclinia* or *androns* (Vitr., *de archit.* VII 149, 3f.). Indeed, similar arrangements were identified within rich houses and palaces of the late Classical and Hellenistic periods in Greece (Reber 1998: 166-169; Zoppi 1991: 92).

The chronology of this primary function of the Garden Triclinium is difficult to establish, mostly due to the intensive later, i.e. medieval reuse of the area. However, the small rock-cut channel leading from the rock-cut rooms towards the cistern (bottom centre on **Figs. 35, 36**) did contain exclusively Nabataean and no later pottery. Most of the frag-



27. Upper terrace, trench 5 in front of the "Garden Triclinium" from N. Medieval walls on top of the Nabataean rock-cut cistern (Schmid).



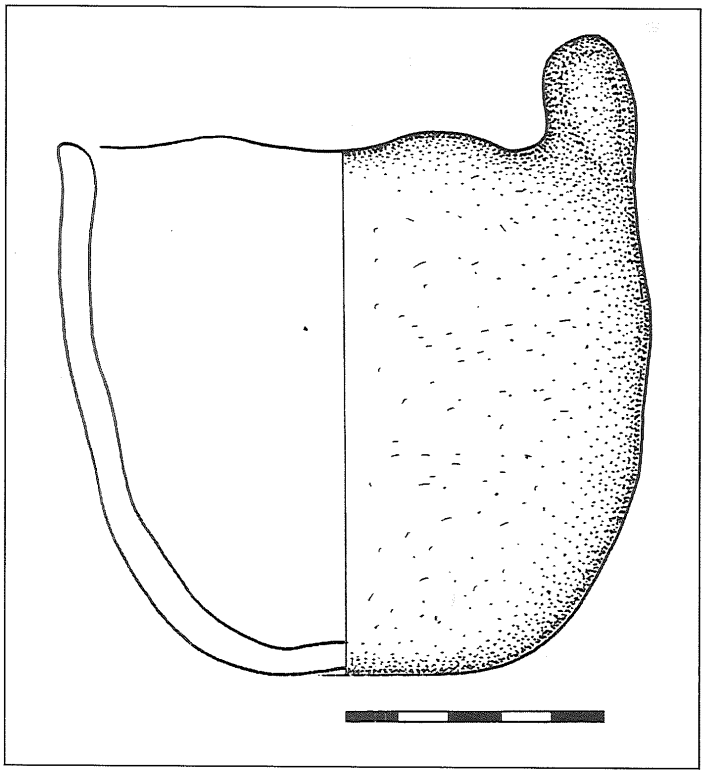
28. Upper terrace, Medieval hand-made painted pottery from structures in trench 5 (Schmid).

ments belong to an almost complete plain bowl of Nabataean fine ware that can be dated to phase 3 of the Nabataean pottery and, therefore, from ca. AD 20-100 (cf. Schmid 2000a: 9 [type E 1c 8] Figs. 52, 53). The broken remains of that bowl covered two bigger fragments of camel bones. Most interestingly, the detailed statistical analysis of different bone material from all over the Petra area by Dr. Jacqueline Studer (Geneva) showed that the camel was exclusively consumed during the Nabataean and Roman periods, while in later periods it disappeared from the local menu (oral communication by J. Studer).[3] It would seem, then, that we have not only a hint for the chronology of the "Garden Triclinium" but also for its rather profane use, including drinking and eating.

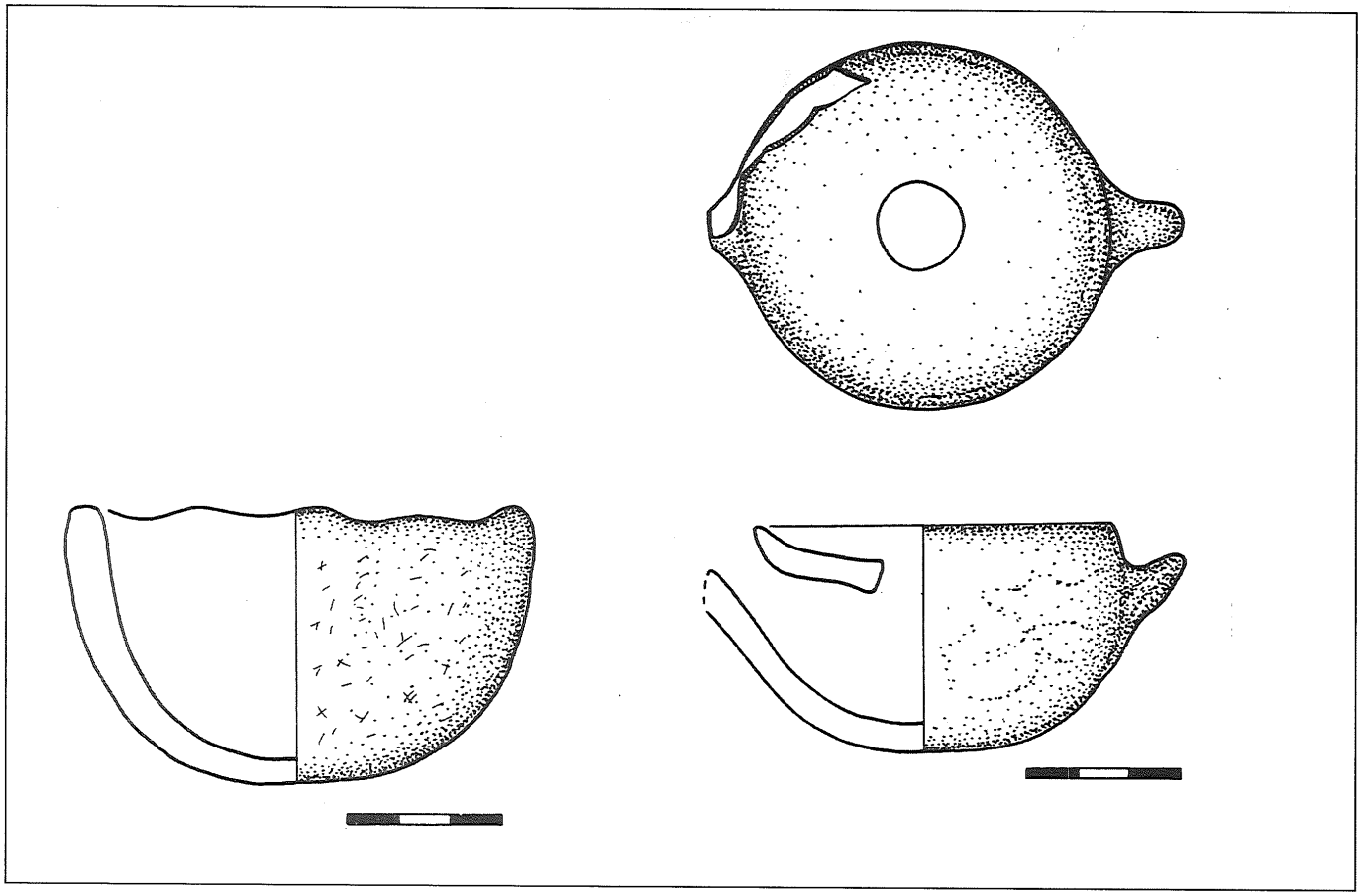
IV. Restoration

Once the different phases of the main retaining wall were understood (cf. above section II), a partial restoration of the wall became possible. The results of our 2001 season showed that, as a matter of fact, the collapse of that wall is not due to water pressure during seasonal rainfalls, but rather to the misled ancient extension of the wall. Therefore, the parts that were already repaired in antiquity and broke out since were taken away (**Figs. 38, 39**), the remaining stones were cleaned and prepared for restoration, and the wall was again closed and repaired up to the level it had before the restoration (**Fig. 40**). For the rebuilding an elastic mortar was used that also contains small pieces of broken pottery — similar to Nabataean mortar — in order to

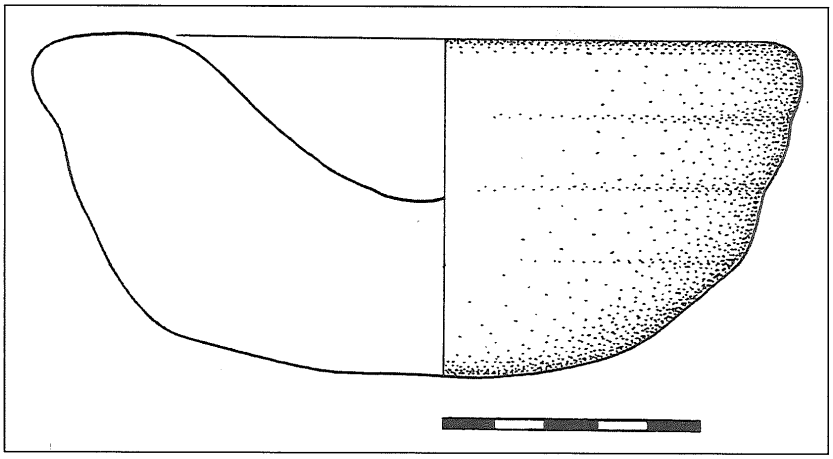
3. For some preliminary thoughts see J. Studer in Frösén *et al.* 2001: 385.



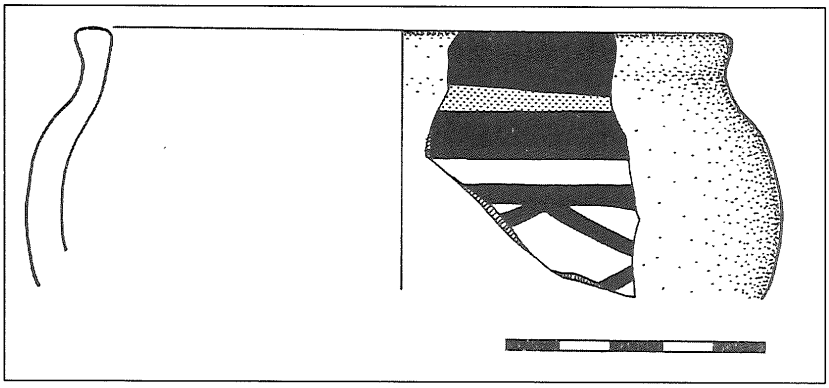
29. Upper terrace, Medieval hand-made pottery from structures in trench 5 (Schmid).



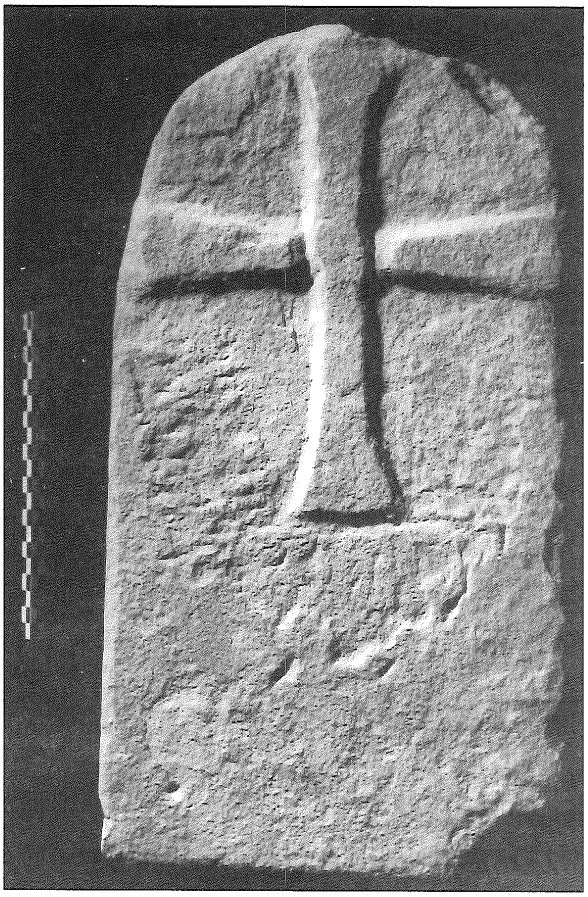
30. Upper terrace, Medieval hand-made pottery (left) and lamp (right) from structures in trench 5 (Schmid).



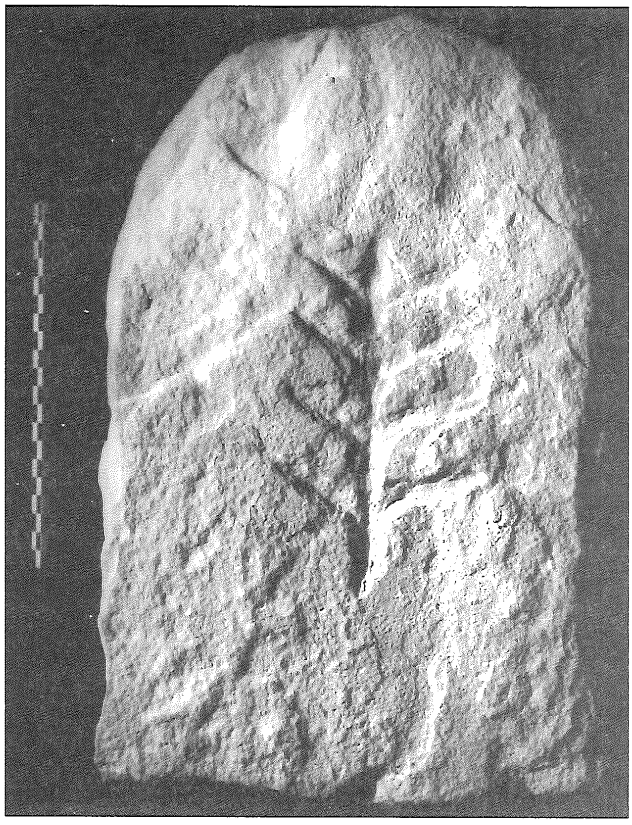
31. Upper terrace, Medieval stone mortar from structures in trench 5 (Schmid).



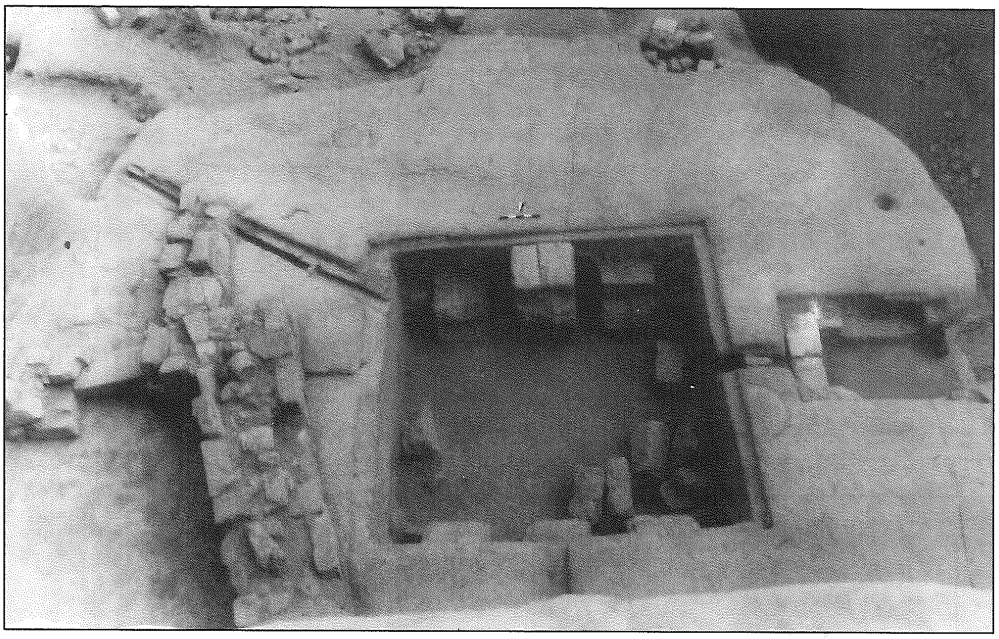
32. Upper terrace, Medieval hand-made painted pottery from wall in trench 5 (Schmid).



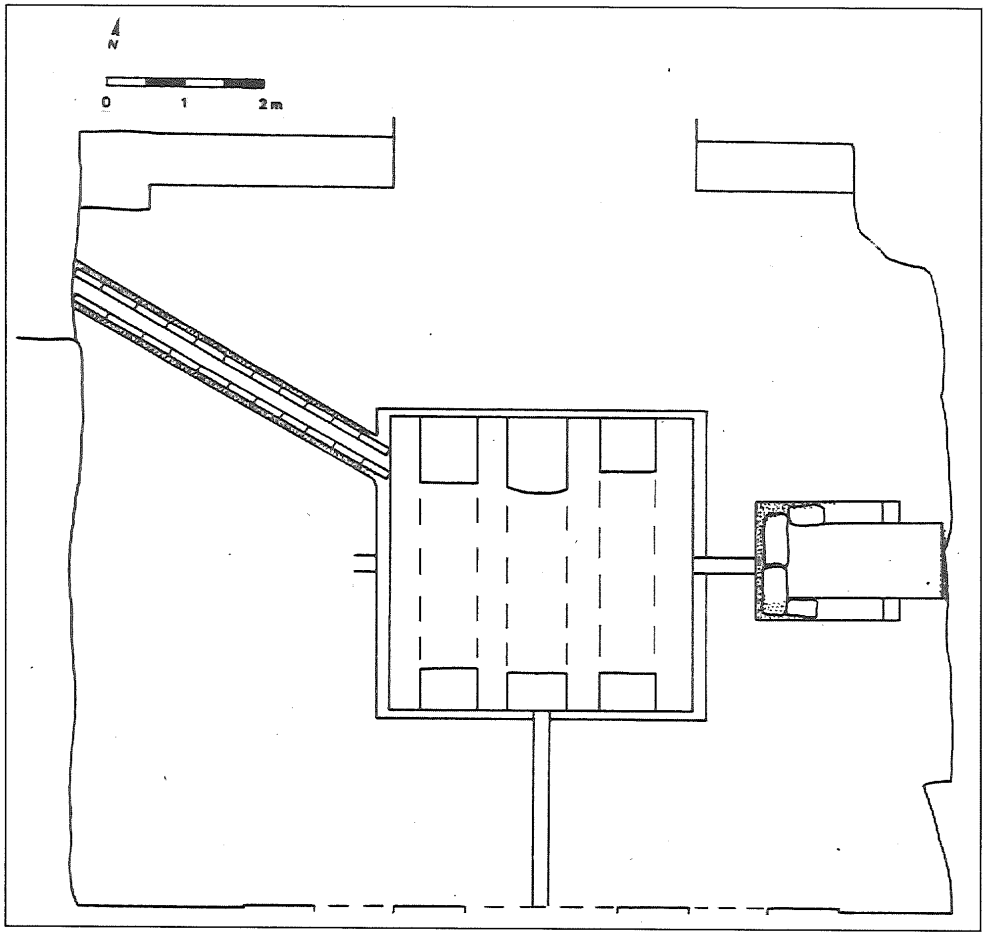
33. Upper terrace, Medieval tomb stone with cross from trench 5 (Schmid).



34. Upper terrace, Medieval tomb stone with tree of life from trench 5 (Schmid).



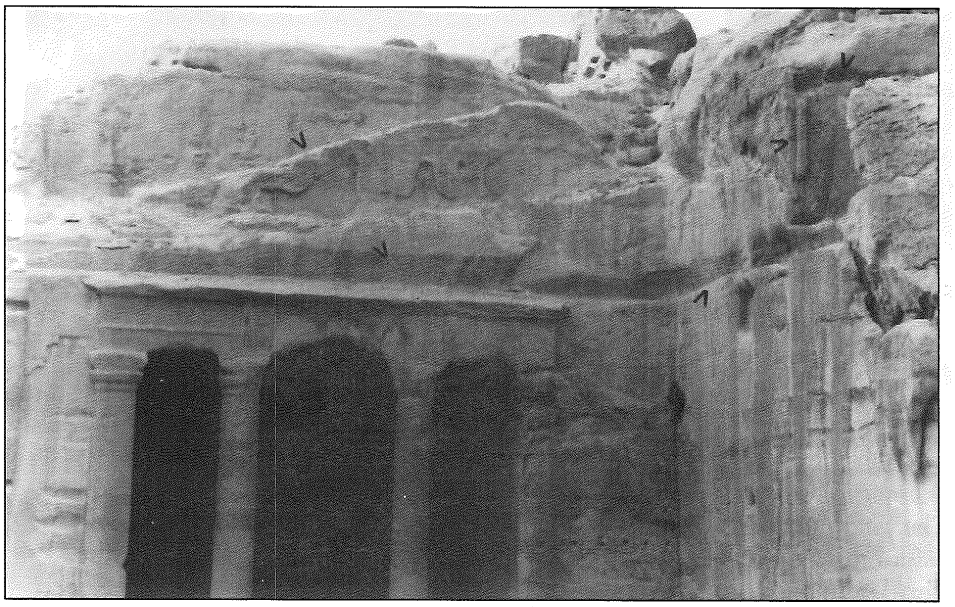
35. *Upper terrace, trench 5 from N. Nabataean rock-cut cisterns and water channels (Schmid).*



36. *Upper terrace, trench 5 from N. Nabataean rock-cut cisterns and water channels (Schmid).*

improve its hydraulic and elastic qualities. Further, in addition to the water channel established during the later phases of the main retaining wall (cf. above section II and **Fig. 14**) a second opening in the wall was constructed in order to allow seasonal flash floods to pass through that area without destroying the wall.

The floor of the main entrance hall was initially covered with huge limestone slabs measuring 40 x 80cm (cf. above section II). As some of them were



37. Upper terrace, "Garden Triclinium" and related structures (rock-cuttings for upper floor etc.) from S (Schmid).



38. Lower terrace, detail of the main retaining wall from NW before restoration (Schmid).

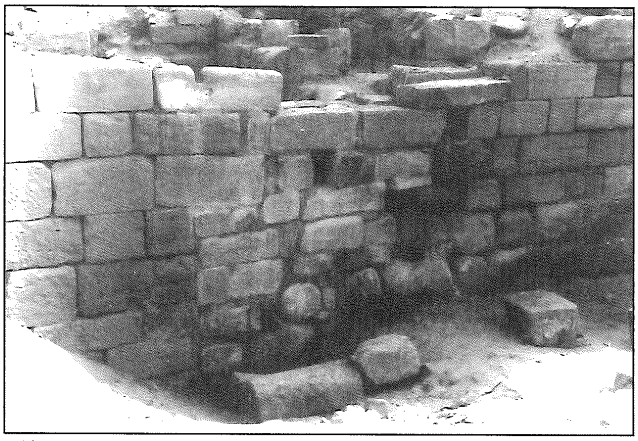


39. Lower terrace, detail of the main retaining wall from NW during restoration (Schmid).

found in the destruction debris of the area, they were put back in their initial position, covered with plastic and sand in order to be ready for restoration once the area will be completely excavated (**Fig. 41**).

V. Perspectives

The results of the 2001 campaign of the IWFP showed that the installations of the lower and upper terrace of the Wādī Farasa East belong indeed to a multifunctional complex, sometimes in



40. Lower terrace, detail of the main retaining wall from N after restoration (Schmid).



41. Lower terrace, trench 1. Main entrance with floor slabs prepared for restoration (Schmid).

astonishingly good condition. The monumental walls, the luxurious dwellings, including two storied living areas with covered cisterns, remains of heated bath installations, etc. clearly point to a wealthy member of the Nabataean aristocracy as owner of the complex. For a coming season the complete cleaning of the "Garden Triclinium", that is the remaining two rock-cut rooms, as well as a continuation of the excavation on the lower terrace, including further restoration, would be undertaken. On the lower terrace, the area where according to the finds of the 2001 season a bathing installation can be supposed, will be a primary goal for further investigations.

S.G. Schmid
École Suisse d'Archéologie en Grèce
Odos Scaramanga 4b
GR 104 33 Athens
Greece

Bibliography

Bachmann, W., Watzinger, C. and Wiegand, T.
1921 *Petra. Wissenschaftliche Veröffentlichungen des Deutsch-Türkischen Denkmalschutz-Kommandos*, Heft 3. Berlin/Lepizig: De Gruyter.

Boas, A.J.
1999 *Crusader Archaeology. The Material Culture of the Latin East.* London/New York: Routledge.

Brown, R.M.
1991 Ceramics from the Kerak Plateau. Pp. 168-279 in J.M. Miller (ed.), *Archaeological Survey of the Kerak Plateau.* Atlanta, GA: Scholars Press.
1988 Summary Report of the 1986 Excavations: Late Islamic Shobak. *ADAJ* 32: 225-245.
1987 A 12th Century A.D. Sequence from Southern Transjordan. Crusader and Ayyubid Occupation at el Wu'eira. *ADAJ* 31: 267-288.

Brünnow, R. E. and v. Domaszewski, A.
1904 *Die Provincia Arabia. Auf Grund zweier in den Jahren 1897 und 1908 unternommener Reisen und der Berichte früherer Reisender.* Strassburg: Trübner.

Brünnow, R.E.
1909 Review of G. Dalman, Petra und seine Felsheiligtümer. *ZDPV* 32: 247-251.

Clarke, J.R.
1991 *The Houses of Roman Italy, 100 B.C. - A.D. 250. Ritual, Space and Decoration.* Berkeley: Univ. of California Press.

Dalman, G.
1908 *Petra und seine Felsheiligtümer.* Leipzig: Hinrich.

Frösén, J. *et al.*
2001 The 1998-2000 Finnish Harun Project: Specialized Reports. *ADAJ* 45: 377-392.

Homès-Fredericq, D. and Franken, H.J. (eds.)
1986 *Pottery and Potters – Past and Present. 7000 Years of Ceramic Art in Jordan.* Tübingen: Attempto Verlag.

Kolb, B. and Keller, D.
2000 Swiss-Liechtenstein Excavations at az-Zantur/ Petra. The Tenth Season. *ADAJ* 44: 355-372.

Johns, J.
1998 The Rise of Middle Islamic Hand-Made Geometrically Painted Ware in Bilad al-Sham (11th-13th Centuries A.D.). Pp. 65-93 in R.-P. Gayraud (ed.), *Colloque international sur l'archéologie islamique. IFAO, Le Caire, 3-7 février 1993.* Cairo: Institut français d'archéologie orientale.

Kreeb, M.
1988 *Untersuchungen zur figürlichen Ausstattung delischer Privathäuser.* Chicago.

Laborde, L. de and Bellefonds, L.-M.-A. Linant de
1828/1994 *Pétra retrouvée. Voyage de l'Arabie Pétrée.* Edited by C. Augé and P. Linant de Bellefonds. Paris: Pygmalion.

Lindner, M.
1997 Beschreibung der antiken Stadt. Pp. 17-36 in M. Lindner (ed.), *Petra und das Königreich der Nabatäer. Lebensraum, Geschichte und Kultur eines arabischen Volkes der Antike*, 6th edition. München/Bad Windsheim: Delp.

Meyer, K.E.
1999 Axial Peristyle Houses in the Western Empire.

JRA 12: 101-121.

Pringle, D.

1984 Thirteenth-Century Pottery from the Monastery of St. Mary of Carmel. *Levant* 16: 91-111.

1985 Medieval Pottery from Caesarea. The Crusader Period. *Levant* 17: 171-202.

Reber, K.

1998 *Die klassischen und hellenistischen Wohnhäuser im Westquartier*. Eretria 10. Lausanne: Payot.

Schmid, S.G.

2000a *Die Feinkeramik der Nabatäer. Typologie, Chronologie und kulturhistorische Hintergründe. Petra - Ez Zantur II 1. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen* (= Terra archaeologica IV. Monographien der Schweizerisch-Liechtensteinischen Stiftung für Archäologische Forschungen im Ausland [SLSA/FSLA]). Mayence: von Zabern.

2000b The International Wadi al-Farasa Project (IWFP). Exploration Season 1999. *ADAJ* 44: 335-354.

2001a The International Wadi Farasa Project (IWFP). Between Microcosm and Macroplanning – A First Synthesis. *PEQ* 103: 159-197.

2001b The Nabataeans. Travellers between Lifestyles. Pp. 367-426 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press.

2001c The International Wadi Farasa Project (IWFP). 2000 Season. *ADAJ* 45: 343-357.

Tonghini, C. and Vanni Desideri, A.

2001 The Material Evidence from al-Wu'ayra: A Sample of Pottery. Pp. 707-719 in *SHAJ* 7. Amman: Department of Antiquities.

Trümper, M.

1998 *Wohnen in Delos. Eine baugeschichtliche Untersuchung zum Wandel der Wohnkultur in hellenistischer Zeit*. Rahden.

Vannini, G. and A. Vanni Desideri

1995 Archaeological Research on Medieval Petra. A Preliminary Report. *ADAJ* 39: 509-540.

Walmsley, A.

2001 Fatimid, Ayyubid and Mamluk Jordan and the Crusader Interlude. Pp. 515-559 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press.

Walmsley, A.G. and Grey, A.D.

2001 An Interim Report on the Pottery from Gharandal (Arindela), Jordan. *Levant* 33: 139-164.

Wenning, R.

1987 *Die Nabatäer – Denkmäler und Geschichte*. Göttingen/Freiburg: Universitätsverlag Vandenhoek & Ruprecht.

Zanker, P.

1995 *Pompeji. Stadtbild und Wohngeschmack*. Mayence: von Zabern.

Zoppi, C.

1991-2 L'architettura abitativa in età ellenistica. Il modello vitruviano e i documenti superstiti. *Rendiconti della Accademia di archeologia, lettere e belle arti, Napoli* 63: 157-198.

SWISS-LIECHTENSTEIN EXCAVATION AT AZ-ZANṬŪR/PETRA: THE TWELFTH SEASON

Bernhard Kolb and Daniel Keller

The 12th and for the time being last excavation campaign on az-Zanṭūr (الزنطور) in Petra by the Basel University Department of Archaeology under the patronage of the Swiss-Liechtenstein Foundation for Archaeological Research Abroad (SLSA) took place from 18 August to 17 October 2001. On the excavation site EZ IV, the archaeologist Daniel Keller (excavation assistant) and the archaeology students Alexander Collo, Esau Dozio, Matthias Grawehr and Consuelo Keller worked under the direction of Bernhard Kolb. The architect Anne-Cathrine Escher and the draftswoman Claude Spiess were responsible for keeping the architectural records. The archaeozoological remains were analysed and documented by Jacqueline Studer of the Musée d'Histoire Naturelle de Genève, while Markus Peter of the Römermuseum Augst identified the coins restored by Christine Pugin. In 2001 the small finds were photographed by Regina Hügli.

We should like to thank Dr. Fawwaz al-Khraysheh, Director-General of Jordanian Department of Antiquities and his collaborators Dr. Khairieh 'Amr, Dr. Fawzi Zayadine, Faisal Qudah and Suleiman Farajat for their cooperation and valuable support with logistics. We are also indebted to Mohammed Abd al-Aziz, curator of the museum in Petra, and the inspectors Hani Falahat, Ahmad Shami and Zuheir Zubi who were appointed to look after our project. We are grateful to the Jordanian Embassy in Berne and the Swiss Embassy in 'Ammān for the administrative support they provided.

A total of 35 workmen from Umm Ṣayḥūn and the surrounding villages were employed on the excavation site. The management of the excavation house was again in the hands of Adnan Falahat with the collaboration of Mohammed Salamin and Haroun 'Id. For the provision of the necessary financial support we owe thanks to SLSA (Zurich), the Canton of Basel-Stadt, the University of Basel, Novartis International (Basel) and DEZA (Berne).

The Nabataean Mansion on EZ IV: Results of the Sixth and Last Excavation Campaign

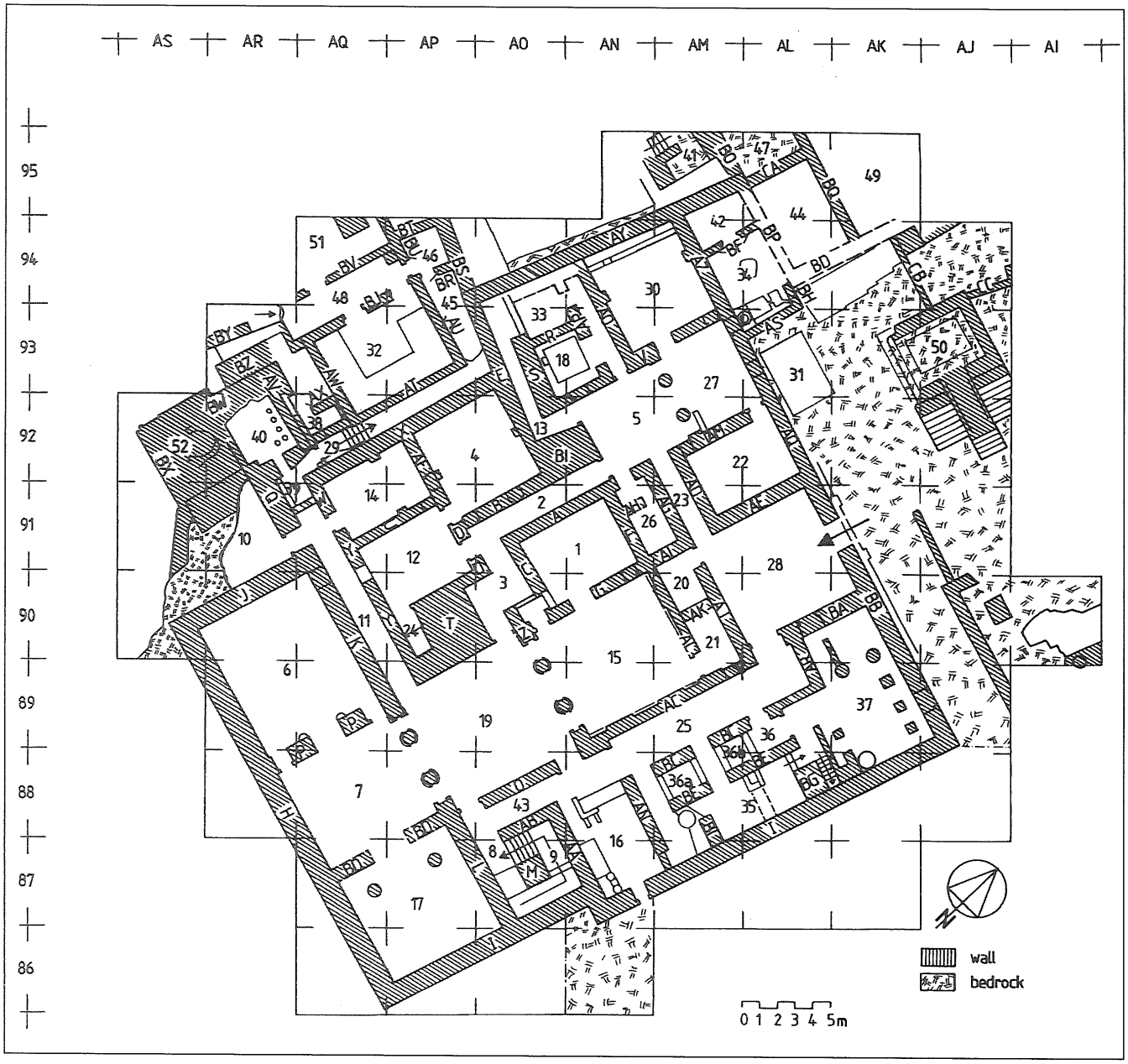
Work with a view to attaining one of the main objectives of the 2001 campaign was commenced on the north side of the site: the search for clues as to how the large building was provided with access and services. Where did the access road run, and the access path to the north of the main entrance? Was the same route followed by the water conduits that fed the two large cisterns under rooms 22 and 27, or did the canal network follow a different plan?

Although the findings made during the nine week period in squares 89-93/AJ did little to answer these questions, our excavations brought to light other, completely unexpected and spectacular structures.

A Neighbourhood Shrine on EZ IV?

Roughly six metres to the north of the main facade AQ/BB, in squares 92-92/AJ and 93/AK, we encountered an altar measuring approximately 6 x 7.5m with a preserved height of approximately 2m and a tripartite stairway leading up to it on the east side (**Figs. 1-3**). Each flight of stairs on the two sides has a width of ca. 2.1m, while the steps of the central flight which projects 1.5m towards the east have a width of 1.7m. The tripartite stairway has step heights of 0.16-0.19m, and on the basis of the preserved total height of the altar it can be estimated that roughly 70% of its original length still remains. The body of the altar was hewn in the form of a squat "step pyramid" from an elevation in the exposed sandstone bedrock. The two bottom steps served as a base for the altar faces built with large, well-cut ashlars which can still be seen along the west, north and south sides (**Figs. 2, 3**). In other words, the rock core of the altar was not originally visible but was encased in masonry.

Positioned at right angles to the main facade of the mansion, the altar relates to a structure that is also located on the same east-west axis — probably a small temple which could only be subjected to a preliminary study in squares 89-90/AJ and 90/AI (**Figs. 1 and 4**). In accordance with the topography of the altar area, on the eastern side of the terrace the bedrock rises markedly and in the zone of square 89-90/AJ, in the form of a poorly preserved foundation wall or terracing wall, it carries the northern end of a building that stood parallel to the

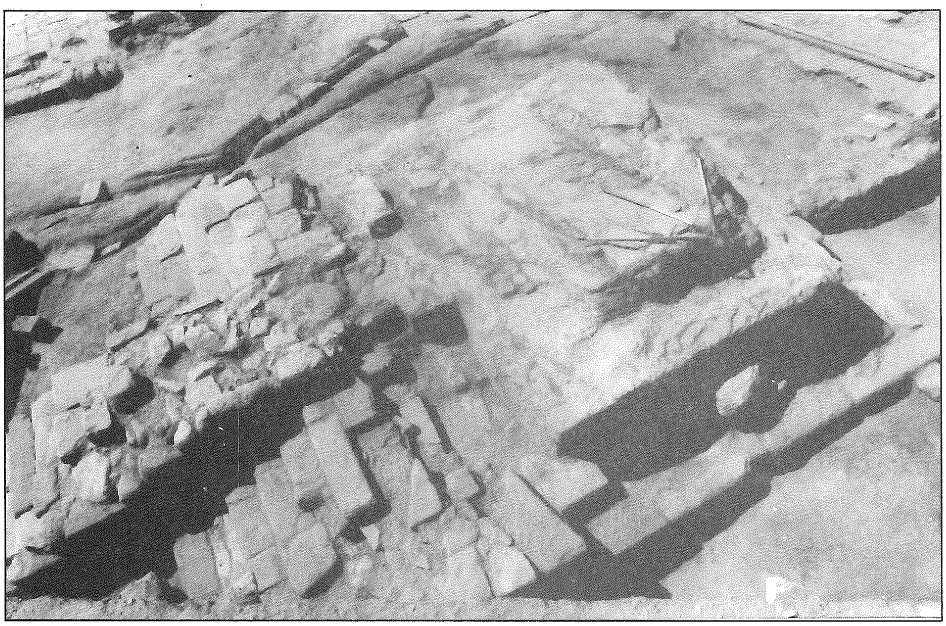


1. Schematic plan of the structures on EZ IV (drawing: B. Kolb).

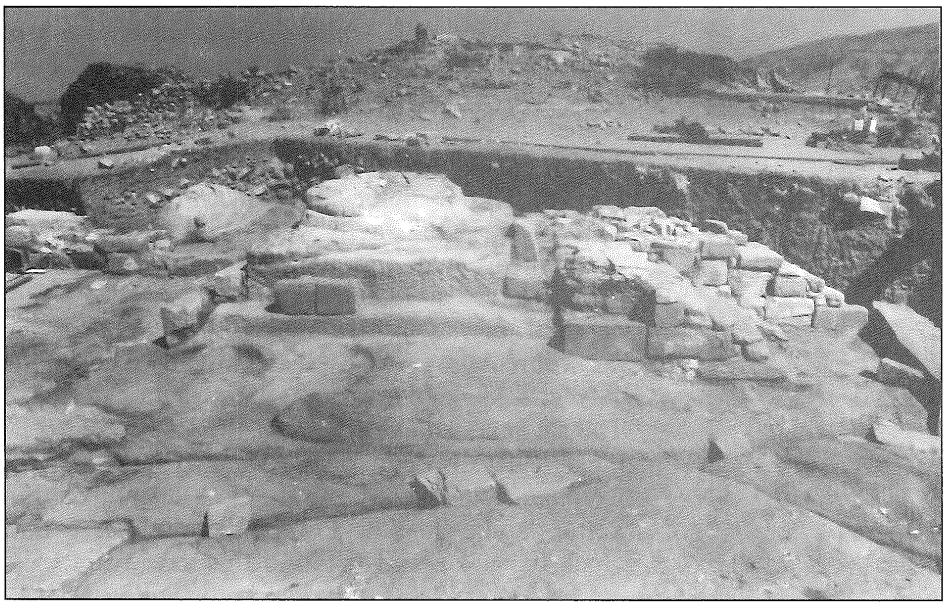
facade of the house at a distance of just over 3m (see **Fig. 8**, lower third of picture). The narrow wall that continues in the same direction in square 90/AJ belongs to a later phase of construction and has nothing to do with the presumed temple building. As a result of the higher level of the rock (926.15m above sea level, or approximately 1m above the level in front of the main entrance to the mansion), the structures examined in square 90/AI were only 40-45cm below the present surface of the terrace and their state of preservation is correspondingly poor. **Fig. 4** shows the remains of a neatly joined stone slab floor which is separated from the bedrock only by a thin levelling layer. To the east, the boundary of the stone slab floor is formed by a *stylobate*(?) with a half-exposed column drum. Unfortunately this evidence is insufficient to give a clear picture of the body of the building.

The important question of the date of construction of the neighbourhood shrine or its chronological relation to the mansion cannot be answered for the present. Both the altar and the structures in square 90/AI are built directly on the rock, and thus lack foundations that might contain possible dating evidence. It was decided not to carry out a partial dismantling of the altar stairways because the remaining structure shows clear signs of repair and there would be no certainty of finding undisturbed fill material beneath the steps.

During the excavation of square 91-92/AJ, a



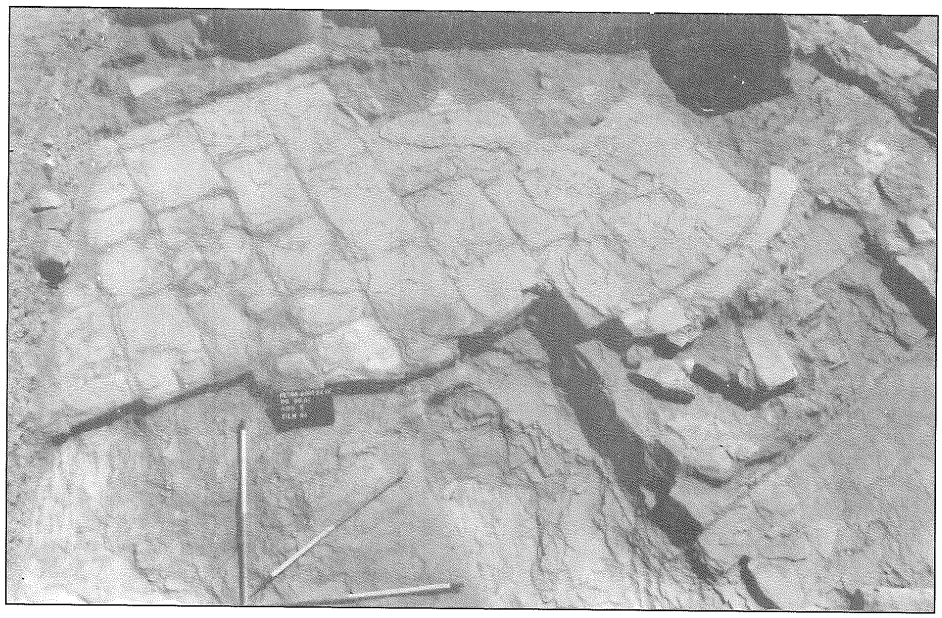
2. View from the north of the partly rock-hewn, partly built altar 52 with the main entrance to the mansion in the upper left corner of the picture (photo: D. Keller).



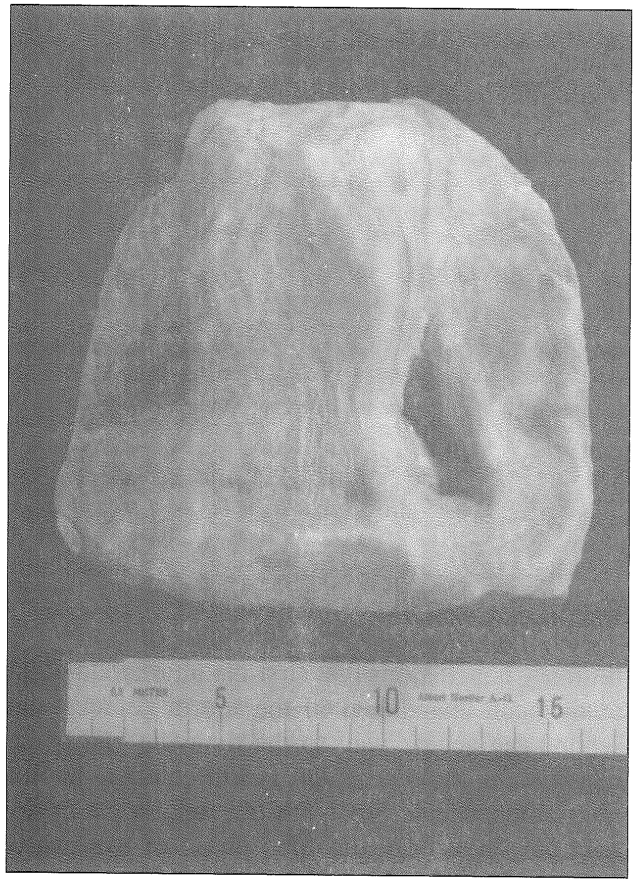
3. Altar 52 from the south with az-Zanṭūr in the background (photo: D. Keller).

layer of ash with a thickness of up to 1.5m was documented which extended from the north, continued over the altar steps and petered out on an east-west line roughly 3m from the facade of the house. On this line the ash met with the northernmost debris of the north facade of the mansion that was destroyed in the earthquake of AD 363. The described clear dividing line between ash and debris is also reflected in the finds made in the two zones: the material from the lowest ash strata dates from the second and more towards the third century AD (squares 91/AJ, Abs.5, FK 3611; 92/AJ, Abs.5, FK 3543 and Abs.6, FK 3549), while the small finds from the layer beneath the debris of the collapsed facade date uniformly from the fourth century (91/AK, Abs.4, FK 3339). This allows the preliminary conclusions that first the altar area had already been abandoned in the fourth century, and second the access way to the mansion can be reconstructed, at least in the fourth century, as running along facade BB from the east, since in this area the finds from the final phase of use extend down to the bedrock.

The northwest profile of squares 92-91/AJ contained architectural parts such as fragments of bases and capitals, architraves etc. which may have belonged to a *portico* forming the northwestern limit of the area with altar and small temple. Without further excavations in this zone it will be impossible to determine with any clarity how the small temenos to the north of the mansion was configured and how this complex fitted into the layout



4. The rock outcrop and the remaining structures of a small temple (?) to the east of the large altar 52 in square 90/AI (photo: D. Keller).



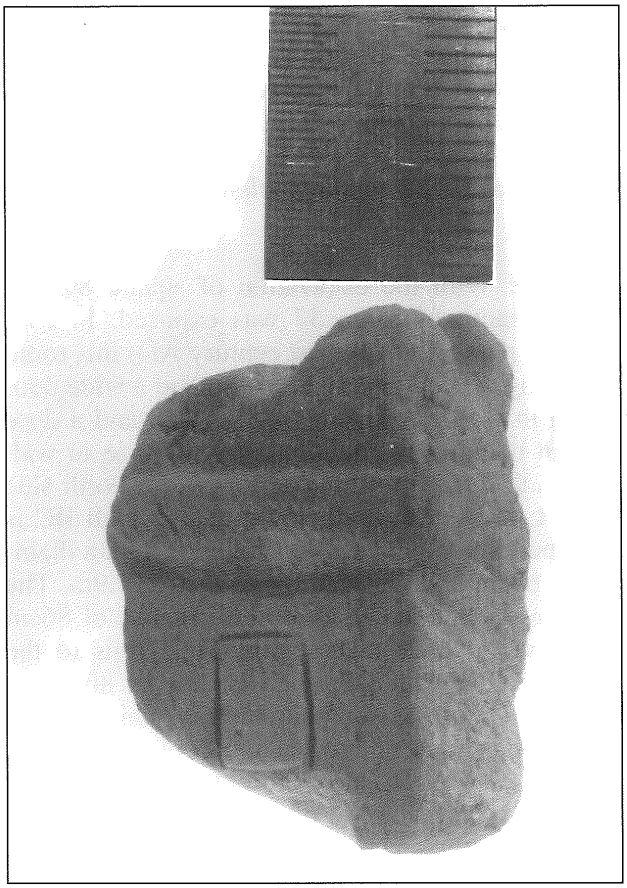
5. Fragment of an imported alabaster statuette of Isis (photo: R. Hügli).

of the buildings in the vicinity. Let us briefly consider the question of which deity the area was dedicated to. In square 91/AJ, between the large altar and the probable temple, in Abs. 4 a very well preserved fragment of a cast bronze statuette came to light, a lyre — the instrument of Apollo (EF 3483, height 5.1cm, max. width 4.7cm). On the back of this masterfully formed instrument, the left hand by which it is held and the wrist are preserved. Some 6m to the west of the altar, in the areas of rooms 44 and 49, two statuette fragments of enthroned female deities in stone were recovered. **Fig. 5** shows the heavily weathered, preserved legs of a seated female figure in Egyptian alabaster (95/AK, Abs. 3, EF 3430, height: 17cm, width: 18cm, depth: 18cm). The certain origin of the stone and the still recognisable seat leave little doubt as to the subject's identity as a mourning or nursing Isis.[1] The second statuette fragment (**Fig. 6**) can also be presumed to be part of the same type of Isis, of which various examples have been documented in Petra. Again only the lower part, sculptured in a block-like form and made in this case from local calcareous sandstone, is preserved (Square 95/AL, Abs. 1, EF 3379, height: 8.8cm, width: 5.7cm, depth: 5.7cm). If we also consider the relief medallions with positively identified representations of the gods Ares/Dusares and Allat/Athena, the circle of possible "candidates" is further enlarged (Kolb and Keller 2001: 314-315 and fig. 6). The remarkable number of possibilities opened up by the finds does not allow the deity to be named with any certainty — a situation which is typical of Petra. For none of the three temples so far excavated at Petra has a principal deity been positively identified without doubt. In this connection mention should also be made of the eye idol briefly presented in the report of the previous season, which was found secondarily incorporated into a stone alignment

1. The mourning Isis is well documented in Petra. Cf. Bricault 1992: 37-49; Hammond 1990: 115-130. For more general information on Isis see V. Tran Tam Tinh, Isis in *LIMC* V 1 (Zurich and Munich 1990): 761-796.



6. Fragment of a statuette of Isis made from Petra limestone (photo: R. Hügli).



7. Fragment of a miniature horned altar in limestone (photo: R. Hügli).

(Kolb and Keller 2001: 320-321 and fig. 14); finally, among the new finds with a cultic significance, a fragment of a miniature altar (**Fig. 7**) warrants mention. It was found in square 86/AN, Abs. 5, in the sloping area to the east of the outer wall (EF 3460, height: 3cm, width: 2.6cm, depth: 1.8cm).

The findings made in 2001 throw a new light upon the architecture and painted decoration of the northern facade as presented in the report on the 2000 campaign (Kolb and Keller 2001: 315 and figs. 4-6): A year ago, the reconstructed quasi-monumental main entrance to the mansion with its lateral pilasters supporting a Doric frieze with busts of gods in medallion frames, and also the paintings which depict a libation on the lateral surfaces of the facade, confronted us with a number of interpretation problems. The most recently unearthed structures now show that the whole configuration of the northern facade can be regarded as a decorative boundary to the sacred space in front of the main entrance. But there is also no doubt that the owner of the mansion (and possibly also priest) could count on his house being "ennobled" by having the shrine in the immediate vicinity. His two-storied domicile was enthroned upon the highest rock terrace of the al-Kātūta ridge (الكاتوتة), and its exposed south, west and east sides probably dominated the view from the whole southern part of the city of Petra. Only the northern side was hidden by the rocky hill of az-Zanṭūr, and it is here that we find the little shrine set in front of the mansion. We can confidently say that the building was sited in this way with the specific aim of enhancing status, in the same way as is familiar to us from late Hellenistic and Roman republican private architecture of the highest level.

To sum up the activities in the northernmost grid squares, it can be said that after the completion of the excavation on EZ IV, not only has the most important Nabataean private building of Petra been exposed, but also that with the discovery of the close spatial connection with the probable neighbourhood shrine, this building complex has been revealed as one that seeks its equal even beyond the limits of the Nabataean realm. The only parallel that can be named in the narrower geographical area is the Herodian construction at Samaria. Beside of the large temple dedicated to Augustus lie the remains of a peristyle villa from the late first century BC, which was most recently in-

terpreted as part of the palace area of Herod the Great.[2] In contrast to EZ IV, however, the podium temple dominated the private building that stood beside it in every respect.

Room 37 and the Soundings along the Eastern Facade

Room 37: With the excavation of square 89/AK, the remainder of room 37 was exposed. In construction phase 1 (early first century AD) this room measuring approximately 8.2 x 4m had a wide door (1.2m) in wall BA leading to room 28 and a door with an opening of roughly the same size in wall BB which opened to the exterior on the north side (**Figs. 1, 8, 9**). The north-south axis of wall BC is continued in room 37 by two columns with a diameter of 63cm and an intercolumnium of 1.9m. The northern column is followed at a distance of 86cm by a row of three square pillars that runs to the south of outer wall BB at a distance of 80cm. A small *ṭābūn* built against the servants' staircase and wall I stands in the southwest corner of the room.

A look at **Fig. 1** clearly shows that in its original state the room had none of the supports shown in the plan, for the southern columns block access to the door in the northwest and one of the three pillars on the northeastern long side obstructs the exterior door in wall BB. An approximate *terminus post quem* for the parts incorporated at a later stage is provided by the findings from the two door areas. The data which have yet to be discussed from the area of the exterior doors in the northeast, and the finds from the partly dismantled walling-up of the northwestern doors, both suggest that the door closing devices date from the early second century AD, i.e. construction phase 2. All the described supports incorporated at a later stage were built directly on the floor of sandstone slabs, which did not jeopardise stability since the rock surface was only a short distance below the floor. In the destruction horizon of AD 363 (Abs. 2, FK 3460; Abs. 3, FK 3467), an unusually large number of tile fragments (several hundreds of kilograms) was found in the zone between the supports and wall BB, which suggests that the supports in room 37 carried a tile-covered gallery. The relatively high proportion of brick fragments must have been incorporated in the upper parts of the pillars or is attributable to brick-built structures at storey level.

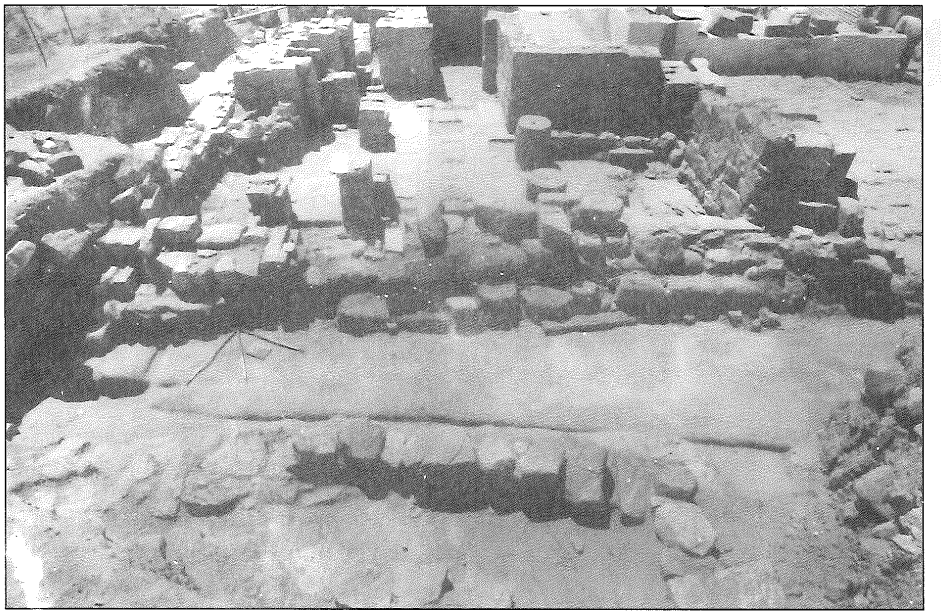
It has not yet been established why the small *ṭābūn* from the last occupation phase in the south-east corner of the room was built on a layer of ash 40cm thick, which extended 1.5m into the room, or in which connection the ash came to be in the room.

In *squares 87/AK-AL and 88/AJ*, the rubble was cleared to the level of the fourth century AD, which, in combination with the evidence in 86/AN (see below) gave an idea of the fourth century level along the east facade. The fourth century surface is particularly well preserved in square 88/AJ, where a layer of stone chips a few centimetres thick with added loam descends steadily in a southerly direction from the northern corner of the house (**Fig. 9**). At the corner of the outer walls I/BB the layer has a surface level of 924.56m above sea level. Surprisingly, in the adjacent square 89/AJ there is no evidence that the layer extends along the main facade to the northwest or of the existence of a wall or stair construction. (cf. **Fig. 9**). The bedrock surface that was reached in 89/AJ, Abs. 5 runs just over 50cm below the level of the layer with values of approximately 923.90-924.00m above sea level, and the finds (FK 3530) indicate that it was still walked upon in the fourth century.

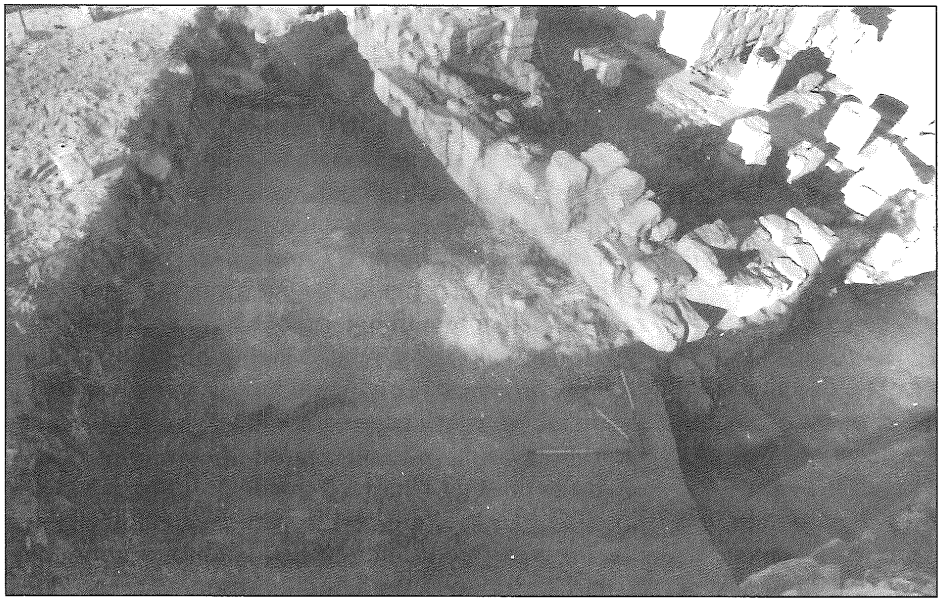
At this point we must again consider the possible course taken along the north facade of the mansion by the road mentioned at the outset. In the original state of the building, room 37 opened with a wide door (opening width approximately 1.3m) onto the zone of the presumed road in front of the north facade.[3] Due to the extensive destruction of wall BB in the earthquake of 363, the level of the outer threshold can be only approximately stated as 925.00m above sea level (cf. **Fig. 8**). Immediately to the north of wall BB, a levelled, strip-like structure of flat stones and ample quantities of earth fill material runs for a distance of just under five metres along the main facade (level approximately 924.65-70m above sea level). Two details are of significance: 1. a thin stratum of ash divides the cross-section of the structure into two layers; 2. at the level of the western door post, a small architectural block with a finely worked *Lesbian cyma* protrudes from the profile beneath the ash (marked with arrow in **Fig. 8**). The outlined findings suggest to us that the architectural block broke away from its original place in the architectural decor of the north facade in the earthquake of the early sec-

2. Barag 1993: 4ff, considers the peristyle house to be part of a complex consisting of various buildings which was built for Herod the Great in Samaria. It is quite conceivable that in the choice of the site for the dwelling house, Herod was inspired by the house of Augustus in Rome, which is known to have been built beside the Temple of Apollo, cf. Carettoni 1983.

3. The door was probably walled up as part of the measures to consolidate the structures after the stated earthquake in the second century AD.



8. Northeast corner of the mansion with room 37 seen facing south from square 90/AI (photo: D. Keller).



9. The exterior level of the fourth century AD and room 37, viewed facing southwest (photo: D. Keller).

ond century AD which has already been repeatedly referred to, and came to rest in front of the door to room 37. The overlying thin layer of ash can be attributed to the same event. From the location in which the block was found we can deduce the "street level" in the early second century, and arrive at a figure of approximately 924.50m above sea level. The difference in level between the outside/street level and the door of room 37 must accordingly have been roughly 50cm — a height that is quite possible in the private architecture of Petra (Kolb 2000: 254). In this zone, the same is confirmed as was established a year earlier for the area to the north of the main entrance: in the last phase of use the surface of the access path was completely torn away except for the above-mentioned narrow strip along the facade. In view of this fact it remains unclear how the building was linked with the much higher fourth-century level in square 88/AJ which is discussed above.

Squares 86-87/AN were cleared down to the bedrock in order, on the one hand, to obtain a reference for the course of the rock on the east side of the terrace, and on the other hand in order to establish whether traces of a stair construction are preserved directly beneath the narrow door of room 16 (cf. **Fig. 1**). It can be seen from **Fig. 10** that in the rock flank that falls away irregularly and steeply to the east there is an entrenched gulley — probably a drainage canal — which originates 15 metres further to north in a shallow basin at the foot of house corner I/BB (cf. **Fig. 9**) and follows the east facade



10. Square 86/AW: view facing south-west of the steeply downward-sloping rock with drainage canal in front of the east facade I (photo: D. Keller).

in a southward direction at an average distance of 30cm.

In square 87/AN, despite the large height difference of 1.35m between the door threshold in wall I and the exposed rock, no evidence could be found of stairs leading down from the door of kitchen 16. In view of the narrow door opening (0.5m) and the lack of evidence of an outside staircase, a customary use for the door can be ruled out — it may have served for the disposal of kitchen or other waste.

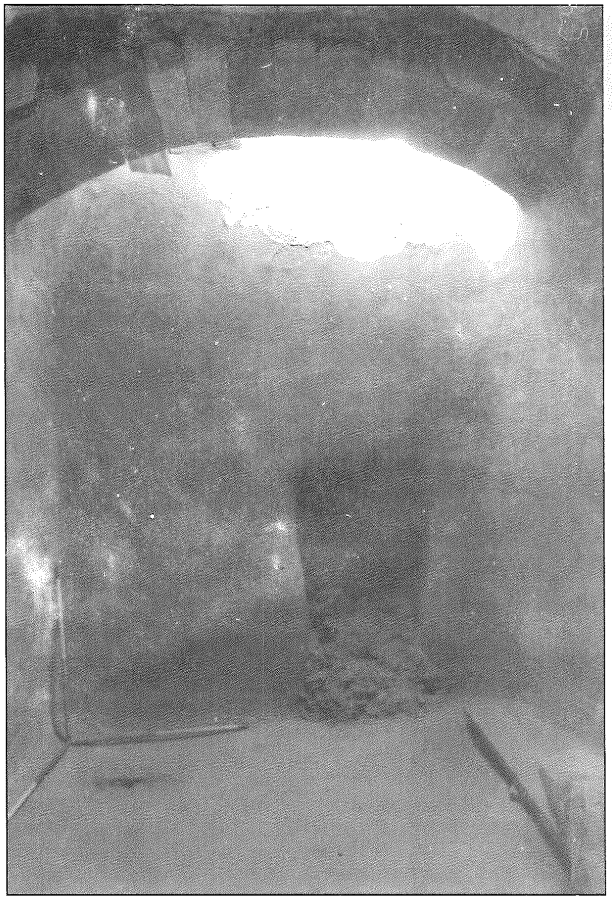
Stratigraphic excavation in square 86/AN unexpectedly brought useful data on the history of the mansion's construction phases and destruction. The ash deposit in Abs. 2 with FK 3524 and 3533 provided clear indications as to the final destruction in 363. A further chronological "bar line" — a somewhat vaguely defined construction phase 2 in various parts of the terrace in the late first or second century AD — received clear confirmation in the form of a thin layer of ash. The lamp and glass finds from the associated FK 3546 date homogeneously from the second century AD, and confirm the assumption of a moderately severe (not historically documented) earthquake that led to the structural repairs observed in various places and the renewal of a number of interior decorations. The last-mentioned FK also included a small series of painting and stucco cornice fragments that will be of great value in the coming reconstruction of the two-phase wall and ceiling decorations. In other words, the stratigraphy in square 86/AN enabled the most important events in the constructional history of EZ IV to be more clearly visualised than was the case in any other part of the terrace.

The Cisterns of Rooms 22, 27 and 17 (Southern Substructure)

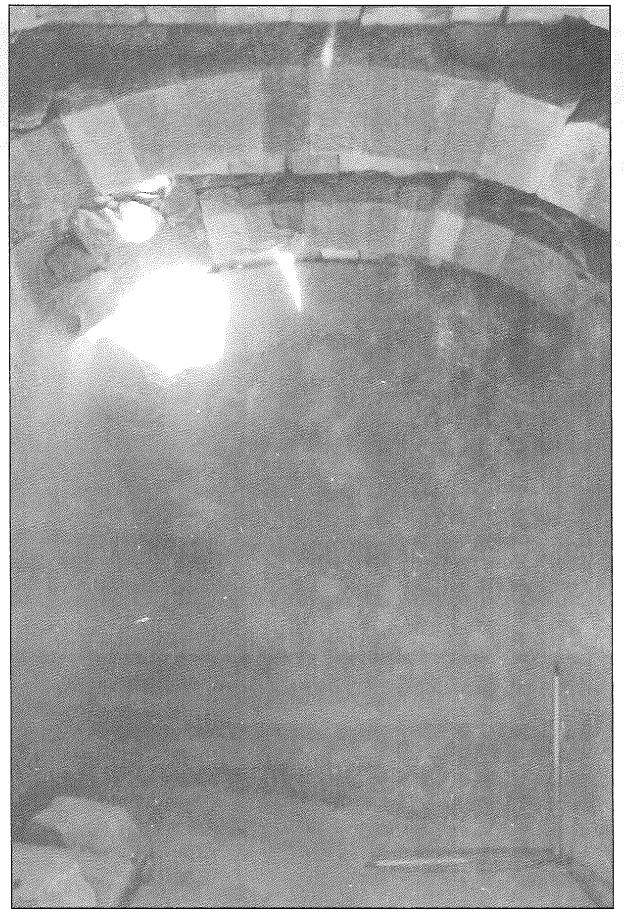
A team of six workmen was entrusted for the duration of the campaign with the difficult and complex task of clearing the rubble-fill from the cisterns beneath rooms 27 and 22. In order not to unduly endanger the damaged floor structure of room 27, the remaining rubble amounting to approximately 40 cubic metres had to be hauled up in buckets on ropes. This procedure was also used in the neighbouring cistern 22, although in this area the rubble could only be cleared down to floor level in the northern half of the rock-hewn installation. Thanks to the care taken in clearing the rubble, the waterproof layer of hydraulic mortar on the cistern walls was very largely preserved (**Figs. 11, 12**).

The water stored in cistern 27 originally flowed from a smaller, likewise rock-hewn cistern located to the north under room 34 through a vertical rectangular opening 1.45m high and 0.4m wide (**Fig. 1**).[4] The neighbouring cistern under room 22 also has a storage installation further to the north which communicated with the main storage container via a shaft, and even the two main cisterns were linked by a tunnel 0.8m wide and approximately 1.5m wide under wall AM (cf. **Fig. 11**). The water storage complex in squares 92-93/AL-AM is of first-class workmanship and in excellent repair but provides no clues as to the route followed by the lost water conduit(s) that fed the cisterns. The finds deposited on the floors of the cisterns show that the

4. The connection was walled up and sealed with hydraulic mortar at an unknown point in time.



11. Cistern under room 27: view to the east of the rock-hewn communicating tunnel to the cistern under the adjacent room 22 (photo: D. Keller).



12. Cistern under room 27: view of the west wall and the roof construction (photo: D. Keller).

cisterns were used and maintained up into the fourth century.[5]

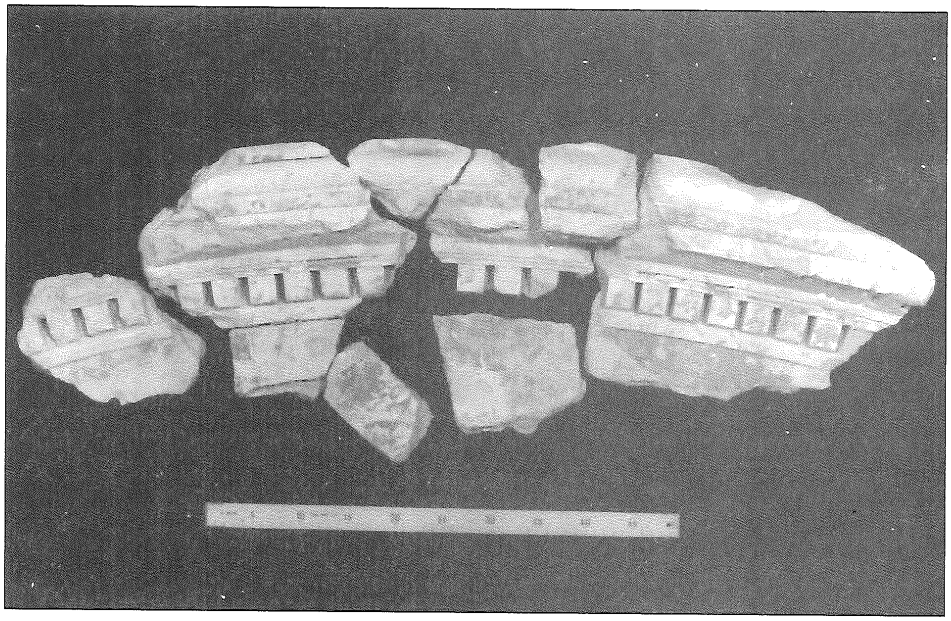
In the southern substructure of room 17, the removal of the rubble-fill from the small cistern of the earlier building which began in the previous year was completed (see Kolb and Keller 2001: 317-319). We again recovered many fallen architectural fragments and fragments of the wall and ceiling decoration from room 17. The rich finds of curved stuccoed cornice fragments were evidence that banqueting room 17 was roofed by a barrel vault (**Fig. 13**). Some sequences of the wall decor could also be reconstructed. **Fig. 14** shows the margin of an endless repeat pattern consisting of polychrome octagons and squares which is terminated by a painted stucco profile with a key-pattern frieze. The achieved "wallpaper effect" is reminiscent of decoration systems of the fourth Pompeiian Style from the last third of the first century AD.[6] In other words we can assume that the preserved parts of the decoration of room 17 belong to construction phase 2 and date from the early second century. However, the system "à la mode romaine" has — quite characteristically of the Nabataeans — been enriched with elements that are not found on contemporary Roman walls, such as the notching of the outlines of both the squares and the octagons. Here we thus have an anachronistic element which originates from the Hellenistic Masonry Style which was highly esteemed by the Nabataeans and was combined with contemporary decor types in the described form (cf. Kolb 2001: 441-442 with bibliographical references).

Final Soundings on the West Flank of Terrace EZ IV

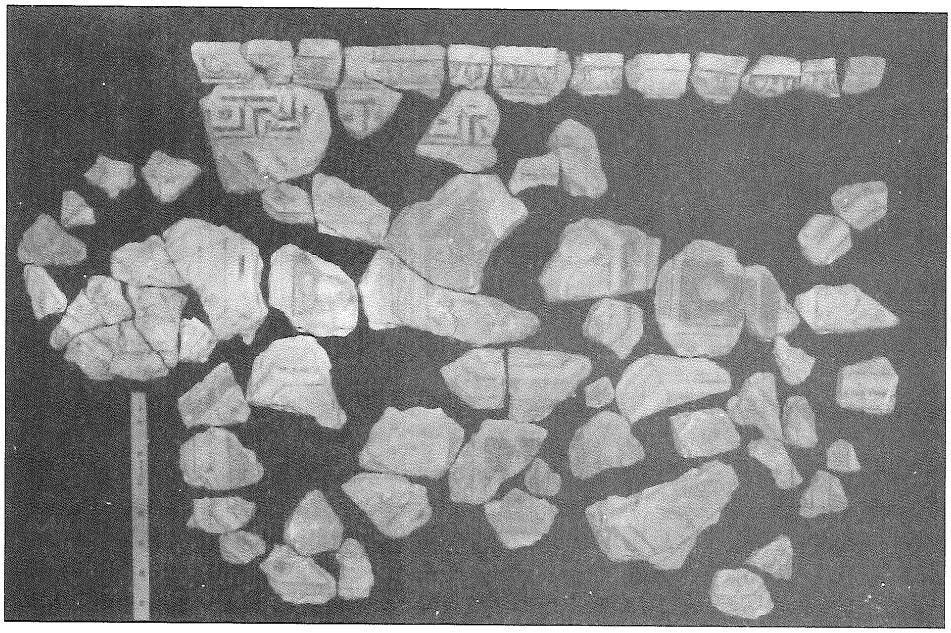
The Bath-house: In the southwest corner of the building, in the preceding year, with room 40 and room 39 we exposed the caldarium and the praefur-

5. The small amounts of sand deposited on the cistern floors indicate that maintenance and cleaning work continued until the very end.

6. For Roman examples of "wallpaper patterns" from the time of Vespasian cf. Thomas 1995: 156 figs. 100-101 with details of walls from room 9 of the Villa d'Arianna in Stabiae and from Cubiculum I of the Casa degli Amorini Dorati in Pompeii (VI, 7.38).



13. *Room 17: fragments of the dentil cornice from the lunette of the barrel-vaulted ceiling (photo: R. Hügli).*



14. *Room 17, wall decoration: continuous repeat pattern consisting of octagons and squares with terminal key-pattern frieze and stuccoed ledge (photo: R. Hügli).*

nium of a small private bath-house which, with room 10, included a definitively identified third room (**Fig. 1**). With the aim of determining the groundplan of the remainder of the installation, which could be reached from corridor 11, work was commenced in the area which falls steeply towards the southwest (squares 90-92/AS). In contrast to the whole of the structure unearthed on EZ IV, the eastern wall segment BX departs from the orthogonal layout and runs from the wall corner H/J for a distance of approximately 6.5m along the bedrock flank, which has been left in its natural state (**Figs. 1 and 15**). To the northwest it is joined by the square foundation zone of room 52 with a side length of 4.8m. The visible faces of the walls BX and BW show the best masonry quality so far documented on EZ IV: the *pseudoisodomic* masonry of sandstone ashlars are precisely jointed into the structure of headers and stretchers.

The majority of the structures marked by erosion and the robbing of stones could only be recorded in the foundation zone. The low surviving height can best be demonstrated on the basis of the levels of preservation. Room 27, with a preserved height at 922.77m above sea level, can be taken as a reference for the original floor level in the bath-house. If we compare this value with the preserved height of the western enclosing wall of room 52 (920.32m), we see that there is a gap of approximately 2.5m between the original floor level and



15. View from room 10 of wall BX (left half of picture) and the foundations of room 52 (photo: D. Keller).

the preserved masonry. Against this background, it is difficult to reconstruct the purpose of room 52 with its central, horseshoe-shaped foundation. If we make a comparison with the small private bath-houses of Palestine, the horseshoe-shaped foundation seems to have supported a circular structure that could have been a tiny *laconicum* (sweat bath).[7] The position of room 10 in the groundplan suggests that it might have served as an *apodyterium* (changing room) which could have housed a small frigidarium in a partitioned-off area.

As regards the extent of the mansion in the western slope area, the work in squares 91-92/AS and 93/AR threw light on the matter: Only the bath rooms accessible from corridor 11 belonged to the main building, while the triclinium 32 and its subsidiary rooms belonged to a separate structure. With its exterior rising up like a tower, the bath-house built in the early second century AD (construction phase 2) probably had a marked impact on the appearance of the mansion at the steep southwestern corner of the terrace.

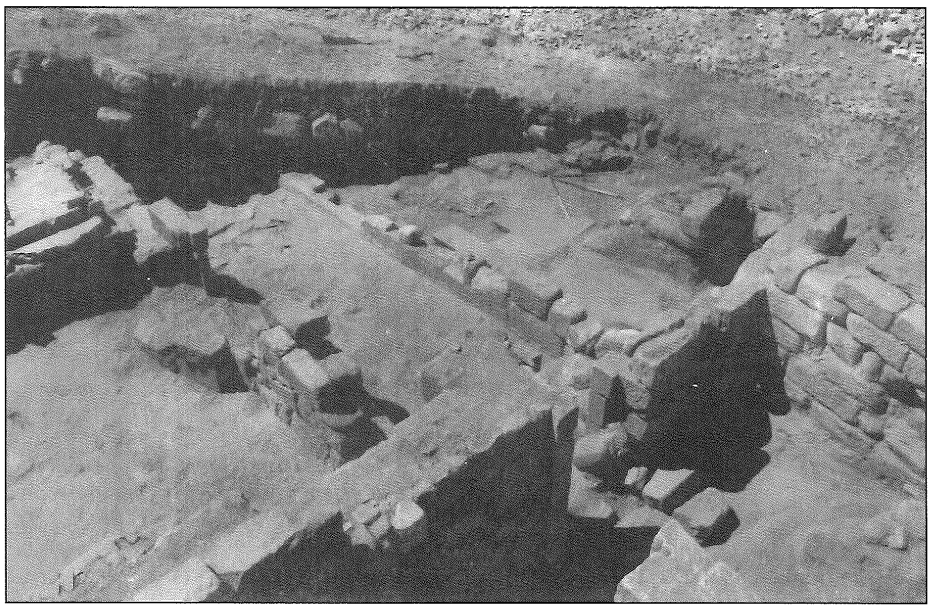
The Structure with Triclinium 32: After the conclusion of the excavation work in 2001, the triclinium no longer stands isolated on the western side of the slope. In square 94/AP the small, trapezium-shaped subsidiary rooms 45 (1.2/2.2m x 4.8m) and 46 (2.4/3m x 2.7m) were uncovered, incorporated between the banqueting room and the extended exterior wall E of the mansion (**Figs. 1 and 16**). In both rooms much of the floor covering has been lost. In room 46, the floor must have been stepped so as to descend in a southward direction since the rock surface in front of the wall BS, with a height at 921.04m, is substantially higher than the threshold level of the door to corridor 48 (920.69m). The thin walls AU, BR, BU and BT with thicknesses of 0.4-0.5m are of good quality and needed to be consolidated from the bottom up largely because of erosion damage to the sandstone ashlars.

The finds from the lowest excavation strata in rooms 45 (Abs. 4, FK 3483) and 46 (Abs. 5, FK 3489) place the last utilisation in the decades before 363. No clues as to the first utilisation could be obtained because of the torn-out floor coverings.

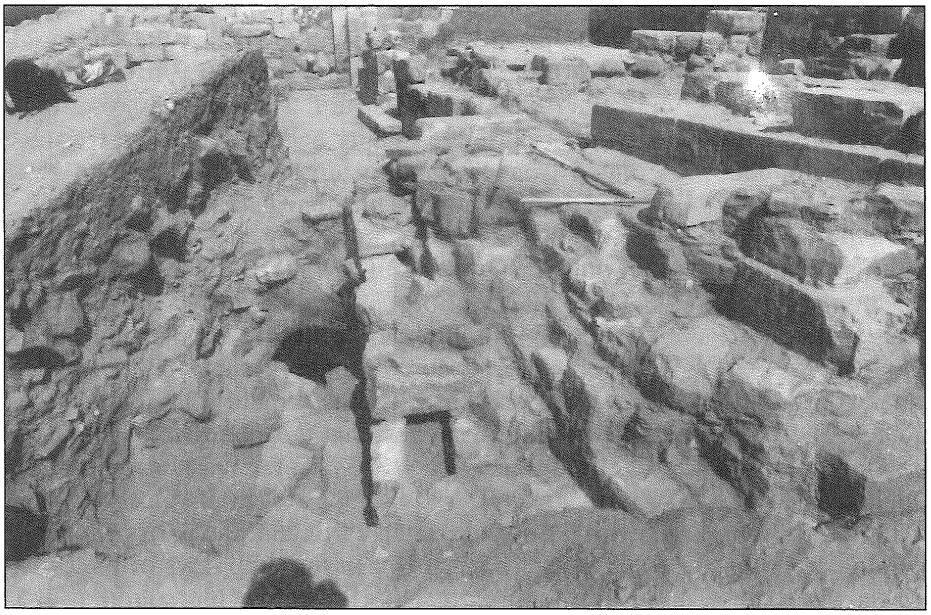
The position of rooms 45 and 46 in relation to the triclinium suggest that they were at least initially used as service rooms. To the west of the triclinium are corridor 48 (approximately 7.2 x 1.8m) with a floor of beaten earth, and the partly excavated room 51 (**Fig. 16**). In the final days of the campaign, approximately 1m below the southern end of the corridor (square 93/AR) we came upon a vertical, roughly circular hole in the rock that proved on closer examination to be a window-like opening to a room completely hewn out of the rock, with a floor area of ca. 7 x 7m (**Figs. 1 and 17**). Since there was insufficient time for a proper study of the room, we limited ourselves to a massive blocking of the window opening in order to at least substantially hinder the expected illicit excavations.

Rooms 44, 47 and 49: Because of their poor state of preservation, it is difficult to say anything specific about the two rooms 44 and 49 located to the west of altar 50 (**Figs. 1 and 18**). Of the completely plundered walls BP and BD, only the impressions of stones in the underlying surface have been

7. Cf. the Herodian bath-houses in Netzer 1999: 45-55; Nielsen 1999: 42-43.



16. Triclinium 32, corridor 48, subsidiary room 46 and room 51 seen facing west from wall E (photo: D. Keller).



17. Window opening of the rock-hewn room under rooms 48 and 52, seen from the south (photo: D. Keller).

preserved thanks to the careful work of square supervisor M. Grawehr. The walls BQ and CA are in somewhat better repair, but most of these structures have also been lost. The same applies to the floor coverings. It can be concluded from **Fig. 18** that a rock-hewn channel covered with crude slabs passed through room 49 and effected drainage in a westerly direction. Room 47, which adjoins room 44 on its western side, belonged, like the rooms around triclinium 32, to one of the terrace buildings below the mansion on EZ IV. With a floor level at 922.50-60m, room 47 is roughly 3m lower than room 44 (925.42-46m). After six years of excavations, the structures unearthed along the west flank testify to a high building density on the slope, bordering the main building of EZ IV over its whole length.

Glass Tableware of the Mid Fourth Century AD on EZ IV (D. Keller)

Due to the sudden destruction of the house on EZ IV during the earthquake of AD 363, excellent archaeological contexts are preserved as the debris of the collapsed walls sealed the finds underneath them. Therefore, those finds represent the household inventory used in the different rooms of the house just before its destruction. A contextual analysis of the glass tableware found in these rooms offers a closer look at the function and the status of glass tableware in the mid fourth century AD in Petra.

In this preliminary study, the glass finds from room 6 as well as from a small part of another room — the niche at the western end of corridor 11 — will be presented and compared to the glass



18. The west terrace edge of EZ IV with rooms 44 and 49 in the foreground, seen from square 95/AJ (photo: D. Keller).

tableware from the other rooms on EZ IV. To quantify these glass assemblages, the method of estimating the minimum number of vessels (EMN) is adopted, where a conservative estimate of the minimum number of different vessels in an assemblage is made by judgments from the colour of the glass fragments and the preserved rim, body and base sherds found in the same room.[8]

The glass finds from room 6 (FK 3051 and 3065) — already presented in an earlier preliminary report[9] — consist of a shallow bowl and three conical beakers, each of them with cracked-off rim, decorated with wheel-cut lines (except one of the beakers) and made of good quality thick-walled colourless glass. Additionally, there are two other conical beakers with fire-rounded rim and a concave base as well as a jug with funnel-shaped mouth and a folded flange below the rim, and another closed form with a globular body and a concave base, each of them made of thin-walled bluish green or greenish blue glass.

The glass vessel fragments from the lowest layer above the floor at the western end of corridor 11 (FK 3139) were found within an area of a little more then one square meter. This layer had a very large content of ashes of burnt wood and contained some iron nails and bronze fragments. The evidence suggests that the glass vessels were stored in a wooden shelf or a wooden box in the niche at the western end of corridor 11 just in front of the wall that divides this corridor from room 39.[10] The glass sherds belonged to two large bowls, one with a tubular out-folded rim and one with a fire-rounded rim and a double fold in the wall, two smaller bowls of the same shapes as the two larger vessels, four beakers (a cylindrical and a conical beaker with a fire-rounded rim each, a beaker with concave base and a conical beaker with folded pushed-in base), a jug with fire-rounded rim, funnel-shaped mouth and a single trail, a flask with cylindrical neck and a jar with fire-rounded rim and mould-blown ribs on the body. All these vessels are made of greenish blue to bluish green thin-walled glass, which could occasionally be nearly colourless. The only exception from this context is a large cylindrical beaker with cracked-off rim, which is made of thick-walled, probably colourless glass and which bears an abraded decoration showing a Greek inscription and a herringbone pattern.

Both assemblages show complete sets of glass tableware of the mid fourth century AD, but they differ from each other. The set in room 6 consists almost exclusively of good quality colourless thick-walled glass — at least the bowl for the presentation of food and three of the five beakers for drinking — with the addition of two beakers and two closed forms made of naturally coloured glass of a lower quality. The glass vessels from the western end of corridor 11, on the other hand, are all made of lower quality thin-walled glass, the only exception being the large beaker with the Greek inscription.

The typical high quality glass tableware set, as shown by the finds from room 6, consists of four thick-walled colourless vessels with cracked-off rims, being normally one shallow bowl and three conical beakers. Such sets with an identical composition were also found twice in room 12 and in the room between walls AN and BI. Occasionally one of the three beakers can be replaced by a thick-

8. This method of quantifying glass assemblages is fully explained and discussed by Cool and Price 1995: 9-10.
9. Kolb, Keller and Gerber 1998: 268-272 no. 1-7 fig. 15. The third conical beaker made of colourless glass and preserved in a base sherd was omitted in this report by mistake.
10. This is only a preliminary interpretation of the metal finds from FK 3139. It may well be that the belonged to something different.

walled colourless hemispherical bowl with cracked-off rim, as demonstrated by finds of such sets consisting of a shallow bowl, a hemispherical bowl and two conical beakers from rooms 27 and 13.

While the mentioned high quality glass tableware sets are very uniform in their function, shapes and composition, the low quality set from room 11 shows a wider variety of forms and shapes. There are large bowls as well as small bowls, and there are different types of bowls as well as of beakers. But not only within this set there are different vessel shapes, the variety of shapes seems to be a common feature of the lower quality glass tableware sets within the house on EZ IV, as shown by similar sets in rooms 2, 12, 13, 16, 35, 37 and in the room between walls AN and BI. They always consist of one jug or flask and between three and five beakers of different shapes, but their bowl-composition can range between two large and two small ones like in room 11, one large and two small bowls (twice in room 12), one large and one small bowl (in rooms 2, 13 and 37) or only two small bowls (twice in room 16, twice in the room between walls AN and BI, and once in each of rooms 35 and 37).

Looking at the rooms on EZ IV, in which glass tableware was found, there were two rooms, in which obviously two sets of each quality were stored, namely in room 12 and in the room between walls AN and BI. While the former can be regarded as a kind of storage room in the southwestern part of the house according to the abundant glass finds, the later was a kitchen, as clearly shown by the huge *ṭābūn* discovered in this room (Kolb and Keller 2000: 364). Glass vessels were also stored in larger quantities at the western end of room 11 — as demonstrated above, in corridor 13, where one high quality as well as one low quality set were found, and in rooms 2 and 37, with one and respectively two low quality glass sets. While the glass vessels from room 11 were obviously stored on a wooden shelf at the western end of this corridor, and the glass finds from room 37 belonged to a kitchen as shown by the *ṭābūn* discovered in this room as well, the question why in the two smaller corridors 2 and 13 there were one or even two complete glass tableware sets, remains unanswered for the moment.

If one compares the other single glass tableware sets, it is remarkable that the two high quality sets were found in two rooms (6 and 27), both of which had prominent architectural features and rich interior decoration. In general, the spatial distribution of the high quality glass tableware within the house on EZ IV is concentrated in the western (or mainly southwestern) part — with the remarkable exception of the two high quality sets stored in the kitchen between walls AN and BI, while in the other smaller rooms in the eastern wing of the house (rooms 16, 35 and 37) only glass vessels belonging to the low quality group were found. This shows once more that the glass used in this house at the time of its destruction is well divided between good quality glass in the larger rooms and low quality glass in the smaller rooms, as already shown with the glass lamps found in the same building (cf. Kolb and Keller 2000: 366-370, fig. 15.1; Kolb and Keller 2001: 321-323, fig. 15).

B. Kolb
D. Keller
Seminar für Klassische Archäologie
Basle University
Schönbeinstrasse 20
4056 Basel
Switzerland
bernhard.kolb@unibas.ch
dukeller@yahoo.com

Bibliography

Bricault, L.
1992 Isis dolente. *BIFAO* 92: 37-49.
Barag, D.
1993 King Herod's Royal Castle at Samaria -Sebaste. *PEQ* 125: 3-18.
Carettoni, G.
1983 *Das Haus des Augustus auf dem Palatin.* Mainz am Rhein: Philipp von Zabern.
Cool, H.E.M. and Price, J.
1995 *Roman Vessel Glass from Excavations in Colchester, 1971-85.* Colchester Archaeological Report 8. Colchester: Colchester Archaeological Trust.
Hammond, P.C.
1990 The Goddess of the "Temple of the Winged Lions" at Petra (Jordan). Pp. 115-130 in F. Zayadine (ed.), *Petra and the Caravan Cities.* Proceedings of the Symposium organised at Petra in September 1985. Amman: Department of Antiquities.
Kolb, B.
2000 *Die spätantiken Wohnbauten von ez Zantur in Petra und der Wohnhausbau in Palästina vom 4.-6. Jh. n.Chr.* Petra. Ez Zantur II. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen. Mainz am Rhein: Philipp von Zabern.
2001 A Nabataean Mansion at Petra: Some Reflections on its Architecture and Interior Design. Pp. 437-445 in *SHAJ* 7. Amman: Department of Antiquities
Kolb, B., Keller, D. and Gerber, Y.
1998 Swiss-Liechtenstein Excavations at az-Zantur in Petra 1997. *ADAJ* 42: 259-277.

Kolb, B. and Keller, D.
2000 Swiss-Liechtenstein Excavations at az-Zantur/ Petra: The Tenth Season. *ADAJ* 44: 355-372.
2001 Swiss-Liechtenstein Excavation at az-Zantur/ Petra: The Eleventh Season. *ADAJ* 45: 311-324.

Netzer, E.
1999 Herodian Bath-houses. Pp. 45-55 in J. DeLaine and D.E. Johnston (eds.), *Roman Baths and Bathing*. Proceedings of the First International Conference on Roman Baths held at Bath, England, 30 March – 4 April 1992. JRA Suppl. Series No. 37. Portsmouth, Rhode Island: Thompson-Shore.

Nielsen, I.
1999 Early Provincial Baths and their Relations to Early Italic Baths. Pp. 35-44 in J. DeLaine and D.E. Johnston (eds.), *Roman Baths and Bathing*. Proceedings of the First International Conference on Roman Baths held at Bath, England, 30 March – 4 April 1992. JRA Suppl. Series No. 37. Portsmouth, Rhode Island: Thompson-Shore.

Thomas, R.
1995 *Die Dekorationssysteme der römische Wandmalerei von augusteischer bis in trajanische Zeit*. Mainz am Rhein: Philipp von Zabern.

THE MONUMENTAL ENTRANCE TO THE UPPER MARKET AND THE TRAJANIC INSCRIPTION AT PETRA, THE ARCHITECTURAL CONTEXT

Chrysanthos Kanellopoulos

Dedicated to the memory of Antony Ostrasz

Introduction

Since Kirkbride's initial publication in 1960 (p. 120), three inscribed blocks found in the staircase to the Upper Market at Petra have been consistently associated with the architectural remains of what appears to be a monumental arch. The architectural remains connected with the inscription consist of one molded pedestal, which Kirkbride interpreted as the pier of the arch, and several arch voussoirs found in the same context (**Figs. 1, 2 and 7**). These fragments and the inscription, honoring Trajan, have always been considered as a single unit with canonical reconstructions placing the imperial inscription on a free-standing arch located at the edge of the street pavement. Indeed, Kirkbride's general conclusions have been widely acknowledged; the remains are often cited as the Trajanic Arch of Petra (Browning 1989: 144). Recently however, S. Tracy (1999: 53) has argued that the dedication could have been inscribed on any masonry in the area and that the inscription need not necessarily relate to the arch. This paper provides documentation of the architectural blocks and examines the Trajanic inscription in relation to the material remains and the original architectural context.[1]

The Inscription

Restored, the text covers a length of ca. 5.80m or about 20 Roman *pedes* of 0.296m. The text was inscribed on seven ashlar blocks with a total length of 6.30m. Only three survive today (Tracy 1999: figs. 1-5). Each block is ca. 0.89-0.93m long. All are ca. 0.57m tall. It should be noted that the right side of the inscription ends in the middle of the blocks, while the left side ends exactly at the reconstructed joint (**Fig. 3**). This indicates that the ashlar masonry was perfectly canonical, with one half-block and one full-length block at either end of the course. The lengths of the inscribed blocks — un like masonry blocks in the area of the staircase, which have randomly arranged joints and lengths (**Fig. 4** and Kanellopoulos 2001: fig. 5) — are also perfectly regular. This evidence indicates that the blocks were part of a frieze rather than elements of wall masonry.

Indeed, the three courses of the inscription, as restored by Tracy, are almost perfectly symmetrical. Though perfect symmetry is not required, it would be expected in this sort of formal dedication and assists the reconstruction of the text. Specifically, the second course of Tracy's restoration involves 52 letters right of the axis of the first course and only 45 letters left of the same axis (**Fig. 3**).

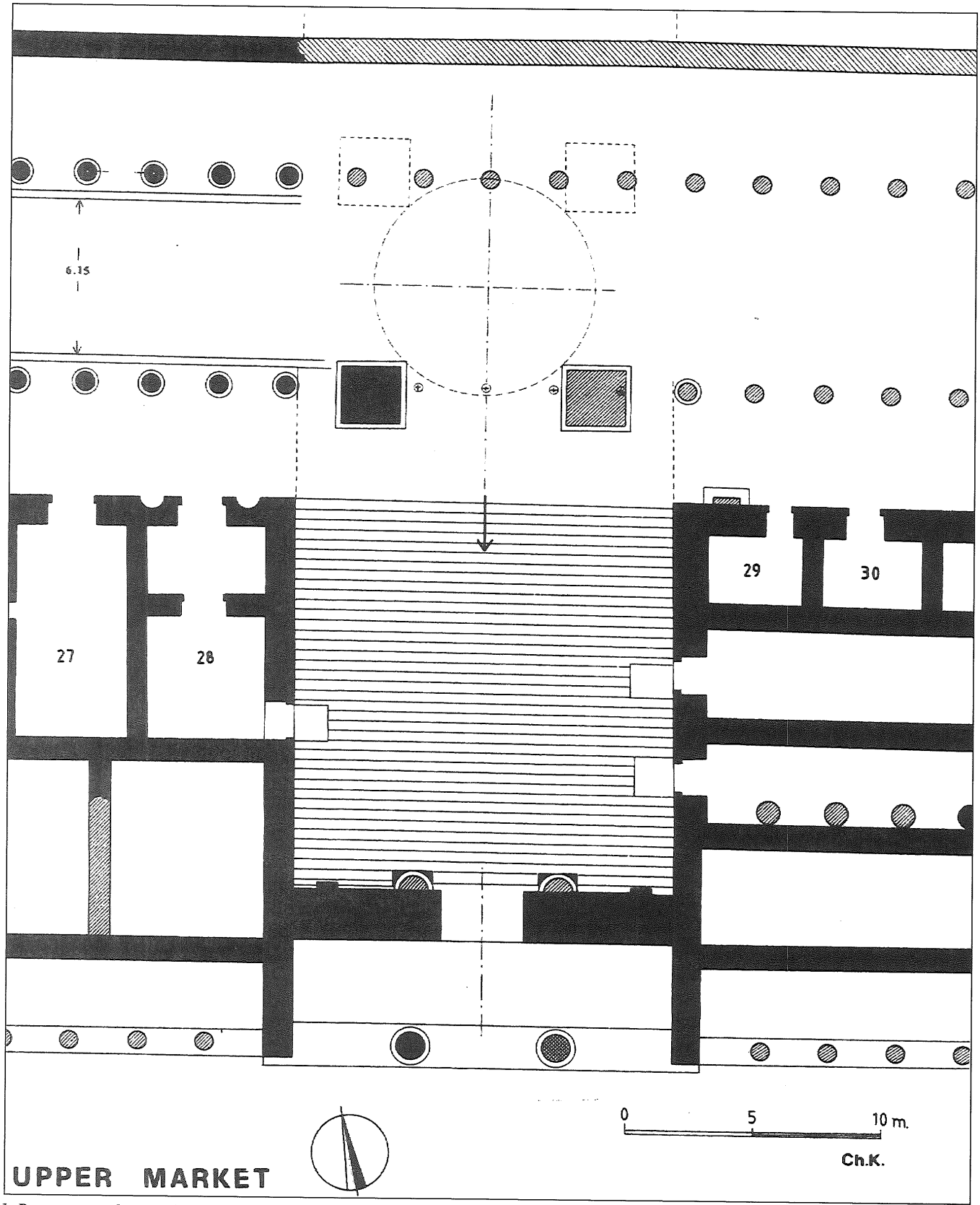
1. [ΑΥΤΟΚΡΑΤΟΡΙ ΚΑΙΣΑ]ΡΙ ΘΕΟΥ [ΝΕ-ΡΟΥΑ ΥΙΩ] ΝΕΡΟΥΑ ΤΡΑ[ΙΑΝΩΙ ΑΡΙΣΤΩΙ]
2. [*vac.* ΣΕΒΑΣΤΩΙ ΓΕΡΜΑΝΙΚΩΙ ΔΑΚΙΚ]ΩΙ ΑΡΧΙΕΡΕΙ ΜΕΓΙΣΤΩΙ Δ[ΗΜΑΡ]ΧΙΚΗΣ ΕΞ-ΟΥΣΙΑΣ ΤΟ [Ι]Η′ ΑΥΤΟΚΡΑΤΟΡΙ ΤΟ Ζ ΥΠ[ΑΤΩΙ ΤΟ C′ ΠΑΤΡΙ ΠΑΤΡΙΔΟΣ *vac.*]
3. [*vac.*Η ΤΗΣ ΑΡΑΒΙΑΣ ΜΗ]ΤΡΟΠΟΛΙΣ ΠΕ-ΤΡΑ. ΕΠΙ ΓΑΪΟΥ ΚΛ[ΑΥΔΙΟ]Υ ΣΕΟΥΗ-ΡΟΥ *vac.* ΠΡΕΣΒΕ[Υ]ΤΟΥ *vac.* ΑΝΤΙ-ΣΤΡΑΤΗΓΟΥ *vac.*

Theoretically, the epithet "Παρθικωι" — although improbable — would fit in the second course of the inscription, resulting in perfect symmetry. Tracy rejects the older reconstruction of the epithet "Παρθικωι" on the ground that Trajan did not officially receive it until late AD 115 or early 116, while the inscription from Petra dates from early autumn of AD 114. However, there is a single known exception: Trajan is styled Parthicus in an inscription dated from the year 114 (Tracy 1999: 54).

1. The architectural survey of the structures described below was conducted during the reconstruction phase of the Petra Roman Street Project in August and October 1996 and from October 1997 to May 1998, under a contract with the American Center of Oriental Research and U.S. Agency for International Development. This area around the staircase to the Upper Market was excavated under the direction of Zbigniew T. Fiema between March and June 1997 (Fiema 1998). I wish to thank Julian Bowsher for all his thoughtful suggestions on the inscription, Pierre Bikai, and Peter Schultz for editing my text. All illustrations are by the author.

The Architectural Features of the Staircase

The Upper Market's grand staircase is located between Shops 28 and 29. It is 14.65-14.66m wide in the lowermost part, and 14.70-14.78m wide in



1. Reconstructed ground plan of the street, Shops 27-30, the staircase and Propylaea of the Upper Market, and the piers of the Trajanic Arch. Hypothetical elements are rendered with hatched lines.



2. The staircase of the Upper Market; view from North. Note the remains of the pedestals which were attributed to a Trajanic Arch (below) and the massive pilasters in the foundations of the Propylaea.

the upper part **(Figs. 1 and 2)**.[2] The width of the stairway corresponds closely to the rhythm of the adjacent colonnade. Indeed, the stair's width of 14.65m is actually the same distance as that between the seven columns positioned according to the average interaxial column space of the colonnade (2.604m).[3] This cannot be a coincidence. It appears as if the colonnade originally ran in front of the staircase with columns corresponding precisely to the staircase's corners. It also seems that this section of the colonnade, made up of five columns, was dismantled in order to accommodate the piers of the so-called Trajanic Arch **(Fig. 1)**. It should also be noted that the stylobate of the colonnade does not end at the corner of Shop 28 but rather continues further east **(Fig. 4)**.

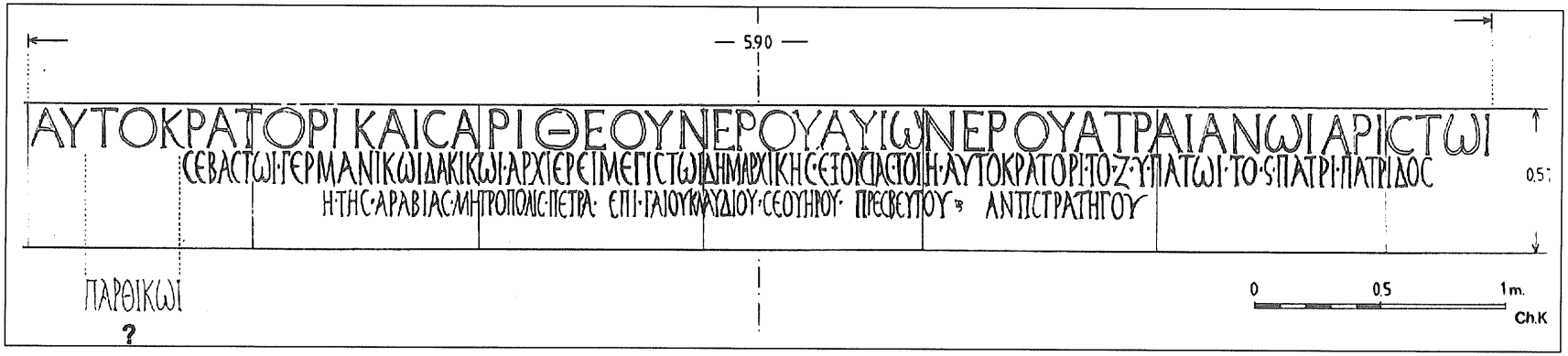
The broad landing in the front of the staircase is as deep as the portico between the Shops and the Colonnade (5.45m). Only the southern sections of its pavement are preserved. Its pavement slopes to the north by 0.18m:3.00m, a feature possibly designed for drainage. The upper parts of the staircase have been destroyed, exposing the foundations of the Propylaea wall. The length of the stairway is ca. 15.44-15.60m. The overall height of the staircase from the lowermost step to the level of the Propylaea stylobate is 11.14m.

The Molded Pedestals (Piers of an Arch) in Front of the Staircase

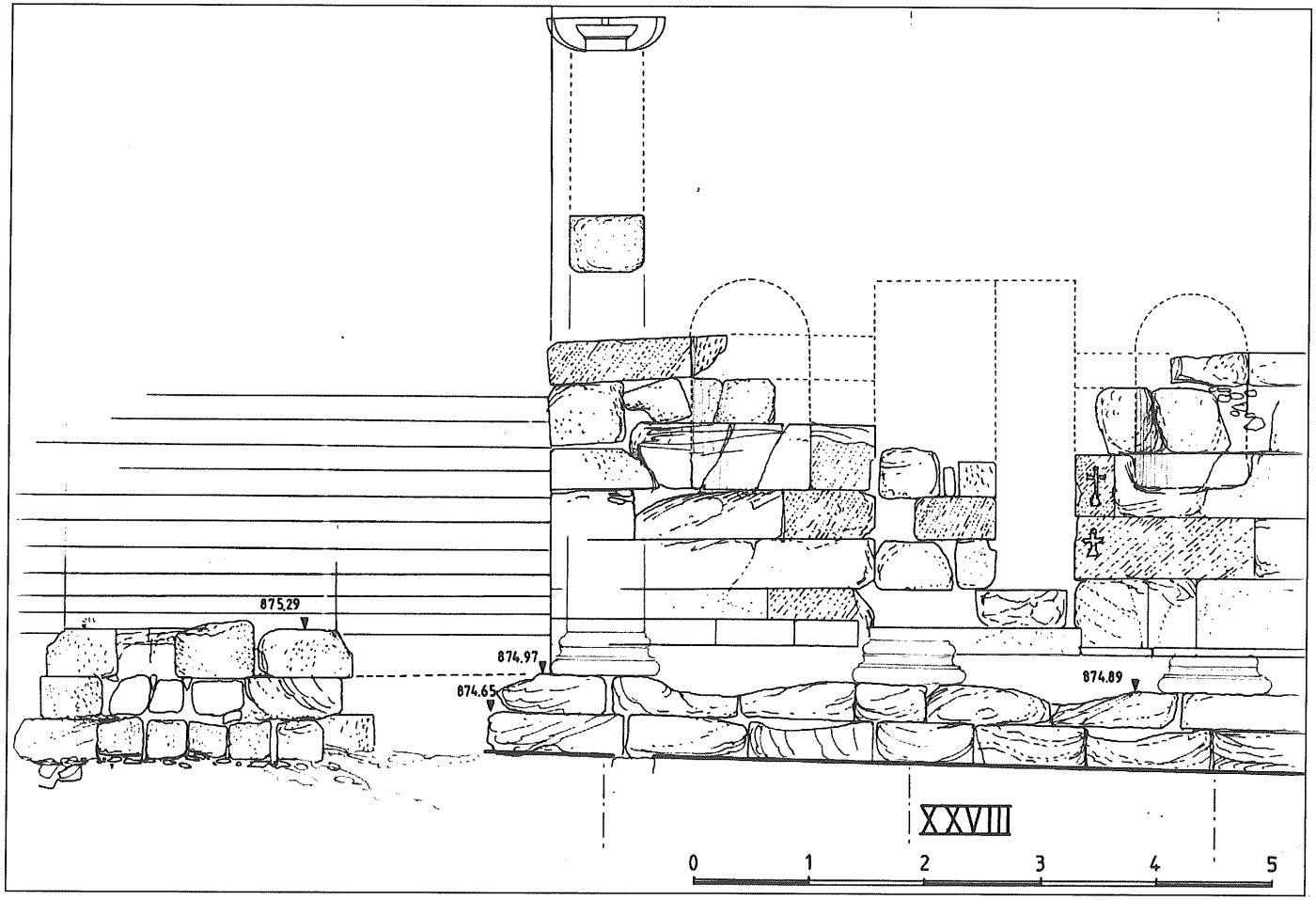
The remains of a rectangular — or square? — pedestal with a molded base are preserved in front of the stairway **(Figs. 1, 2 and 4)**. Its northern end is missing. Its width on the upper edge of the molding is 2.37m while its overall width, including the projection of the bottom molding and socle, is 2.59m. The top of the molding is 3.05m from the end of the staircase and 1.83m from the eastern end of the Shops (the corner of Room 28). The upper surface of its socle, or the beginning of the molding, is at the same level as the surface of the stylobate in front of Room 28. If the northern end of the pedestal was in line with the stylobate, then the pedestal was perfectly square. The overall width of the pedestal is 2.59m, almost identical to the average interaxial column spacing of the Colonnade (2.605m; Kanellopoulos 2001: 17). This indicates that the dimensions of the pedestal conformed to and respected the rhythm of the Colonnade. The poorly preserved blocks on the eastern side of the sidewalk, in a symmetrical position, can also be interpreted as the foundations for a second pedestal. These pedestals could have served as bases for dedications or statues or could have been piers of a monumental composition in front of the staircase like the so-called Trajanic Arch. Had the second pier been symmetrically positioned within the setting of the staircase and relative to the extant pedestal, the restored arch would span ca. 6.20m. Indeed, several members of a monumental arch survive in the immediate vicinity of the staircase. The span of the single passageway of this arch, ca. 6.20 meters, would be one of the largest in Jordan. The arched central opening of the Temenos Gate in Petra, for example, is only 3.40m while the corresponding opening of the large Triumphal Arch at Jarash is 3.71m wide. The main passageways of the East Triumphal Arch and the Central Triumphal Arch in

2. This width is almost equal to 50 Roman *pedes*. Indeed, 50 *pedes* x 0.296m = 14.800m.

3. 15.624m. (= 6 interaxial spaces x 0.2.604m) - 0.977m (overall diameter of the column base) = 14.647m.



3. The Trajanic inscription, following Tracy's (1999) reconstruction. Note the lack of symmetry in the second course.



4. Actual elevation of the staircase to the Upper Market, the remains of the western molded pedestal/pier of the Arch and Shop 28 (from left to right).

Buṣrā are respectively 5.07 and 6.20m wide (Segal 1997: 134-135).[4]

A Tetrapylon in Petra?

The alternative restoration of a *tetrapylon* as opposed to an arch in this area is tempting, even though it is based on weak evidence.[5] As noted, the restored distance between the piers is 6.20m, almost identical to the width of the Colonnaded Street between the two stylobates. This distance allows the hypothetical restoration of another two piers on the north edge of the Street. Indeed, all four piers would then be symmetrically positioned around a perfect square with distances of 6.20m between them (**Fig. 1**).

Ideally, the *tetrapylon* would be placed on an intersection, but this is not the case in the area of the Trajanic Arch. It is remotely possible, however, that an intersecting street once existed across from the staircase to the Upper Market. This street might have been associated with a hypothetical bridge across from Wādī Mūsā (وادي موسى). Unfortunately, the evidence is shaky: the street pavement, the sidewalks and the banks east and north of the monumental staircase were washed away during floods coming from Wādī al-Maṭāḥa (وادي المطاحه) (see hatched features in **Fig. 1**). There is no trace of another two piers, a bridge or an intersection in the examined area.

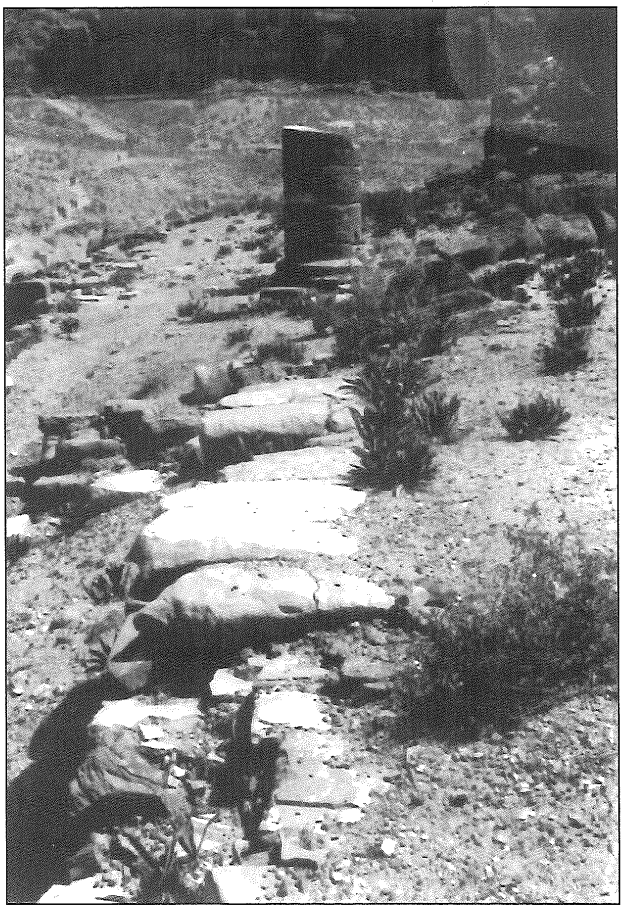
It should also be noted that the Tetrapylon, whether a tetrakionion or a cross vaulted quadrifrons "is purely decorative and is never erected to honour a specific personality or important event... Tetrapyla appear in the region somewhat later than the triumphal arches, the earliest being the quadrifrons at Gerasa, dating to the sixties of the 2nd century C.E." (Segal 1997: 140-141).

The Propylaea of the Upper Market

The remains of what seems to be a large Propylaeon at the top of the staircase were documented in 1997-1998. This structure consists of a wall with semi-columns at the edge of the staircase and a large portico behind with either two columns *in antis* (i.e., framed by pillars or pilasters) or with four columns (**Figs. 1, 5 and 6**).

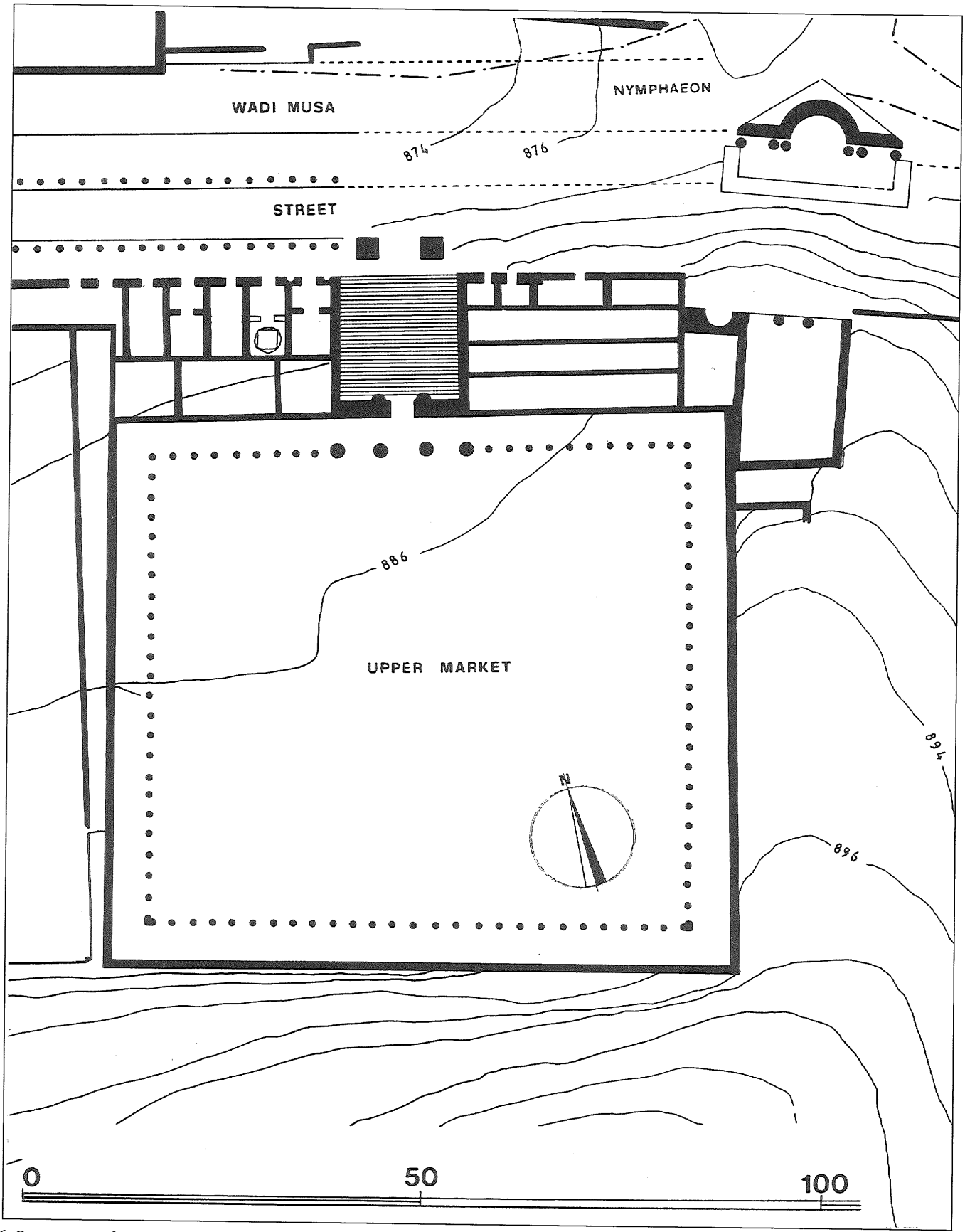
Two roughly square bases (each 1.64 x 1.64 and 1.73m) remain *in situ* in the Upper Market. They are set 4.23m apart and 5.5m behind the edge of the Upper Propylaea wall. An Ionic column base of the Propylaea portico still stands on one (**Fig. 5**). The rectangular slabs should be understood as parts of a stylobate rather than individual column plinths, thus accounting for their slightly irregular dimensions. This would explain the fact that they are at the same level and aligned with the stylobate of the smaller colonnade which ran inside the Upper Market. Had the former slabs been individual column plinths, they should have emerged from the stylobate's level.

The axial distance of the Propylaea columns from the north façade of the Propylaea wall is 6.27m. The height of the Ionic Attic base is 0.339m. The overall diameter of the base, at the level of the lower trochilos is 1.53m. The lower diameter of the shaft is 1.097m. The upper diameter 1.03m. The distance between the axis of the western column and the western wall of the staircase is 4.58m. The interaxial column space between the two large Propylaea columns should be ca. 5.63m.



5. The collapsed Propylaea column with what is interpreted as stylobate of a lesser, surrounding colonnade in the foreground. View from West.

4. A few examples of single arches are the Arch of Titus in Rome, AD 81 (Sear 1982: 146, fig. 85), the North Gate at Jarash (AD 114-115), the Arches of Trajan at Timgad and Beneventum, ca. AD 117 (Sear 1982: 165, fig. 95), the Arch of Hadrian in Athens, the Antonine Arch in Eleusis, and the Arch at Leptis Magna, Libya.
5. Thanks to Pierre Bikai who prompted me to investigate the possibility of a Tetrapylon.



6. Reconstructed ground plan of the Colonnaded Street, the Upper Market and its monumental entrance, the piers of the Trajanic Arch and the area of the Nymphaeon.

The western column shaft has collapsed to the south (**Fig. 5**). Eight upper drums and the pseudo-Corinthian capital of the Nabataean horned type (Type I, in McKenzie 1990: diagram 14.g.) lie on the ground in a row running NW-SE. The upper part of an identical capital, apparently from the east column, was found in the upper parts of the staircase. Its overall width is 1.90m. The height is 0.54m. Only one small fragment from the lower part of these capitals was discovered. Elements of the eastern column were found among debris that covered the staircase. At present, it is unclear whether antae or columns existed in the corners of the four-pillared south elevation of the Upper Propylaea.

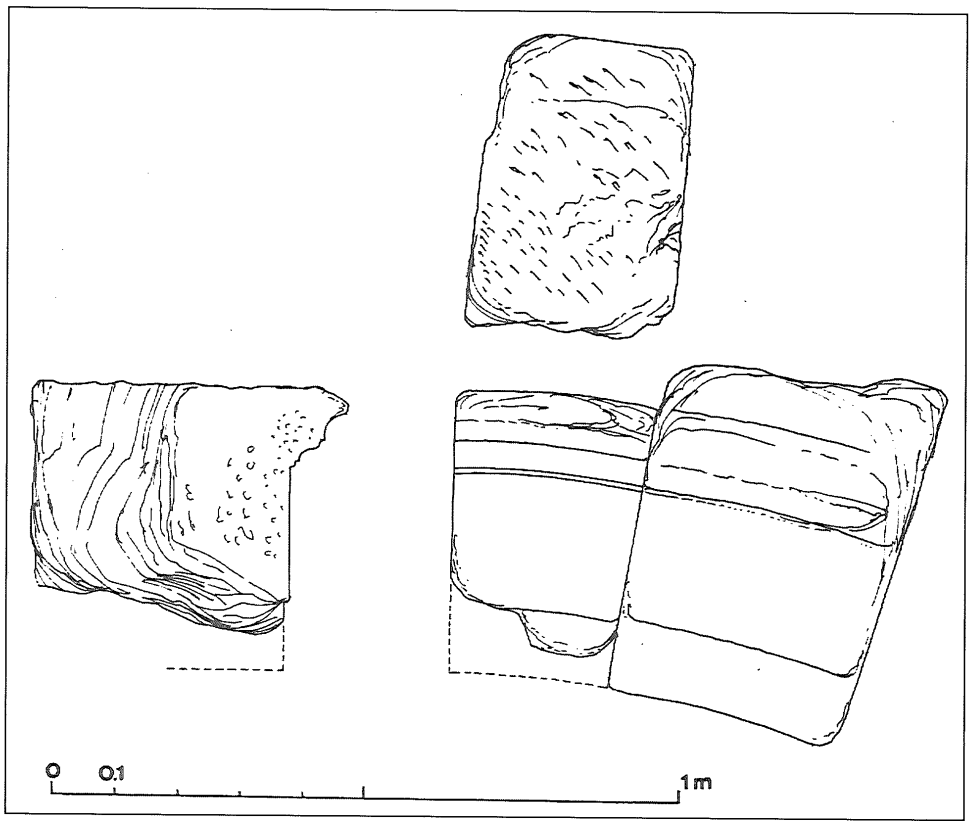
The north wall of the Upper Propylaea projected ? 2m from the retaining wall of the Upper Market and bonded with the walls that flank the staircase. These two elements seem to have been constructed in the same phase. The foundation of the Upper Propylaea's north façade was a wall 1.80m thick marked by four objects that resemble pilasters: two large pilasters (1.53m) in the center and two narrow pilasters (0.80m) at the sides (**Figs. 1 and 2**; also Fiema 1998: 400, fig. 3). The distance between the broad eastern pilaster and the narrow east pilaster is 2.08m, practically half the distance between the large pilasters (4.12m:2 = 2.06m). Each of the two large pilasters of the Propylaea wall corresponds to one column of the large portico behind. Furthermore, the interaxial spacing of the two large foundation pilasters is identical with the corresponding distance between the two portico columns (5.65m). The projection of the pilasters (0.75m) is half their width (1.53m). As such, what appears in the foundations as pilasters or buttresses could, in fact, have been the bases of half columns attached to the Propylaea north façade. It is also worth noting that the width of the pilasters is 1.53m, a dimension equal to the diameter of the large column bases of the Propylaea porch to the south. Thus, the foundation pilasters could support and accommodate semi-columns with dimensions equal to the dimensions of the freestanding Propylaea columns. The perfect correspondence of the Propylaea columns to the pilasters of the Propylaea northern wall supports the hypothesis.

A few large half drums are scattered on the staircase, but at present it cannot be ascertained whether these are broken columns of the Portico behind the Propylaea Wall, or parts of the proposed semi-columns. It is difficult to asses whether the rear surfaces of these members are quarry surfaces or just broken. It is also worth noting that at least one of the two types of arch voussoirs which were discovered at the lower parts of the staircase might be restored above the Propylaea.[6]

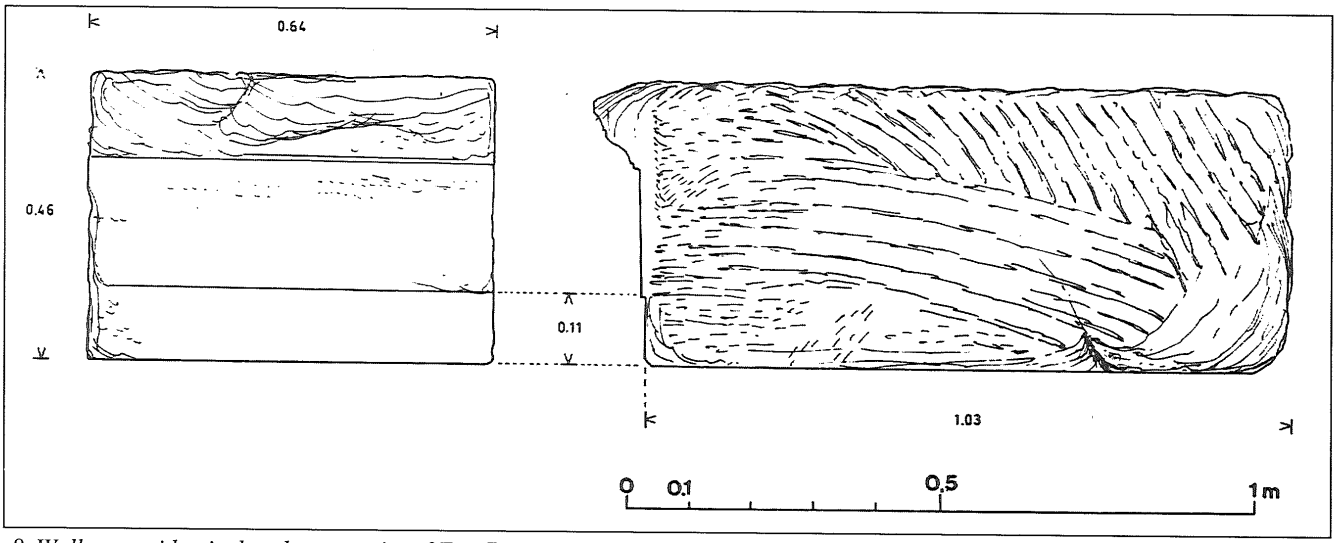
Distinct Entablature and Portico Elements Scattered in the Lower Parts and Landing of the Staircase

1. Arch voussoirs (**Fig. 7**). Four molded voussoirs of this same arch were discovered in a late barrier wall in the NE part of the staircase (Fiema 1998: 402) or buried in the debris in the lower parts of the staircase. Kirkbride (1960: 120) identified only two of them. The height of the voussoirs is ca. 0.46m. The front is divided by two bands *(fasciae)* and a crown molding composed of a square *astragal*, a *cyma reversa* and a *cavetto* on the top. Height of lower fascia: 0.11m.
2. Wall crown (**Fig. 8**). Two blocks of what appears to be a wall crown were discovered near the lower parts of the staircase. The height of the blocks (0.46m) as well as the moldings and the *fasciae* of the front are identical to the corresponding features which decorate the front of the voussoirs above. The wall crown must factor into the reconstruction of the arch.
3. Arch voussoir (**Fig. 9**). Another voussoir of a second molded arch was found in the debris that covered the staircase. Its length is 0.905m. Its height (approx. 0.38m) is different from the height of the aforementioned voussoirs and the front is not treated with *fascias*. This could be evidence for a second arch in the area of the staircase (i.e. the Upper Propylaea).
4. Frieze (**Fig. 10**). One block of a frieze, lying in front of the flight, was also measured and drawn. The height of the block is 0.44m, the width of the lower surface is ca. 0.42m, and the width of the upper surface 0.62m. Obviously, the trapezoidal block belonged to a frieze that was constructed as a relieving flat arch, with inclined joints meeting at a center. It is interesting that the frieze block was manufactured from a reused Nabataean pilaster capital. This evidence, combined with the column drums inside the molded pedestals of the suggested arch, indicates that some older buildings were demolished and reused during the construction of the new structures. Several column drums from the colonnade have also been reused for the construction of the retaining wall of the Upper Market (for reused architectural elements in the Temenos Gate, and Qaṣr al-Bint, see Zayadine 1986: 136; McKenzie 1990:

6. See infra. Conclusions.



7. Molded voussoirs from a monumental arch, found on and in front of the staircase to the Upper Market.



8. Wall crown identical to the voussoirs of Fig. 7.

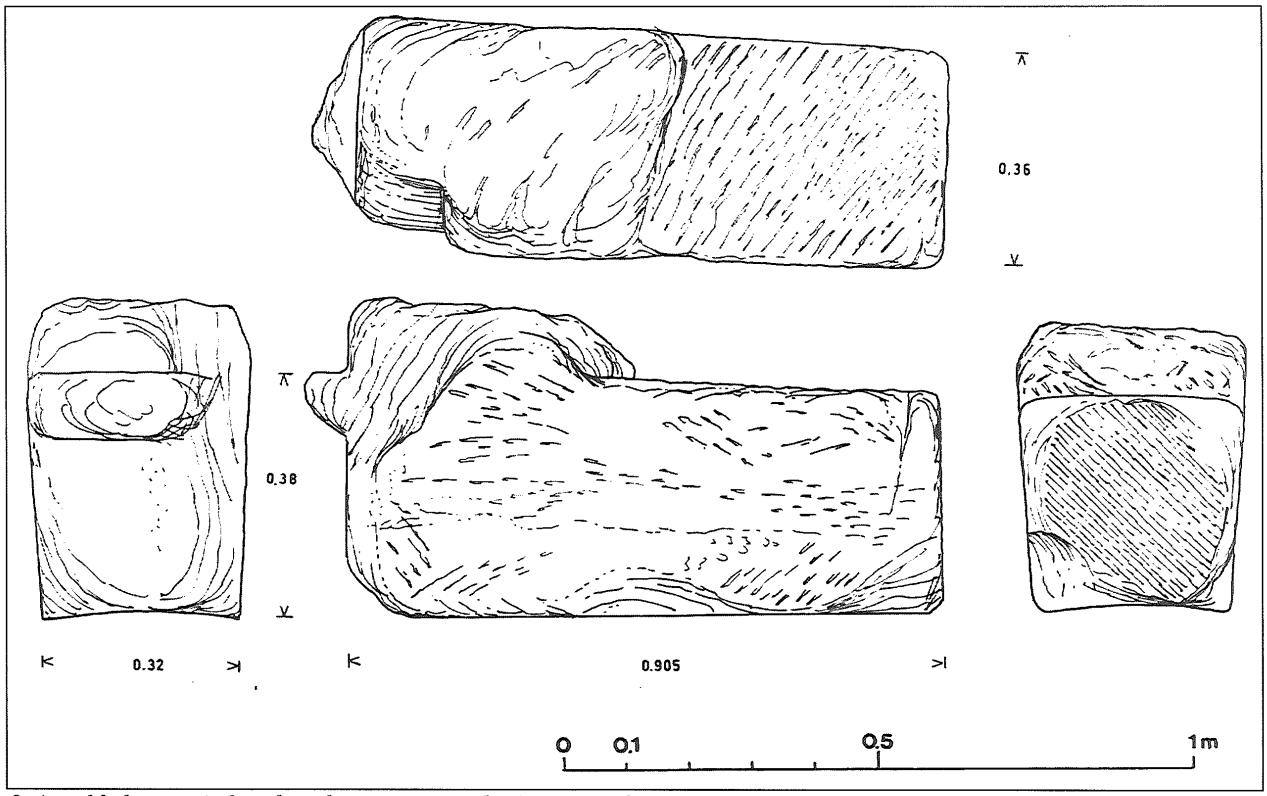
138). Such phenomena during the Roman period (after annexation in AD 106) often relate to recycled older buildings damaged during the early second century AD earthquake. This earthquake accelerated the transformation of the city center of Petra into a city plan in line with second century Roman urban schemata (Stucky 1996: 14, 21; Fiema 1998: 419).

5. Cornice with sima (**Fig. 11**). One large fragment which preserves the upper moldings of a cornice is situated on the landing of the staircase. Its lowest possible height is 0.41m. The moldings from top are a *cyma recta, cavetto,* soffit, bevelled *ovolo,* and finally an eroded dentil element. The lowermost molding is completely destroyed. The minimum overall length is 0.805m. The member might be attributed to an entablature on the wall of the Upper Propylaea or the speculated Arch in front of the Staircase.
6. Block from a large cornice (**Fig. 12**). A block from the corner of a large cornice or from a large ceiling coffer (?) was also found at the landing of the staircase. Its height is ca. 0.58m on the right-hand side and ca. 0.44m on the left.

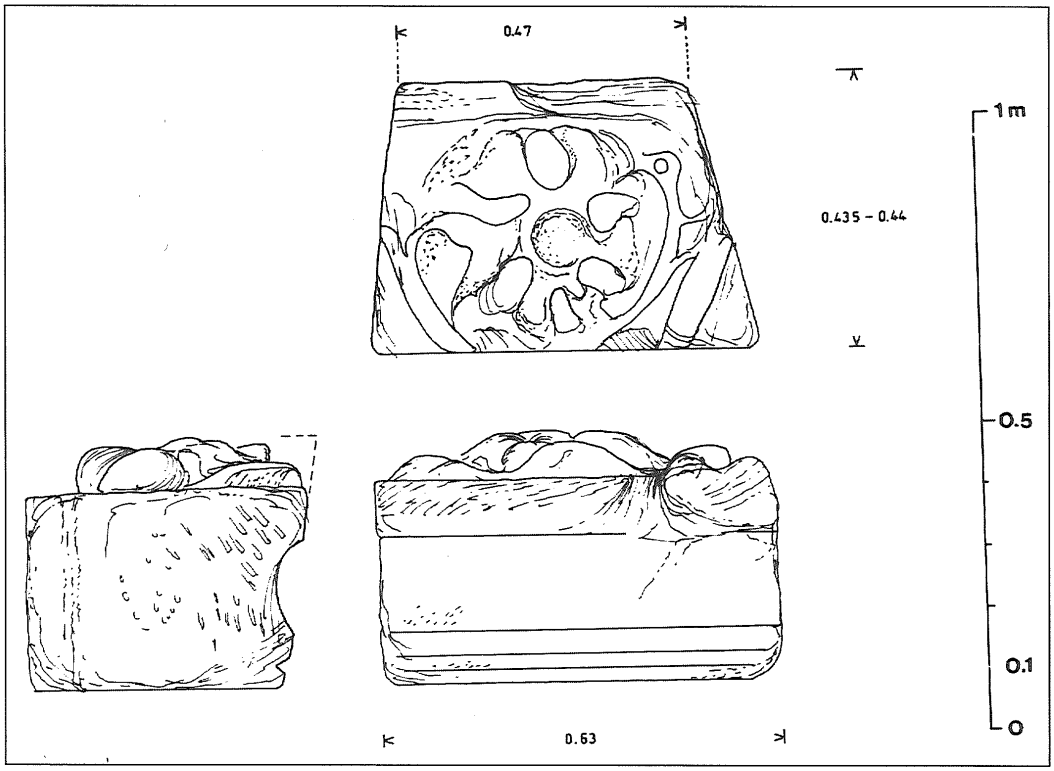
The width is 0.815m. The member retains on its bottom surface parts of an *ovolo* and a dentil element. This cornice block could be attributed to the entablature of the Upper Propylaea or to the hypothetical Trajanic Arch. Its restoration to the nearby Nymphaeon cannot be excluded.

Surrounding Colonnade, Retaining and Enclosure Walls of the Upper Market

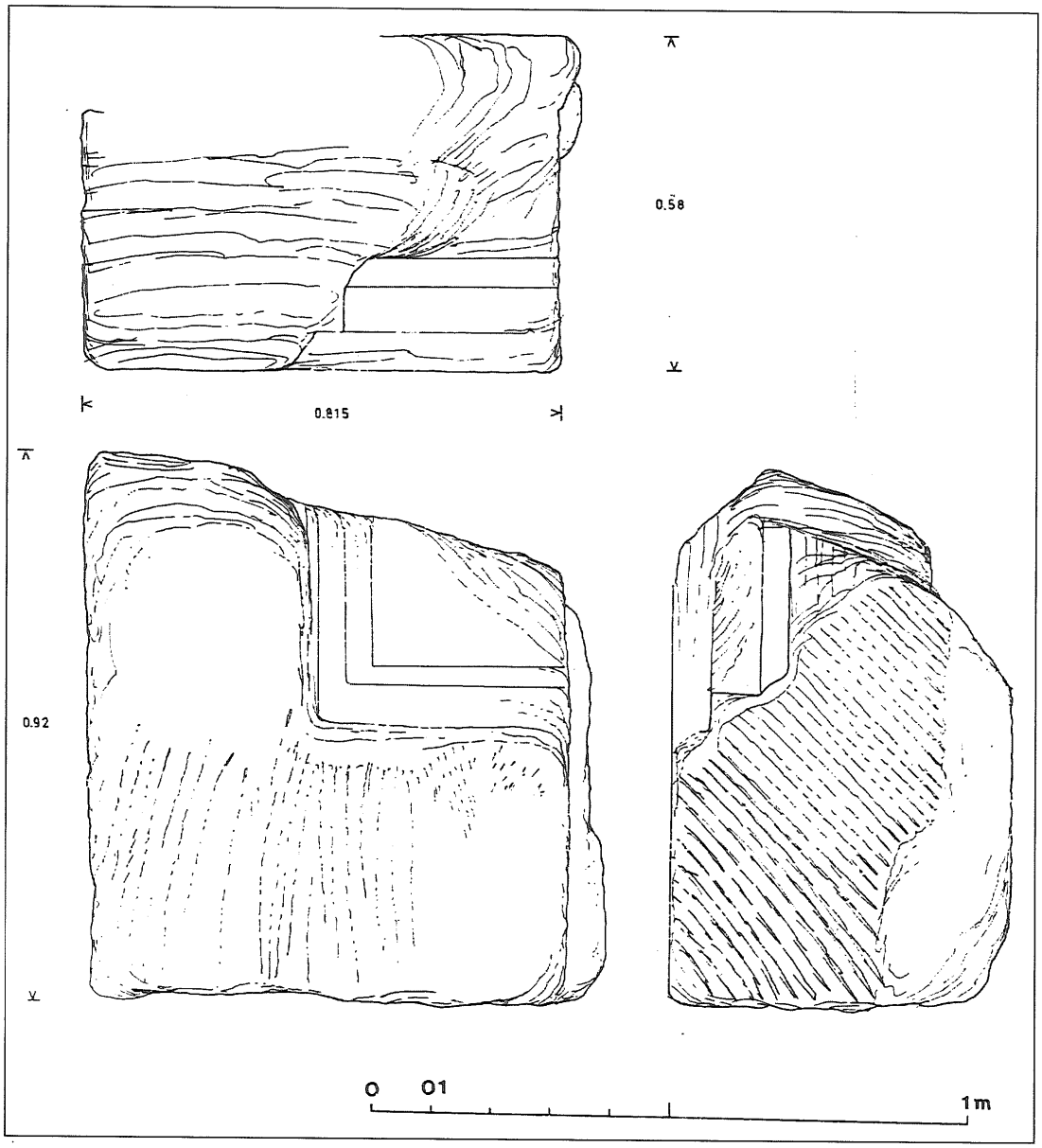
The Upper Market was located on an artificial



9. A molded voussoir found on the staircase to the Upper Market.



10. A frieze block made up from a reused pilaster capital.



11. A block from a large cornice (?) found on the staircase to the Upper Market.

plateau ca. 70m wide by 75m long surrounded by a retaining wall ca. 11.5m tall. The effort and expense invested in the creation of this platform should not be underestimated. The creation of the space alone, with its four-meter-thick retaining wall to the north, the 12-meter high enclosure walls, and the quarrying operation which extracted masses of rock in its south and east sides, may have cost a great deal more than the monumental structures with which the Market was decorated. It is also likely that the material quarried from the cliffs south and east of the Upper Market was used in the construction of the Propylaea, the retaining walls of the Upper Market and its fill, the hypothesized colonnade inside the piazza, the construction of the phase two shops and, perhaps, for the "Trajanic" Arch, and the rest of the monuments in this area. It has also been suggested by L.-A. Bedal (2001; personal communication) that this extracted material might have been used for the Street Colonnade itself and for the conversion of the Great Temple into an *odeion*. This hypothesis is intriguing and works well with the chronology of those structures that were constructed around the annexation to Rome in AD 106.

On the north side of the Upper Market, the earth fill of the artificial plateau was held by a massive retaining structure ca. 3.70m thick and made of successive walls.[7] Apparently, the enclosure of the Upper Market on the north side was erected on the edge of the retaining wall. As described above, a colonnade ran parallel to this

7. Some column drums from scrap of the colonnade are built into the retaining wall.

wall (**Figs. 1 and 6**). Hypothetically, this colonnade may have run along all four sides of the Upper Market, but direct evidence exists only on the northern side. Specifically, the two large columns of the Propylaea are in line with the poor remains of another course, which runs E-W on the Upper Market. This course (1.07m wide) can be interpreted as the stylobate of a portico running along the north side of the Upper Market at a distance of 3.63-3.75m from the edge of the retaining/ enclosure wall (**Fig. 5**).[8] The clear space of the hypothetical stoa between the suspected colonnade and the enclosure wall would be 2.70m. This stylobate, as mentioned above, is at the same level with the stylobate of the large Propylaea columns. As such, it seems that the massive portico of the Propylaea was interrupting, apparently near the middle, a smaller colonnade near the north side of the Market.

On the south and eastern sides of the Market, the natural rock was cut at a right angle and at a uniform height. The enclosure of the Upper Market on these two sides was the vertical face of the rock itself, some 10 meters high. A row of beam sockets is preserved on the vertical face of the rock. These sockets are 7.55m above the stylobate and are uniformly spaced on an even level (**Fig. 13**). The sockets served for the insertion of the beams of a roof which must have existed between the colonnade and the enclosure of the Market (**Fig. 6**). While this colonnade might have belonged to a second phase, the features of its roof are "Classical" being both tall and consistent with an extended length (at least 40 meters). The colonnade can thus be considered contemporary with the stylobate remains on the northern side.

A portion of the south enclosure wall (built against the vertical face of the rock) is still standing at a height of 11.30m. It is also noteworthy that the floor level of the Upper Market is 11.45m above the stylobate of the Street Colonnade. Possibly, the Market was designed as two equally tall compounds, one on top of the other, with a common height of 11.40m.

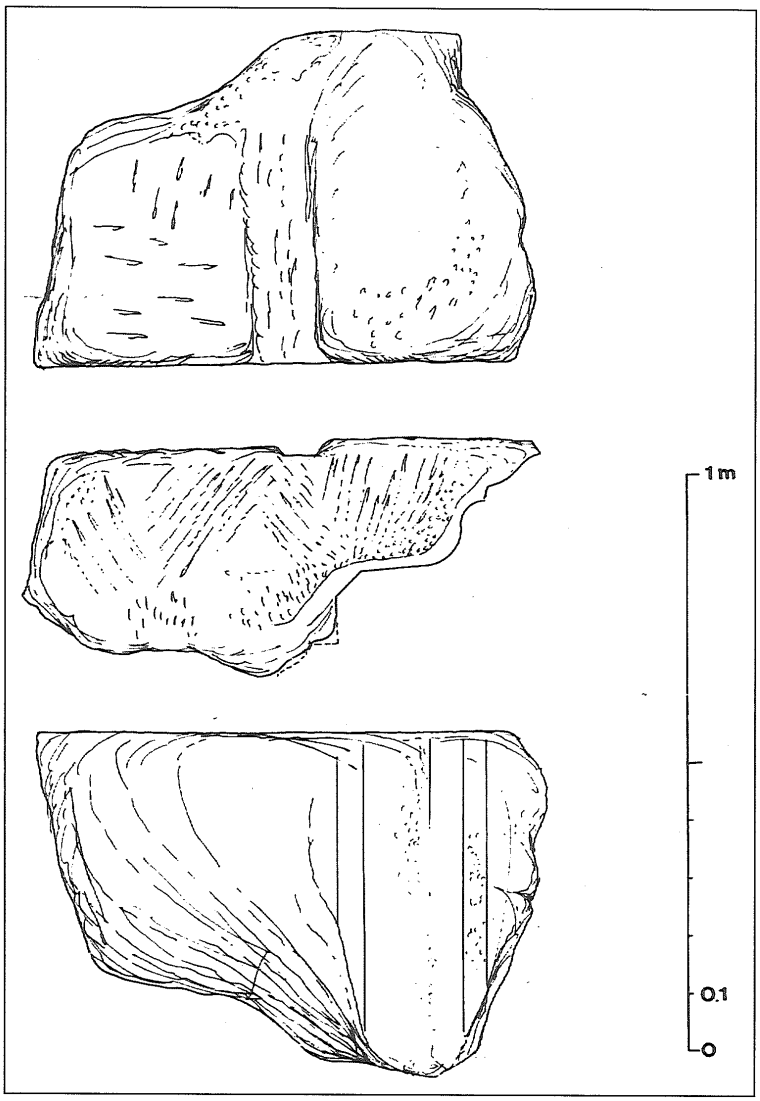
Conclusions

Recent excavation and re-examination of structural details (Fiema 1998: 416, 419) suggest that the staircase to the Upper Market, the renovated shops, colonnade, paved street and as well as the Upper Market itself were all constructed in the early decades of the second century AD. It is not a coincidence that the Trajanic dedication was placed exactly at this key commercial junction which included a public fountain (the Nymphaeon), a tavern (Shop 28) and nearby treasury (Shop 29) (Kanellopoulos 1999; 2001: 20-22). It is the same area where, according to Segal (1997: 166), the Nymphaeon (was the first monument that) "greeted the wayfarers on their way to Petra and heralded their entrance into the city itself" (**Fig. 6**). The broad staircase of the Upper Market is probably the product of architects working under the second century AD standardization of the Roman town plan, and was integrated into the designs of the street colonnade, the Nymphaeon and the concert hall (*odeion*) — and assembly (*bouleuterion*) hall? — inside the Great Temple, only after annexation to Rome.[9] Distinctive assembly halls and *odeia* which could, alternatively, be used for other popular assemblies, appear similarly in the neighboring Decapolis only during the second century AD, perhaps with the exception of the Hellenistic "Municipal Basilica" at Scythopolis (Bowsher 1992: 275-278).[10]

Some key conclusions might also be noted:

1. For Tracy (1999: 53), the dedicatory inscription to Trajan, which dates from the early autumn of AD 114, could be incised on any masonry in the area of the staircase or the Upper Market. It need not be linked to the speculated arch.
2. The inscribed blocks, however, do not appear to belong to wall masonry. They are more appropriately attributed to a finely crafted monument.
3. The arch voussoirs discovered in the vicinity of the piers and the inscription belong, in fact, to two different monumental arches. One of these arches might be associated with the Propylaea of the Upper Market or even the nearby Nymphaeon (**Fig. 6**).
4. The material found on the staircase and the landing before it (including the arch voussoirs and the inscription blocks) is also associated

8. The foundations of this stylobate, now exposed, were interpreted as the retaining wall of the Market (Browning 1989: map 4).
9. The architectural features, specifically the capacity of the *theatron* inside the Great Temple, supports its dual function as an *odeion and* as a *bouleuterion*. Five or six hundred *boule* members were common in eastern cities of the Roman Empire (Clark, Bowsher and Stewart 1986: 229; Bowsher 1992: 276). For the function of the Great Temple and the added *odeion*, see Schluntz 1998 and Tholbecq 2002.
10. Frézouls (1961) had speculated that *odeia* in the Middle East could have been used as *bouleuteria*. This dual function was successfully established through epigraphical evidence by J. Bowsher (Clark, Bowsher and Stewart 1986: 205-229, esp. 229; Bowsher 1995: 70-72). Tribal names recovered on the seats of the theater at Nāblus suggest that the latter was used as a theater (perhaps also as an *odeion) and* as a *bouleuterion*.



12. A cornice block with sima.



13. Beam sockets on the eastern cliff of the Upper Market, possibly from the roof of a surrounding colonnade. View from West.

with the collapse of the Propylaea to the Upper Market.

5. One of the two voussoir types is identical with a wall crown or wall architrave. The two elements would normally belong to the same course. This course would have been arched in the middle. While the adoption of this feature is not unique for engaged façades in the Nabataean style (see the West Gate and the Central Triumphal Arch at Būsrā in Segal 1997: 91, 136), its combination with a gabled elevation in the manner of a Syrian pediment should be excluded. The occurrence of this feature so far south of Syria would be unprecedented.
6. The two known piers of the so-called Trajanic Arch could belong to a perfectly square composition. The possibility of a conjectural *tetrapylon* was noted above. This would be a particularly convenient solution, as the hypothetical single arch is traditionally restored at the edge of the sidewalk instead of spanning across the street, like arches are normally expected to span. Unfortunately, the material evidence is inconclusive due to the poor preservation of this area of the site and as such the whole the argument for a Tetrapylon is too weak.
7. The colonnade was designed to run in front of the Staircase to the Upper Market. The width of the staircase can accommodate exactly 5 columns and 6 intercolumnar distances of the street colonnade (**Fig. 1**). However, it cannot be ascertained whether the colonnade originally ran in front of the staircase and that a section of this colonnade was demolished for the construction of the piers of the "Trajanic Arch".
8. The width of the staircase to the Upper Market (14.78m) is, by far, the largest of its kind in Petra. Indeed, it is 2.5 times wider than the staircase leading to the immense complex of the Great Temple. The size of the Upper Market staircase can be compared to the monumental staircases of the Artemis and Zeus sanctuaries at Jarash (ca. 15 and 20m wide respectively) and betrays the adoption of the new landscape schemes introduced after Trajan. The large size of the Upper Market would have made it an ideal space for open-air assemblies and gatherings. As such, it would have performed an important role in the social life of the city.[11]
9. The unexpected discovery of a pool complex in the area known since 1921 as a "Lower Market" (Bedal 1999; 2001) makes caution necessary when referring to the unexplored Middle and Upper "Markets".
10. The suggested plan of the Propylaea in **Figs. 1 and 6** is both general and hypothetical. Still it does seem that the north façade consisted of two large semi attached columns that corresponded to the freestanding columns of the south porch. No further details can be suggested. Although this design is somewhat unusual for Propylaea, which would be expected to exhibit a colonnaded portico *before* the entrance wall, it makes sense within the given context. The main façade was a wall with doorway(s) and attached semi columns which corresponds in turn to the wall of the market enclosure while the porch behind it corresponds to the internal colonnade of the piazza. This arrangement would be morphologically acceptable within the tradition of the Nabataean "façade architecture", in which the screened-blind openings and semi-columns became a style in itself in both rock cut relief tombs and free-standing temples (at-Tannūr التنور and adh-Dhaīḥ الذريح).

C. Kanellopoulos
104 Aphrodite Street
17562 Paleo Phalero
Greece

Bibliography

Bedal, L.-A.
1999 A Paradeisos in Petra: New Light on the "Lower Market". *ADAJ* 43: 227-239.
2001 A Pool-Complex in Petra's City Center. *BASOR* 324: 23-41.
Bowsher, J.M.C.
1992 Civic Organisation within the Decapolis. *Aram* 4: 265-281.
1995 Segal, A., Theatres in Roman Palestine and Provincia Arabia. E.J. Brill, Leiden. Pp. ix+117, 155 figs. *Bulletin of the Anglo-Israel Archaeological Society* 14: 70-72.
Browning, I.
1989 *Petra*. 3rd ed. London: Chatto & Windus.
Clark, V.A.; Bowsher, J.M.C. and Stewart, J.D.
1986 The Jerash North Theater. Architecture and Archaeology 1982-1983. Pp. 205-229 in F. Zayadine (ed.), *Jerash I: Jerash Archaeological Project 1981-1983*. Amman: Department of An-

11. The clear public use of this, as yet unexplored, square is emphasized by the accessibility provided by the monumental staircase. And yet, the obvious lack of substantial structures in the interior of the "market" is puzzling especially when compared, for example, to the sanctuaries of Jarash where similar a monumental Propylaea and staircase give entrance to prominent sanctuaries. That the Upper Market was the site of open-air meetings seems to be the best solution.

tiquities.
Fiema, Z.T.
1998 The Roman Street of the Petra Project, 1997. A Preliminary Report. *ADAJ* 42: 399-424.
Frézouls, E.
1961 Récherches sur les theatres de l'orient Syrien II. *Syria* 38: 54-86.
Kanellopoulos, C.
1999 The Colonnaded Street and Shops in Petra. In P. Bikai and V. Egan (eds.), Archaeology in Jordan. *AJA* 103: 507-509.
2001 The Architecture of the Street and Shops in Petra. *BASOR* 324: 9-22.
Kirkbride, D.
1960 A Short Account of the Excavations at Petra in 1955-56. *ADAJ* 4-5: 117-122.
McKenzie, J.S.
1990 *The Architecture of Petra*. British Academy Monographs in Archaeology 1. Oxford: Oxford University.
Schluntz, E.L.
1998 The Upper Temenos and the Great Temple. Pp. 209-224 in M.S. Joukowsky, *Petra Great Temple, Volume I: Brown University Excavations*. Providence, RI: Brown University, Petra Exploration Fund.
Sear, F.
1982 *Roman Architecture*. London: Batsford Academic and Education Limited.
Segal, A.
1997 *From Function to Monument: Urban Landscapes of Roman Palestine, Syria and Provincia Arabia*. Oxbow Monograph 66. Oxford: Oxbow.
Stucky, R.
1996 Die Nabatäische Bauten. Pp. 13-50 in A. Bignasca, N. Desse-Berset, R. Fellmann Brogli, R. Glutz, S. Karg, D. Keller, B. Kolb, C. Kramar, M. Peter, S.G. Schmid, C. Schneider, R.A. Stucky, J. Studer and I. Zanoni, *Petra: Ez Zantur*, Vol. 1: *Ergebnisse der Schweizerischen - Liechtensteinischen Ausgrabungen 1988-1992*. Terra Archaeologica 2. Mainz: Phillip von Zabern.
Tholbecq, L.
2002 Nabataean Monumental Architecture. In N. Kokkinos and C.D. Politis (eds.), *The World of the Herods and the Nabataeans*, An International Conference at the British Museum, 17-19 April 2001 (in press).
Tracy, S.
1999 The Dedicatory Inscription to Trajan at the "Metropolis" of Petra. Pp. 51-58 in J.H. Humphrey (ed.), *The Roman and Byzantine Near East*, Vol. 2: *Some Recent Archaeological Research*. JRA Supplement 31. Portsmouth, RI: Journal of Roman Archaeology.
Zayadine, F.
1987 Decorative Stucco at Petra and Other Hellenistic Sites. Pp. 131-142 in *SHAJ* 3. Amman: Department of Antiquities.

NEW EXCAVATIONS IN THE QAṢR AL-BINT AREA AT PETRA

Christian Augé, François Renel, Laurent Borel and Chrystelle March

The New Project

Since 1999, a French mission has been carrying out new excavations at Petra, in the sacred precinct (the temenos) of the well-known Nabataean temple called "Qaṣr al-Bint" (قصر البنت). The temple proper had been in the 1970s and 80s the subject of partial excavations, studies and restorations by the Department of Antiquities, helped by architect François Larché, then of the French Institute of Archaeology in the Near East (IFAPO). The scientific publication of their results is currently in press in Paris: this book written by Fawzi Zayadine, François Larché and Jacqueline Dentzer-Feydy contains an updated study of the architecture and decoration of the Qaṣr and of its cults (Zayadine *et al.*, in press).

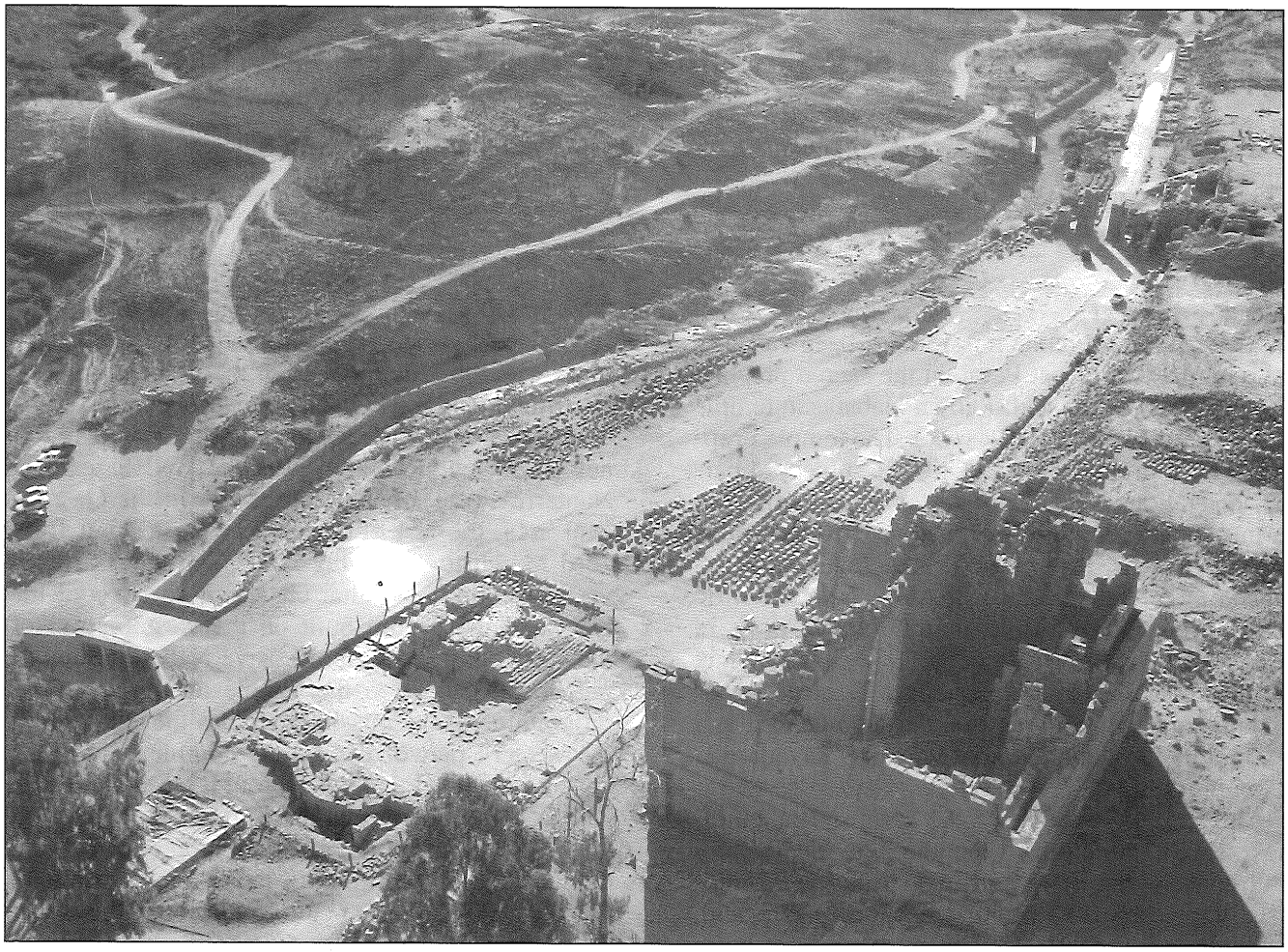
Little was known about the surrounding buildings, which had attracted the attention of the early 19th century travellers and of German archaeologists in the early 20th century (especially Wiegand, in Bachmann *et al.* 1921). The excavations of Peter J. Parr and G.R.H. Wright, and later on of Fawzi Zayadine, had been limited in this area to the southernmost part of the paved court, between the altar and the great stairway of the temple, and to the steps themselves (Parr *et al.* 1968; Zayadine 1981; 1982: 374-376, pl. 124-127).

In order to set the temple back in its architectural and archaeological context and to secure more precise chronology, a new project initiated by the Department of Antiquities[1] and IFAPO started in 1999, thanks to the IFAPO directors, Jean-Marie Dentzer and Jean-Louis Huot, and to Jean-Pierre Braun, then in charge of the 'Ammān branch. Since 2001, these researches became part of a regional programme, "From Petra to Wadi Ramm", directed by Christian Augé (CNRS, Paris-Nanterre) and subsidized by the French Ministry of Foreign Affairs, with the efficient help of the French Embassy at 'Ammān, of IFAPO and of several donors.[2]

Five seasons of fieldwork, led by François Renel (Associate Researcher to the CNRS team at Nanterre) were already carried out in the Qaṣr al-Bint area, the last of which was carried out from 23rd March to 15th May 2002. The team first investigated the main altar erected in the axis of the Qaṣr and the exedra built on the western wall of the court, as well as an extensive Nabataean building, located close to the temple on the east. The programme of the mission includes the study of all the western part of the temple complex, that long paved courtyard entered through a monumental gate at the end of the main axis of the ancient town, the architecture and decoration of which are obviously linked to those of the whole temenos. In the year 2000, after the cutting off and diversion of the service driveway that crossed the area, the ancient pavement of the court was cleared out, setting off the high temple walls and the adjacent structures. Near the modern bridge across Wādī Mūsā first investigation of the northwestern corner of the precinct was performed in April-May 2002. At the same time, in the area formerly excavated by P. J. Parr and by Fawzi Zayadine, part of the steps of the Qaṣr was unearthed, establishing a visible link between the temple and the courtyard (**Fig. 1**).

In order to inform visitors about the work in progress, three provisional notice boards in French, Arabic and English were recently set up near the work area, and a leaflet was prepared in both French and English. Until more elaborate reports are published,[3] the following report aim only to

1. We express our warmest thanks to the directors and officials of the Department, Drs Ghazi Bisheh, Fawwaz al-Khraysheh and Fawzi Zayadine, and to the officials and staff of the Antiquities Office and Museum at Petra, especially Mr Sulayman Farajat and Mr Muhamad 'Abd al-Aziz.
2. The project includes two other operations in the same region: epigraphical and archaeological researches by Laïla Nehmé, CNRS Paris (including the excavation of the "Obodas Chapel" in Wādī Numayr at Petra, epigraphical surveys and further studies linked to the publication of her *Archaeological Atlas of Petra*), and the archaeological survey and mapping of Jabal ash-Sharāh by Laurent Tholbecq, Associate Researcher to CNRS (Nanterre and Brussels). The Jordanian-French Mission in Wādī Ramm (Fawzi Zayadine and Saba Farès-Drappeau), with the participation of Saudi archaeologists and epigraphists, forms another part of the same regional programme
3. Already published articles: Dentzer and Renel 2000: 61; Renel 2001: 29-30. Several articles are in press or in preparation, among which are a preliminary report by F. Renel *et al.* for *ADAJ*; F. Renel, C. Augé, J. Dentzer-Feydy *et al.*, Travaux récents dans le sanctuaire du Qasr à Pétra, to be published in *Syria*; and Zayadine, forthcoming.



1. General view of the excavated area (by L. Borel).

give a brief summary of the results of the work, and to make an updated plan of the area available to any person concerned with the topography of central Petra.[4]

The First Results

The great sacrificial altar was investigated and restored in 2000 (**Fig. 2**), owing to a donation of the firm Radisson SAS, implemented through the UNESCO agency at 'Ammān. This formerly Nabataean building went through several transformations in Roman times, to which it is still difficult to ascribe precise dates. Remains of its marble cladding and decorative mouldings can still be seen. The cavity opened at the top of the altar was connected with an intricate system of channels and drains hollowed out on and under the pavement of the courtyard, the understanding of which is one of our main points of interest.

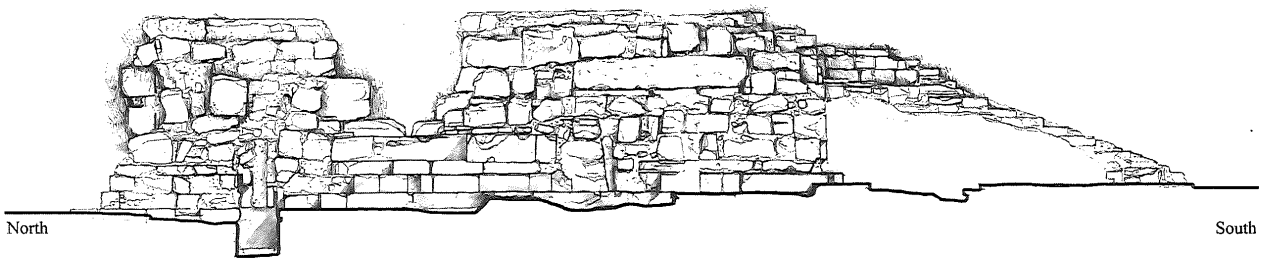
A monumental exedra was built on the western enclosure wall of the temenos (**Fig. 3**), in connection with a second altar — the north altar — which is almost square in shape and carefully clad with polychrome marble. The curved exedra is comprised of a high central platform flanked by projecting columns. It was adorned with statues, some of them larger than life and probably intended to honour the imperial family, as indicated by inscriptions naming Marcus Aurelius and Lucius Verus, co-rulers in AD 161-169, that were found in the excavation (to be published by Zayadine, forthcoming). A number of fragments of marble and sandstone sculpture were found in the destruction layers of the monument, mixed with pieces from the Qaṣr itself, thus providing rich study material to Jacqueline Dentzer-Feydy (CNRS Paris-Nanterre), who is in charge of the study of architectural decoration for both buildings. After the destruction and levelling down of the exedra in later Roman times, a dwelling was built upon its remains, and subsequently destroyed in the fifth century AD.

On the eastern side of the Qaṣr, the team under-

4. Especially in connection with the important Petra Mapping Project by ACOR and the Hashemite University, and the Petra Documentation Center of ACOR. For their presentation, see Kanellopoulos and Akasheh 2001.

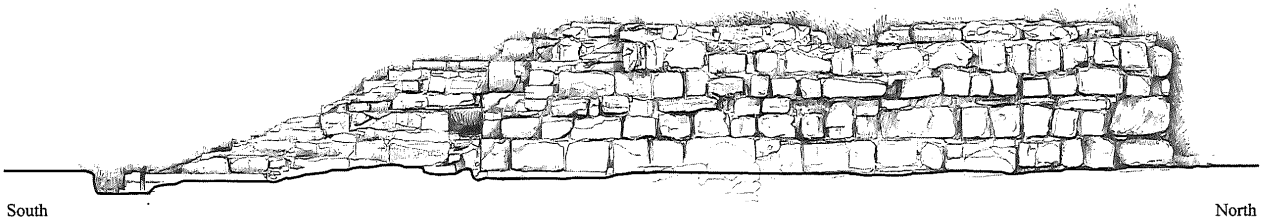
ALTAR OF THE QASR AL-BINT

Recording by L. Borel, E. Laroze and Ch. March
Computerization by L. Borel and Ch. March (2000)



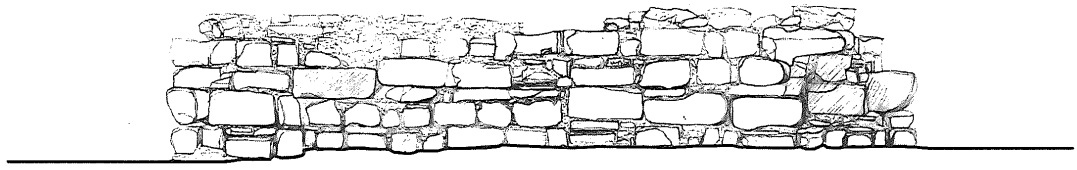
0 5 m 10 m

West elevation



0 5 m 10 m

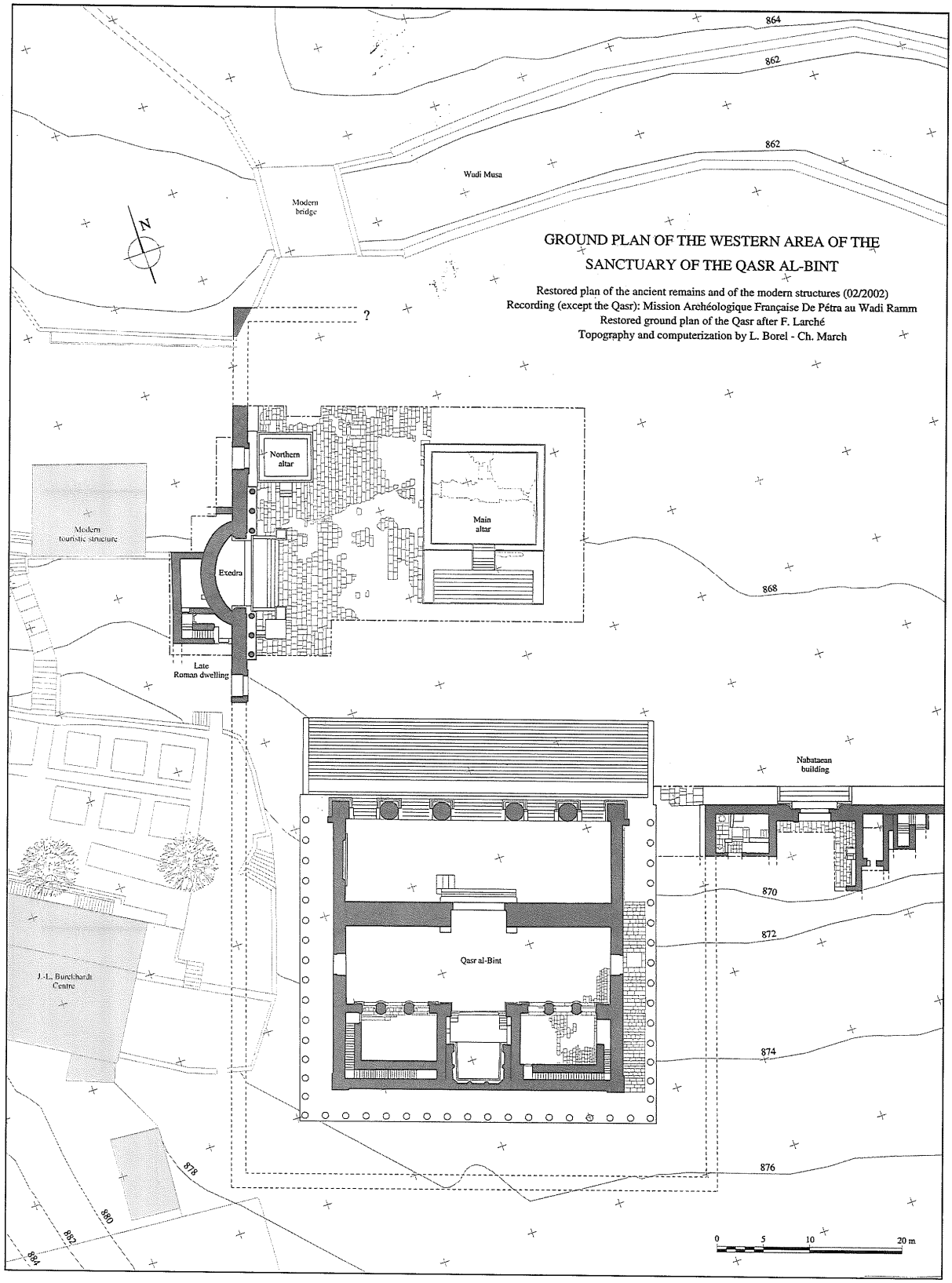
East elevation



0 5 m 10 m

North elevation

2. West, east and north elevations of the main altar, by L. Borel, E. Laroze and C. March.



3. New plan of the western part of the temenos (February 2002) by L. Borel (IFAPO 'Ammān) and C. March, from recordings of the French Mission and the restored plan of the Qaṣr al-Bint by F. Larché.

took the excavation of an extensive Nabataean building, located behind the temenos enclosure and opening onto the sacred court through a monumental gate, notable for its huge monolithic threshold. Its large entrance hall and a row of rooms were partly excavated, showing the remains of a Late

Roman reoccupation. In the next campaigns, the mission intends to focus on the excavation and study of this building, in order to get more accurate information about its plan, its function — it was perhaps devoted to some official use in the Nabataean period — and about its precise chronology.

The five campaigns carried out up till now yielded a considerable amount of material, especially beautiful pieces of sculpture illustrating the imperial adaptation of this sacred area during the second century AD. From ceramics, coins and various artefacts, rich documentation has been gathered on the Late Roman phases of occupation and reoccupation around the former temple. At first sight, the results confirm the general conclusions reached by the American and Swiss missions in neighbouring areas: this part of the ancient town seems to have outlived the famous earthquake of AD 363. Further excavation, study and analysis should provide us with more precise information about the Nabataean period, especially on the planning of the whole sanctuary in Nabataean times, on the chronological sequence of the structures, and on the insertion of the temple in a comprehensive architectural programme.

A Plan of the Area

One of the first achievements of the mission is the ground plan of the whole area, due to its architects, Laurent Borel (IFAPO 'Ammān) and Chrystelle March. This plan is published here for the first time **(Fig. 3)**.[5] It results from the architectural recordings of the different structures, the altar, the exedra and the Nabataean building, that were drawn by several members of the Mission since 1999: C.-É. Bertrand, L. Borel, E. Laroze, C. March, H. Morel-Renel, M. Perrin, F. Renel and E. Ronza. Those plans, together with the restored plan of the Qaṣr al-Bint by F. Larché, were assembled, checked and rectified with complements by L. Borel and C. March.

This new plan reflects the progress of fieldwork after the fourth campaign of the Mission, in spring 2001, and now gives a reliable picture of the western part of the temenos. New features appeared in the fifth campaign (spring 2002), such as the pavement around the main altar and between the altar and the steps of the Qaṣr, and newly excavated rooms in the Nabataean building, but time was too short after the last season to get the drawings ready for publication. They will appear in future reports.

C. Augé
CNRS, UMR 7041,
Archéologies et sciences de l'Antiquité,
Proche-Orient hellénistique et romain
Nanterre - France

L. Borel
Architect, IFAPO 'Ammān

C. March
Architect, 'Ammān

F. Renel
Archaeologist,
Associate researcher to the CNRS team
Nanterre - France

Mission Pétra-Qasr al-Bint
Bureau 263G, Maison René Ginouvès
21 allée de l'Université,
F-92023 Nanterre Cedex, France
E-mail: auge@mae.u-paris10.fr

Bibliography

Bachmann, W., Watzinger, T. and Wiegand, T.
1921 *Petra* (Wissenschaftliche Veröffentlichungen des Deutsch-Türkischen Denkmalschutz-Kommandos, 3). Berlin, Leipzig.

Dentzer, J.-M. and Renel, F.
2000 Qasr al-Bint. *Le Monde de la Bible* 127 (May-June): 61 (French).

Kanellopoulos, C. and Akasheh, T.S.
2001 The Petra Map. *BASOR* 324 (November): 5-7.

Parr, P.J., Wright, G.R.H., Starcky, J. and Bennett, C.-M.
1968 Découvertes récentes au sanctuaire du Qasr à Pétra. I. Compte rendu des dernières fouilles (P.J. Parr), II. Quelques aspects de l'architecture et de la sculpture (G.R.H. Wright), III. Les inscriptions du téménos (J. Starcky and C.-M. Bennett). *Syria* 45: 5-24, pl. 1-3; 25-40, pl. 4-7; 41-66, pl. 8-10.

Renel, F.
2001 A Preliminary Report on the Qasr al-Bint Excavations at Petra. *Majalat Athar* 4: 29-30 (Arabic, translated by A. Badran).

Zayadine, F.
1981 Recent Excavations and Restorations of the Department of Antiquities (1979-80), II. Petra, 4. The Qasr el Bint Temple. *ADAJ* 25: 354-355, pl. 102.
1982 Recent Excavations at Petra (1979-81), II. Qasr el Bint Excavations. *ADAJ* 26: 374-380, pl. 123-129.

Forth. L'exèdre du téménos du Qasr al-Bint à Pétra.

Zayadine, F., Larché, F. and Dentzer-Feydy, J.
in press *Le Qasr al-Bint de Pétra. L'architecture, le décor, la chronologie et les dieux*. Editions Recherche sur les Civilisations, Paris (French, English summary).

5. This plan is also to appear in the forthcoming book by Zayadine *et al.*, in press

THE BROWN UNIVERSITY 2001 PETRA GREAT TEMPLE EXCAVATIONS OFFER MORE SURPRISES

Martha Sharp Joukowsky

The ninth 10-week season of excavation by Brown University archaeologists at the Petra Great Temple took place from June until August 2001, and helped us clarify the architecture of the precinct. Eight trenches and two special projects were excavated with startling results. A revised site plan with the 2001 trenches is shown in **Fig. 1**, and an aerial photograph of the site at the conclusion of the 2001 season is shown in **Fig. 2.**[1]

Excavation Staff[2]

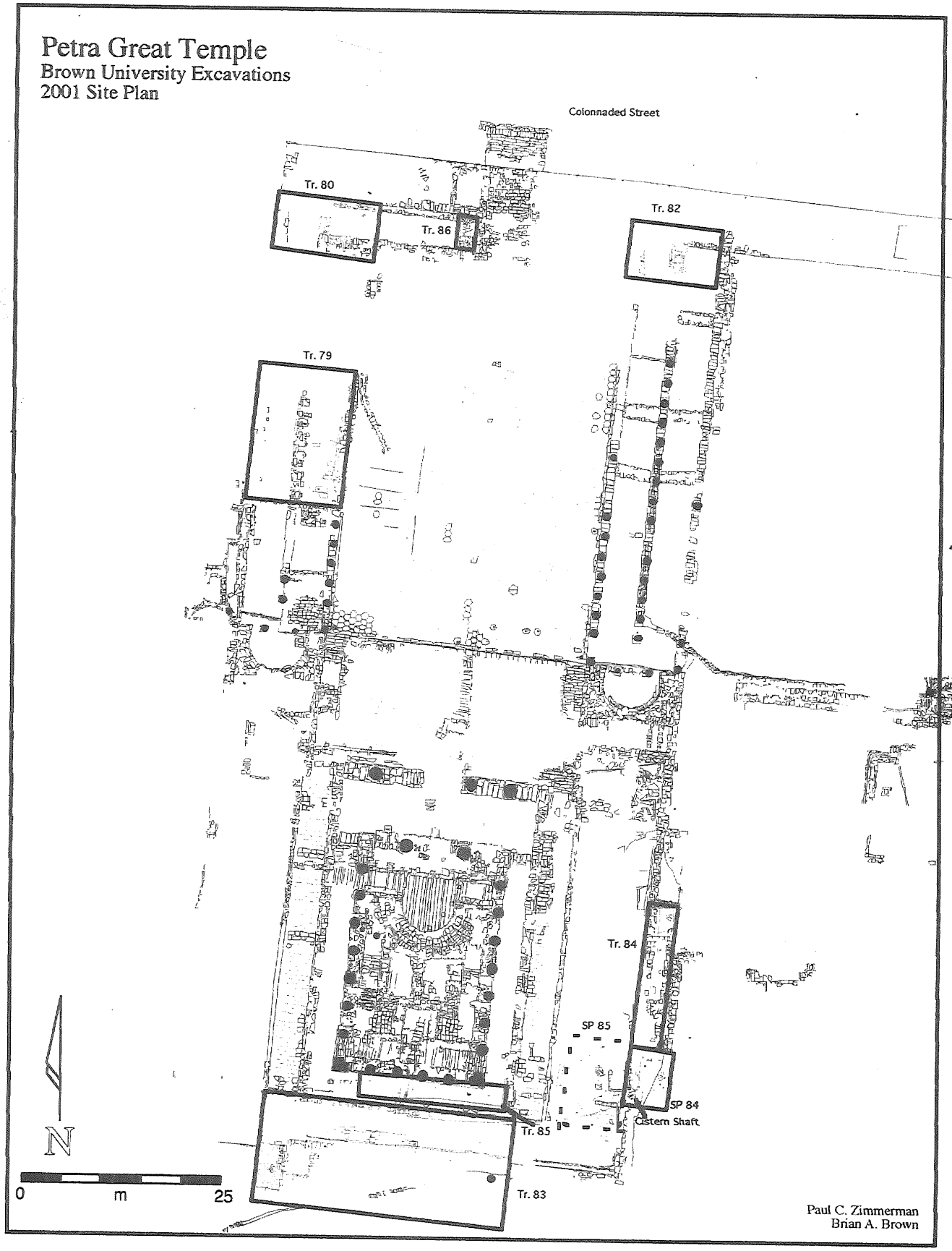
The members of the 2001 Brown University team were Artemis A.W. Joukowsky, photographer; Deirdre G. Barrett, Brown Graduate Student and cataloger, Joseph J. Basile, Associate Director; Brian A. Brown, Assistant Director and surveyor; and John Philip Hagen, artist. In addition there was Sara Karz Reid, Small Temple supervisor, Brown University graduate student, who is writing her dissertation on the Small Temple excavations; Emma S. Libonati, senior archaeologist; and Monica Sylvester, and Donna D'Agostino database managers. I was fortunate to have five extraordinary Brown University undergraduate students who were indispensable for the recovery of the Great Temple architecture: Christian F. Cloke, Emily C. Egan, José I. Fusté, Amanda Henry and Darryl B. Sneag. Fresco and mortar samples were taken for analysis to provide us with their original chemical constituents by May Shaer and Stephan Simon of the GTZ (German Technical Research Institute). Dakhilallah Qublan, our expert foreman and Great Temple restorer, again served a crucial role in the success of these excavations. He oversaw the 50 workmen who aided us and continue to consolidate architectural features weakened by excavation. All small finds have been stored either at the site, in caves cleared for storage, or in the Petra Museum. As in former years, this work has been conducted under my direction.

Sponsors

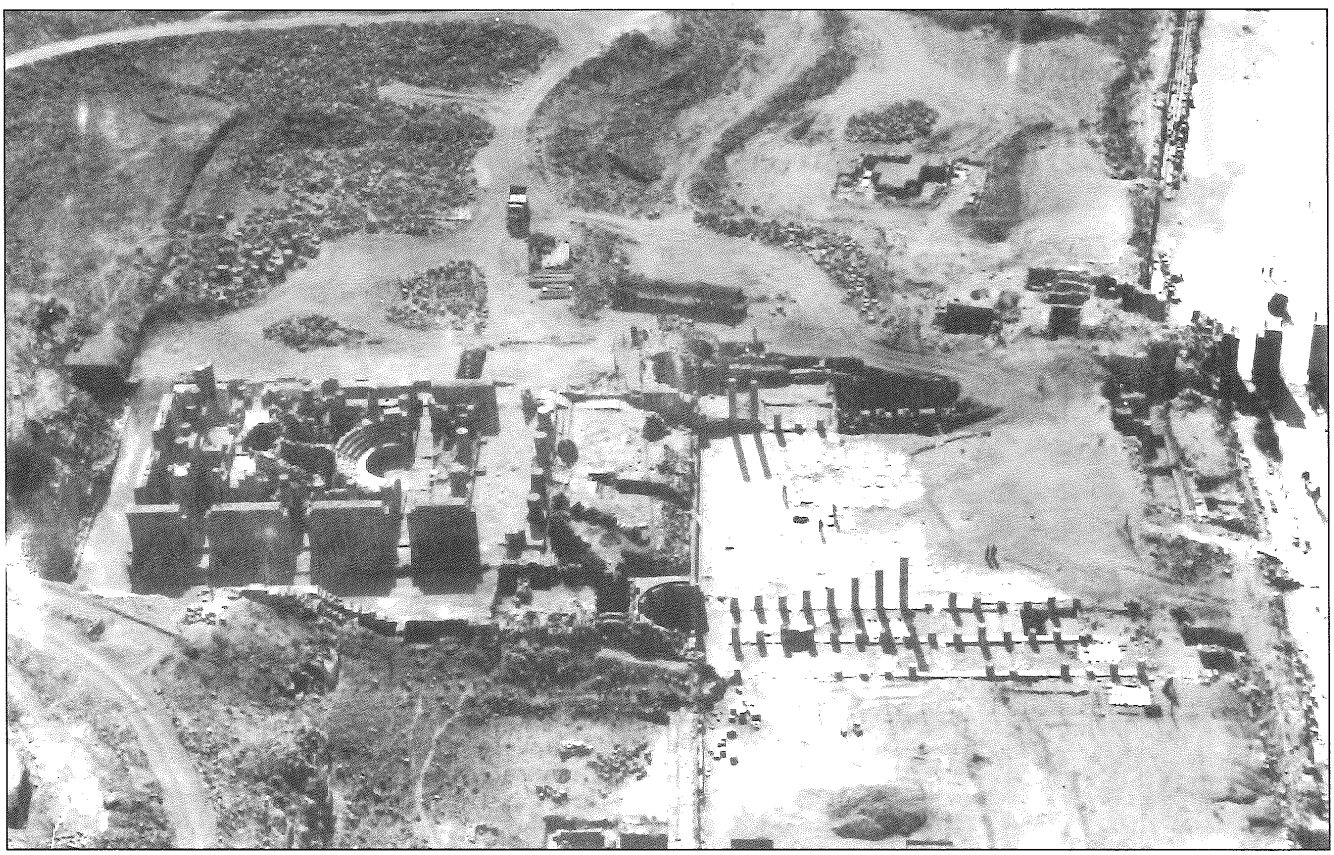
I have been truly fortunate to receive the support of Brown University and the Brown University Undergraduate Teaching Assistantship program and many sponsors for the 2001 excavations. These include major funding from the Replogle Foundation, the Manchester Growth Fund, Donald E. Besser, Chairman, Julie Chrystie Webster, Claire J. Henderson with a matching grant from the CIGNA insurance company, and W. Chesley Worthington. The Joukowsky Family Foundation has most generously underwritten the expenses of site consolidation and restoration. H.E. Prince Ra'ad Bin Zeid helped provide us with helicopter support of the Seventh Squadron of the Royal Jordanian Air Force for aerial photographs. I owe all of these supporters a tremendous debt.

We are also indebted to the Jordanian Department of Antiquities of the Hashemite Kingdom of Jordan for their support in making the 2001 season a tremendous success, most particularly Fawwaz al-Kraysheh, Director-General. Assigned to us this year were Hani Falahat and Dia'eddin A. Tawalbeh as Representatives of the Department of Antiquities, but it is to Suleiman Farajat, Director of the Petra Archaeological Park, that we owe an enormous debt for his continued interest, logistical acumen and moral support. We also greatly appreciate the cooperation received from The American Center of Oriental Research, Pierre Bikai, Director, and all the members of the staff who so ably assisted us with logistical advice and negotiated formalities during the excavation.

1. Annual overviews of these excavations have been published in *ADAJ* with briefer notes in the *AJA* and the *ACOR* Newsletter. The project web site can be found at http://www.brown.edu/Departments/Anthropology/Petra.
2. Special visitors to the Great Temple in 2001 included Jane Taylor, Hana Asfour, Lema and Hana Alireza and Nissa Ra'ad Al-Hussein, Stephanie Truesdell, Andrew Schwartz, Erika Schluntz (who wrote her 1999 Brown University dissertation on the Great Temple architecture) and Donna and Ron Henry. These along with Misha and Jane Joukowsky and Francesca Bennett volunteered their services to the excavation as did Barrett and Mary Hazeltine. Brown University Trustee Duncan MacMillan and his wife, Niven, also paid us a visit as did 13 intrepid Brown University Travelers. Professor Ehud Netzer of the Hebrew University, Jerusalem, made his annual visit to the excavations as did Ali Jabbri, artist. Filmmakers David and Michael Udris created a special documentary of Petra and the Great Temple site. We were interviewed by Quentin Cooper of the BBC's "The Material World," a program that aired on July 20. ART a NOVA affiliate who are producing a film on Petra were also on site to interview us.



1. Plan of the 2001 Petra Great Temple trenches (Paul. C. Zimmerman and Brian A. Brown).



2. Aerial photograph of the Petra Great Temple looking west (photograph by A.W. Joukowsky).

EXCAVATION RESULTS

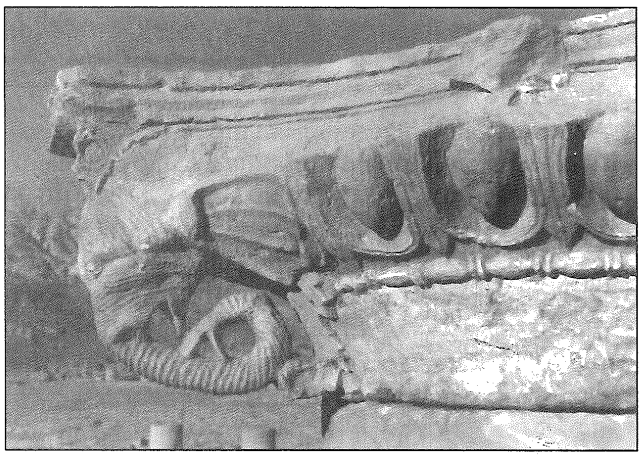
The 2001 season saw excavations continuing in the Propylaeum, the Lower and Temenoi and excavations in the Temple proper. These investigations will be described in that order with a concluding note about our consolidation program.

Propylaeum West

The West Propylaeum today consists of three parallel east-west walls. The northernmost of these bordering the Colonnaded Street is P.J. Parr's "Portico Wall" (Parr 1970, hereafter, the Portico Wall). The Portico Wall separated the Great Temple precinct from the main thoroughfare of the central city. Approximately 3.00m south of this is Parr's Terrace "Wall K" (Parr 1970, hereafter Terrace Wall K), and 4.20m south of Wall K is what we have designated as the Great Temple's Lower Temenos retaining wall. For several seasons, the Great Temple excavations have taken place to the south between Wall K and the Lower Temenos retaining wall in Trench 51, 1998, Trenches 68 and 70 and Special Project 70 in 2000, and in Trenches 80 and 86 in 2001. Yet to be excavated in the Great Temple Propylaeum is the area between the Portico Wall and the Terrace Wall K.

Earlier excavations in the West Propylaeum, between Wall K and the Lower Temenos retaining wall, had brought forth elephant headed capitals from the Propylaeum-Lower Temenos Triple Colonnade. During the 2001 season yet another, the best preserved of all was recovered — one side of an elephant headed engaged capital was completely preserved *(mirable dictu)*, which is shown in **Fig. 3**.

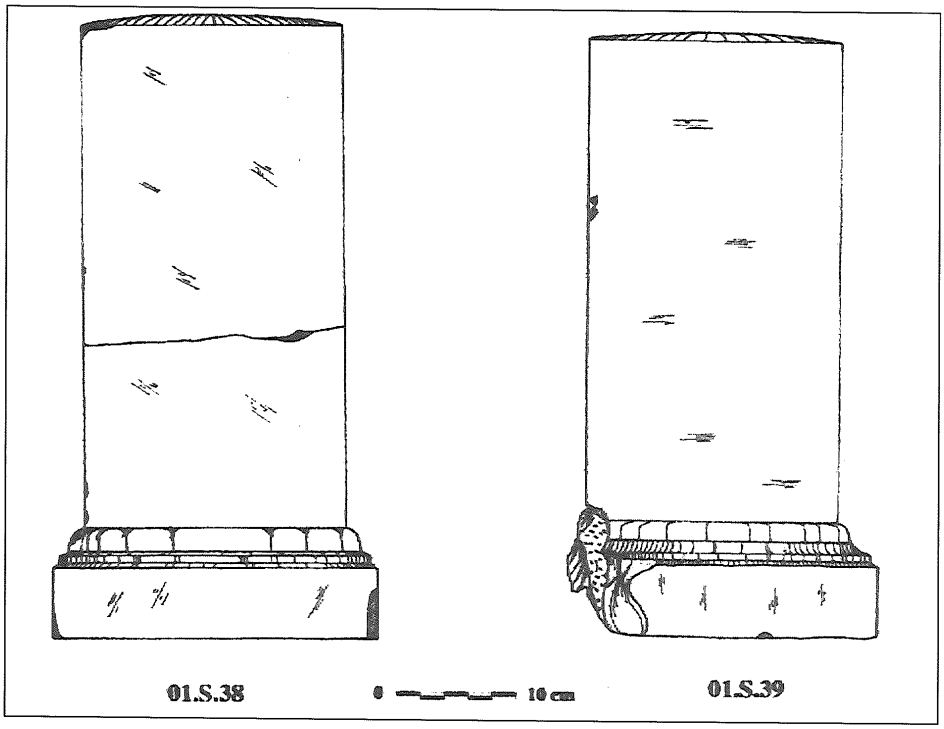
Continuing excavations under the supervision of Darryl B. Sneag in Trench 80 of the West Propylaeum also revealed unprecedented double limestone betyls attached into a niche with plaster. The niche measured 0.97m in width and is inset 0.69m. Shown *in situ* in **Fig. 4** and by drawing in **Fig. 5**,



3. Complete elephant-headed capital excavated in 2001 (photograph by A.W. Joukowsky).



4. Propylaeum west, betyls in situ (photograph by A.W. Joukowsky).



5. Drawing of Propylaeum betyls (drawing by Emily C. Egan).

these sacred aniconic representations of Nabataean deities are in remarkably pristine condition, measuring approximately 0.50m in height x 0.21m in width — their tops are approximately 0.09m in thickness.[3]

A limited test trench, Trench 86, in the West Propylaeum was carefully excavated by Brian A. Brown. The trench, located at the eastern end of the West Propylaeum, was originally bounded to the north by a bench set against Wall K, the north terrace wall, to the east by the later Propylaeum staircase north-south wall, and to the south by the Lower Temenos retaining wall. The purpose of this sondage was to collect data relevant to the sequence of construction in the Propylaeum and Lower Temenos areas. Present thus far in our exca-

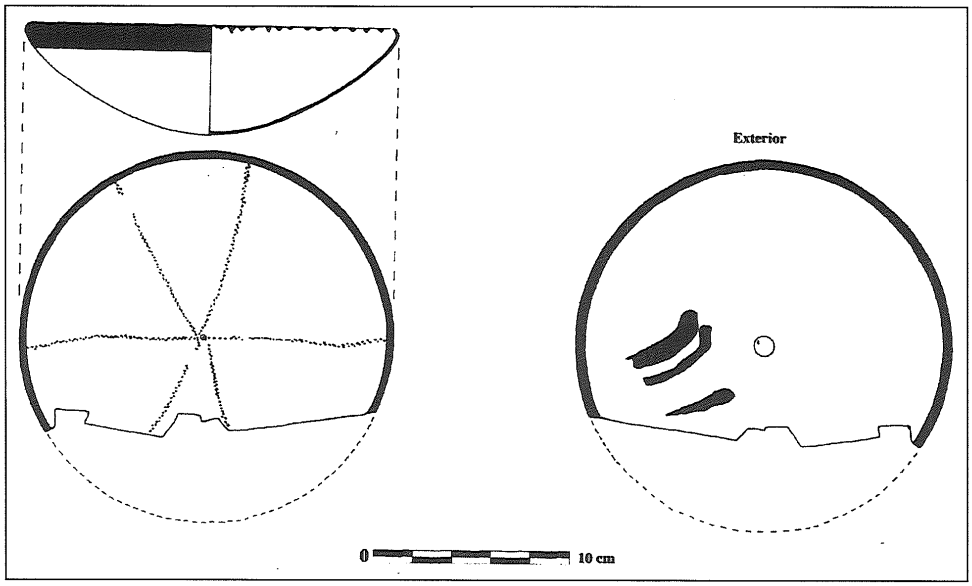
3. The betyls are in remarkably good condition considering the huge collapse/destruction that ransacked the rest of the Great Temple; however, the north betyl, Cat. No. 01.S.38, is fragmented into two pieces and the back left edge of the south betyl, Cat. No. 01.S.39, has a small chip. Unlike those found throughout as-Sīq, most of which are carved out of the sandstone bedrock and are badly weathered, these free standing betyls are carved out of a high-grade limestone, their edges remain well-articulated, and their faces are flush.

vations of the Propylaeum, the earliest construction was Wall K, the east-west north terrace wall (Parr 1970: 351, 362). As for Wall K, Parr *(op. cit.)* notes, "In other words, it is from this time ([his] Phase IX) that the layout of this part of Petra, as we see it today, originally dates".

Wall K in a later phase was abutted on its south face by the construction of an oddly aligned sandstone pavement.[4] Just below this pavement is a layer of floor bedding. In a yet later phase, ten courses of the south Lower Temenos terrace wall were constructed, and in a pocket associated with the south Lower Temenos wall was a Nabataean bowl **(Fig. 6)** recovered from a sealed context in the floor bedding. The unpainted areas on the bowl suggest an early date for its manufacture with its best parallel found in Stephan Schmidt's (2000: Abb. 81) Phase 2a, dated from approximately 30 BC to the first decade of the first century AD.[5] The bowl provides a convenient *terminus ante quem* for the construction of the Lower Temenos platform, the oddly aligned stone pavement, the lowest floor, and the Wall K north terrace wall as well as also a *terminus post quem* for the construction of other features in the area.

Thereafter successive Lower Temenos construction took place and the Lower Temenos retaining wall was re-built and the east-west Cryptoporticus then was installed with its arches and roofing, and a second floor bedding was laid. For some reason thereafter (earthquake?) the cryptoporticus was blocked and what we see today as the north-south Propylaeum staircase retaining wall was constructed, a bench was built against Wall K, and the third floor bedding was laid. Thereafter was the abandonment and robbing of the flooring, and, finally, the area fell out of use. This test trench revealed new components about the stratigraphy of this area and confirmed that the earliest walls of the Propylaeum were the Portico Wall and Wall K.

Excavations in Trench 82 of the *East Propylaeum*, undertaken by Joseph J. Basile, confirmed that the East Propylaeum was constructed in a similar phase as that of the West Propylaeum. Some minor architectural modifications were due to differing destruction patterns with a subsequent complicated series of wall constructions. The trench, located in the southeast corner of the Propylaeum, encompassed the easternmost portion of the southern Propylaeum cryptoporticus. Its measurements were 6.20m north-south x 12.00m east-west. Evidence suggests that the east cryptoporticus may have been accessed from an as yet unexcavated doorway from the Colonnaded Street. More work will be done in



6. West Propylaeum bowl (drawing by Emily C. Egan).

4. This installation did not abut the south terrace wall but fell short of it. It is not clear to us if this pavement is the same as the well preserved stone paving that Parr (1970: 360) mentions, which he dates to ca. 100 BC from a coin of Aretas II and places in his Phase VII. What is clear is that this stone paving is on an entirely different alignment than either the north Wall K or the south Lower Temenos retaining terrace wall. Could there have been a predecessor wall here on a different alignment?
5. The bowl has an even core and is of a light red (Munsell 10R 7/6) ware with a self-same slip. The interior design consists of six evenly spaced lines of small, dark red (Munsell 2.5YR 4/8) dots. These lines extend from the incurved rim, which is decorated with small, dark red (Munsell 2.5YR 4/8) triangles, and intersect at the base. The exterior is undecorated except for three streaks of the same hue of dark red paint as the interior decoration, possibly from the fingers of the potter. The exterior of the rim is painted with the same hue of dark red paint described above. Although there are no exact parallels in Schmidt's typology, the incurved rim and the design of relatively small, closely spaced triangles on the interior of the rim, and open, largely undecorated spaces on the bowl suggest an early date for its manufacture.

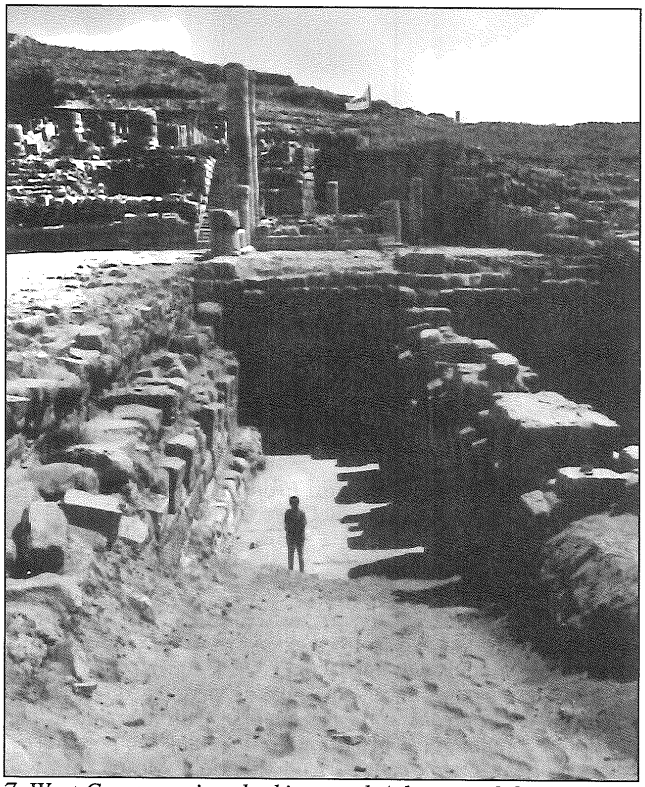
subsequent seasons to answer this question.

Lower Temenos

The structural backbone of the West Triple Colonnade is the West Cryptoporticus. Only after the West Cryptoporticus was constructed could the West Triple Colonnade have been built above it.[6] Excavations under the Lower Temenos' West Triple Colonnade were undertaken in Trench 79 by Martha Sharp Joukowsky to recover the double cryptoporticus constructed under it (**Fig. 7**). Extending from the east-west retaining wall in the south to the north, this double arched system consisted of parallel west and east sectors.

Now with the all but complete excavations of a 13.00m north-south x 12.50m east-west portion the West Cryptoporticus can we begin to interpret its plan on surer grounds. There must have been an entry (not as yet found, but possibly in the Propylaeum) leading into two long subterranean arched galleries. Oriented to the north these two galleries were constructed of well-cut masonry joined with mortar and covered with plaster, some of which is colorfully painted with elegant designs.

As we were excavating both sectors of the cryptoporticus interior, we recovered collapse from the elephant headed capitals and column drums of the West Triple Colonnade. Their collapse in antiquity had triggered the subsequent devastation of the West Cryptoporticus itself. A small portable altar of yellow limestone with four facets was found measuring 0.22m in height, 0.175m in width, and 0.14m in thickness.[7]



7. West Cryptoporticus looking south (photograph by A.W. Joukowsky).

During the early excavation stages the west wall architecture in the west sector of the West Cryptoporticus was uncovered, the middle pier wall (Piers 1-6), and the east sector of the West Cryptoporticus wall. All three walls were constructed with arch springers extending from them. As the excavation moved deeper in depth it was found that under the piers in the Middle Wall, a large ashlar wall supported the piers, and a now disintegrated wooden beam was found in the lower courses of the west wall. The close of the excavation in this area was triumphed with the discovery of an excellently-preserved limestone flooring found in both cryptoporticus sectors. Uncovered in a superb state of preservation at a depth of 4.77m below the building level of the West Triple Colonnade, approximately 6.00m north-south x 3.73m east-west flooring was cleared in the east sector, whereas 1.50m north-south x 4.18m was excavated in the west sector. Excavations also brought to light benches built against the east-west retaining wall in the east sector of the West Cryptoporticus, and one abutting the east wall of the West Cryptoporticus east. More excavation needs to be undertaken to better define these floors and their associated benches.

Upper Temenos

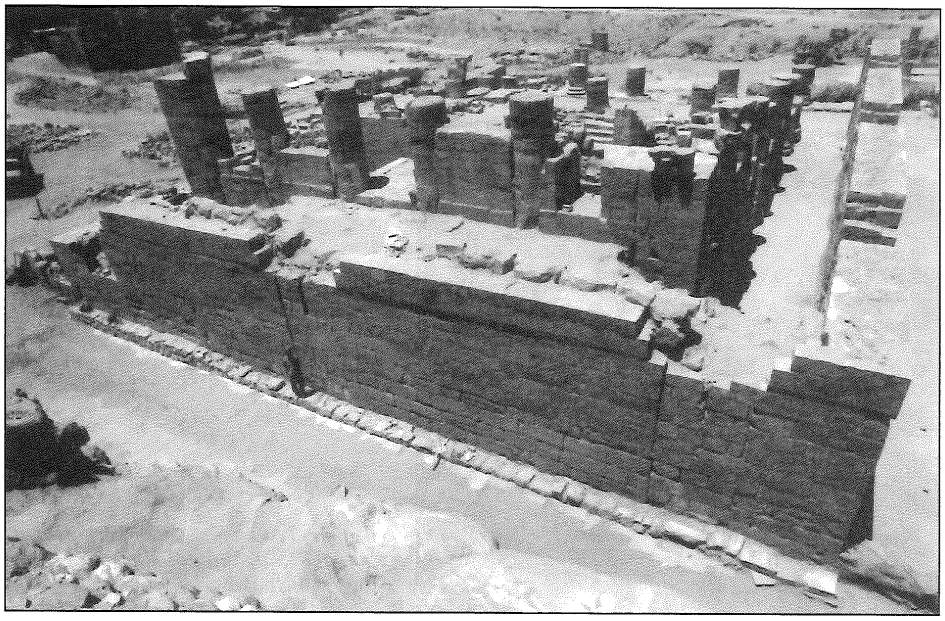
The Upper Temenos excavations concentrated on the East and South Perimeter Walls and the South Passageway where more of the chiseled away bedrock escarpment and a massive cistern came to light. First I will describe the South Passageway and then the cistern, and finally I will detail the excavations of the East Perimeter Wall.

South Passageway and Chapel

Trench 83 is located in the extreme south of the Upper Temenos and stretches 31.20m in east-west length x 6.45m in width in the east, and 12.21m in width in the west. The substantial clearance of the south passageway, excavated by Emma S. Libonati, began with the cleaning and removal of debris in the southwest. **Fig. 8** shows the South Corridor freed from debris.

Excavated to an average depth of 5.30m, this project was undertaken to protect the Great Temple

6. We had identified this rather puzzling cryptoporticus structure under the East Colonnade in the early stages of our excavation, but later built cross walls interrupted our understanding of the sweep of this architectural design.
7. The altar had a depression on top of 0.085m in diameter and 0.04m in depth.



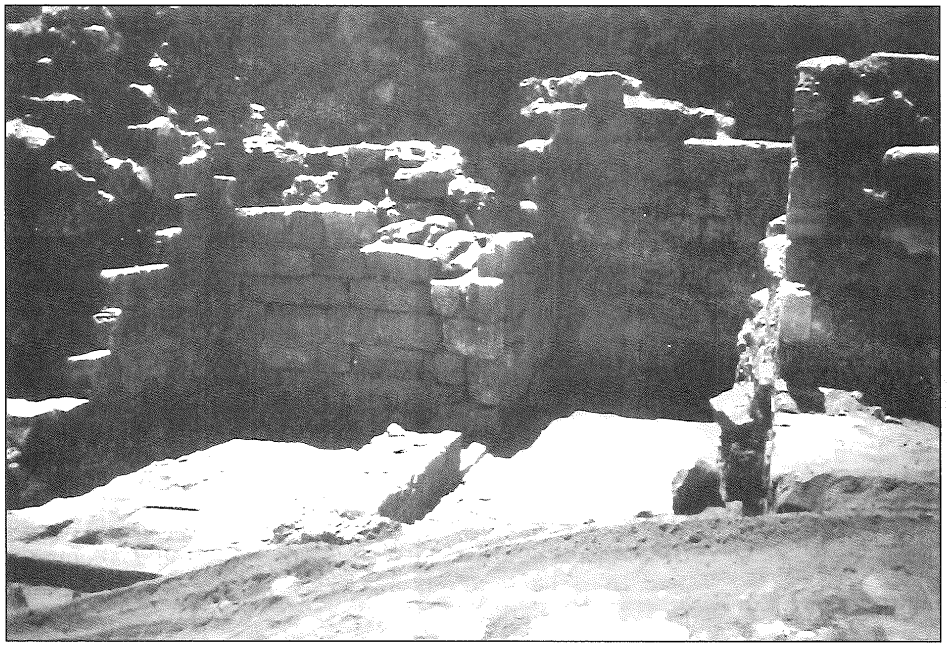
8. Upper Temenos South passageway (photograph by A.W. Joukowsky).

perimeter from further erosion and collapse from the surrounding areas, including the 12.00m high escarpment behind the passageway which required protective consolidation against the onslaught of winter rains. The composition of this extensive deposit represents fill and fluvial wash down from a multitude of periods from the hillside above. As the excavation progressed, the south passageway showed evidence of a cataclysmic collapse, however the fall pattern suggests that the damage was sustained from the hillside above rather than the Great Temple itself. A clear exception to this was an enormous accumulation of roof tiles tumbling down in the earliest violent collapse against the south facade wall. Although it may be possible that the south passageway was partially roofed, these deposits are more likely the result of the Great Temple roof collapse when it fell prey to seismic events.

The south retaining wall of the passageway is in poor condition — only small sections of the original facade wall remain intact, usually only two or three courses in height. In the east central section of the trench, six courses remain intact but dramatically slump into the passageway in a northwesterly direction at a precipitous angle of approximately 30 degrees. This remaining section of the facade wall shows the violent force and pressure of the weight of the terraces behind. In antiquity, this wall would have been constructed at least to the 12.00m height of the surrounding bedrock escarpments. It would have made a dramatic statement for the Upper Temenos south.

Portions of the original south passageway pavement were recovered in fairly good condition, stretching from the east to the west in an uninterrupted line for 23.80m, and extending north-south at its widest point to 1.73m (the average length for a paver is 1.07m while the average width is 0.52m). In the east, most of the pavement was robbed, and in the west, a major portion of the pavement was also missing. The south passageway has slab covered water passage system abutting the south and southeast Perimeter Walls — the conduit is 0.30m wide x 0.73m depth and the channel is lined with hydraulic cement. At some later point in time, additional water channels cut into the south pavement bedrock provided supplementary water. This indicates that the pre-existing water systems were for some reason inadequate and additional surface canalization needed to be added to bring or receive water to or from the west. Certainly, this system and its relationship with the Upper Temenos systems in the east plaza need to be more carefully examined.

In the removal of dangerous fallen blocks from the southwest terraces, we recovered the remains of an anteroom and chapel with frescoed walls, a hexagonal pavement and an empty cult niche. Shown in **Fig. 9**, this enigmatic chapel measured 2.07m north-south and its partially excavated east-west south wall was 3.02m in length. The original construction of the north wall is seen only in its foundation, and the west wall remains under the west balk. The chapel walls are comprised of well-hewn diagonally dressed ashlars — the east wall is composed of five to eight ashlar courses measuring 3.22m in height whereas the east-west south wall is composed of ten courses and measures 4.00m in height. *In situ* decorative plaster in the southeast corner of the chapel adheres to the wall to a 2.09m height. This decoration consists of a purple border



9. Upper Temenos South passageway chapel and anteroom (photograph by A.W. Joukowsky).

surrounding a red painted panel.

In the chapel south wall, 1.32m above the floor level, was a niche with a preserved height of 1.02m. Both the east and west niche walls were comprised of one large ashlar block, 0.38-0.44m in height, carved at the top in an arc with two courses of ashlars below. A 0.31-0.34m recessed platform was carved to provide a prepared surface for a sacred object, most likely, a statue or a betyl. A slight oval depression has been hollowed out in its center and several dowel impressions indicate that there was a purposeful method employed for affixing what was placed there.

The flooring of the chapel is comprised of wet-laid small limestone hexagonal pavers that mirror those found in the forecourt of the Upper Temenos. The pavers average 0.35m diameter (from point to point) and remain in excellent condition. Near the walls the pavement does not retain its hexagonal shape but is cut flush to abut the bottom of the room's walls disregarding the aesthetic schema in favor of practicality. The extreme care and effort taken to set and place this floor in an area not only with the possibility of being sealed off from the public at large further suggests that it had a ceremonial or special purpose. We are undertaking the consolidation of the frescoed walls and will continue the chapel's excavation to the west so that its overall dimensions and other features might be determined.

Leading into the chapel is an anteroom measuring 3.44m north-south x 3.20m east-west. A large regularly carved ashlar serves as the threshold, 1.08m x 0.41m, between the anteroom and the South Passageway. The east wall of the anteroom is composed of seven courses of scavenged building material — some of the blocks contain marginal drafts, however others are small snecking stones set between irregular blocks.[8] The preserved height of the wall is 3.12m. The northern blocks of the facade wall and the eastern wall have been removed to the foundation course making it impossible to determine if these features bond. The floor of the anteroom has been left relatively unexcavated to show the *in situ* position of roof tiles that fell flat onto the surface. Portions of the excavated floor indicate it to have been of rough plaster and mortar — its pavement probably was robbed in antiquity. At a later point in time, and we presume this to be *before* the Great Temple was transformed by the addition of the *theatron*, there was a blockage of the doorway accessing the chapel. This blockage was composed of tightly laid, approximately 0.21m square, diagonally dressed limestone blocks. Great care was exercised to lay these blocks flush to the doorway and the high quality of the material indicated this area was intentionally blocked off. The blockage height was preserved to only 0.48m, suggesting that salvageable blocks in this area were removed in antiquity to be used elsewhere. This blockage suggests the chapel was blocked off and no longer in use while its anteroom may still have remained in use.

In the area of the chapel, the South Perimeter

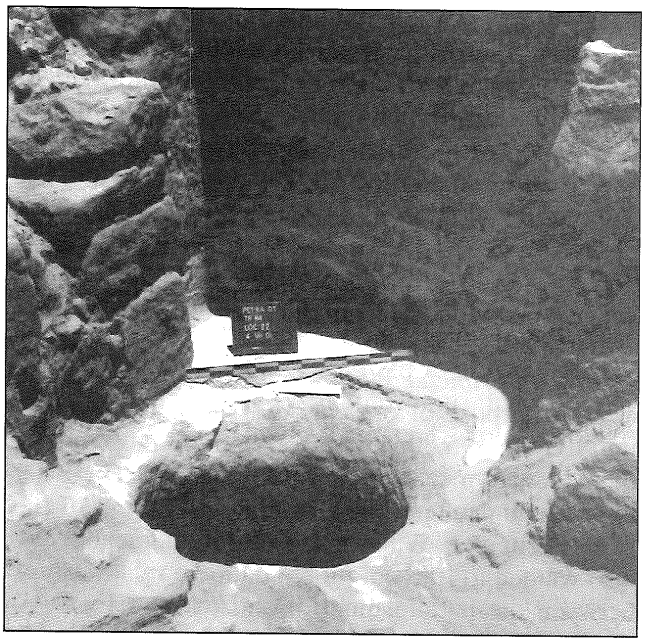
8. It is not clear if this wall was built at a later point in antiquity to construct an anteroom for the chapel, or if the original wall collapsed because of the stress of the terraces it abuts.

Wall in the west served as the north walls for the anteroom and the chapel. In the west, this wall except for its foundation course which remains intact, was entirely robbed out near the chapel and the anteroom. It is likely, as the rooms fell out of use the western portion of the wall did not provide either the structural or aesthetic protection from the terraced area above.[9]

Here, however, there are some deviations from the standard Great Temple phasing, owing to the fact it seems probable the chapel was abandoned without reoccupation earlier than other subsequent reuses of the Great Temple itself, such as the construction of the Theater. The south passageway at the rear of the Great Temple proved to deliver the surprising architectural peculiarities we have all come to know when excavating the Great Temple. The two western rooms and their possible phasing lie at the nexus of these problems; their discovery highlighted the possibility of heretofore-unexpected structures around the outer perimeter of the site, and created more questions than answers concerning the uses and reuses of this area.

Southeast Plaza and Cistern

Shown in **Fig. 10** in the Upper Temenos southeast, was the astonishing discovery of a subterranean cistern, which extended under the southeast plaza bedrock floor. This cistern was part of the overall planned scheme of the Great Temple water management with various canalization systems within the precinct evidently varying in function. Known as Special Project 85 excavated by Christian F. Cloke, this feature was discovered below a round opening along the southeast escarpment. A test trench in the interior, 2.50m north-south x 1.50m east-west, helped us recover its original bedrock floor. While it is likely that the floor is uneven throughout the cistern, perhaps deeper in the center, we were able to get a rough metric estimation of its water-holding capacity. Estimating by the measurements of the cistern room itself (excluding the shaft, and assuming that the cistern was filled to capacity), we arrive at a figure of almost 390 cubic meters, for the structure measures 8.50m in north-south length x 7.80m in east-west width x 5.88m in depth. Although this is hardly an exact computation (as it does not make allowances for the diminishment of the area by columns and other features), it gives us a rough idea of the storage capabilities of this massive structure. In its interior were the remains of two built arches spanning the east and a centrally located massive support column carved out of bedrock.[10]



10. Upper Temenos east cistern opening (photograph by A.W. Joukowsky).

As for the architectural components of the cistern and their sequencing, while not wholly apparent at this point, as the entire extent of most features cannot be seen, some preliminary hypotheses can be made. It appears that the initial building phase involved the cutting of cistern shaft, followed by the quarrying of the cistern in its original form, which was probably a simple rectangular room furnished with an east bedrock column and a short support wall to the southwest of cistern shaft. These features appear to be the most thoroughly incorporated into the cistern's fabric, and the most sturdily and carefully constructed, so they have been assigned to this early building phase. Following initial building the entirety of the cistern was sealed with a coat of waterproof plaster.

Constructed also at this time was the canalization on the west of the Upper Temenos East Plaza, which fed the cistern via an opening in the cistern's southwest ceiling. The shaft and this opening in the southwest were presumably the two main original sources of cistern water. The small channel piping water into the shaft would have sent the water flowing in a cascade against the northeast side of the shaft walls where it would have landed on the ledge transecting the shaft. After there it would have then streamed more slowly into the cistern, so as not to unnecessarily stir up any impurities. These two large systems would have provided a

9. As we have mentioned, there was the abandonment of the chapel and a modification of the east anteroom wall — a wall was built to block access between the chapel and the anteroom and the east wall of the anteroom was reconstructed or modified in design.

10. In the 2001 consolidation efforts of this area, a winter rain uncovered an arched feature and another water canalization or entry in the west Upper Temenos plaza. This will be documented during the 2002 excavation season.

significant influx of water.

The following phase of the cistern's building seems to have taken place not long after this initial phase of construction. The ceiling of the cistern's southwest corner is noticeably and significantly lacking in strength and higher than the bedrock in the other parts of the cistern. This weakness must have occurred during or shortly after the cistern's construction, necessitating the addition of support elements to this room area. There was then the addition of a small north-south wall plus the cistern's south wall with its incorporated arches which lent support to the cistern south. These elements were also heavily plastered to prevent extensive water seepage and possible structural weakening.

Even these elements, however, were apparently deemed insufficient for the support of this area, and another southwest pillar then was added. This stone pillar is somewhat shoddy in construction, and appears to have been a final attempt at stabilizing the ceiling in this critical area. This has been deemed the latest addition because of the poor aesthetics of its orientation and the fact that its position would have left little space for the construction of the south arched wall.

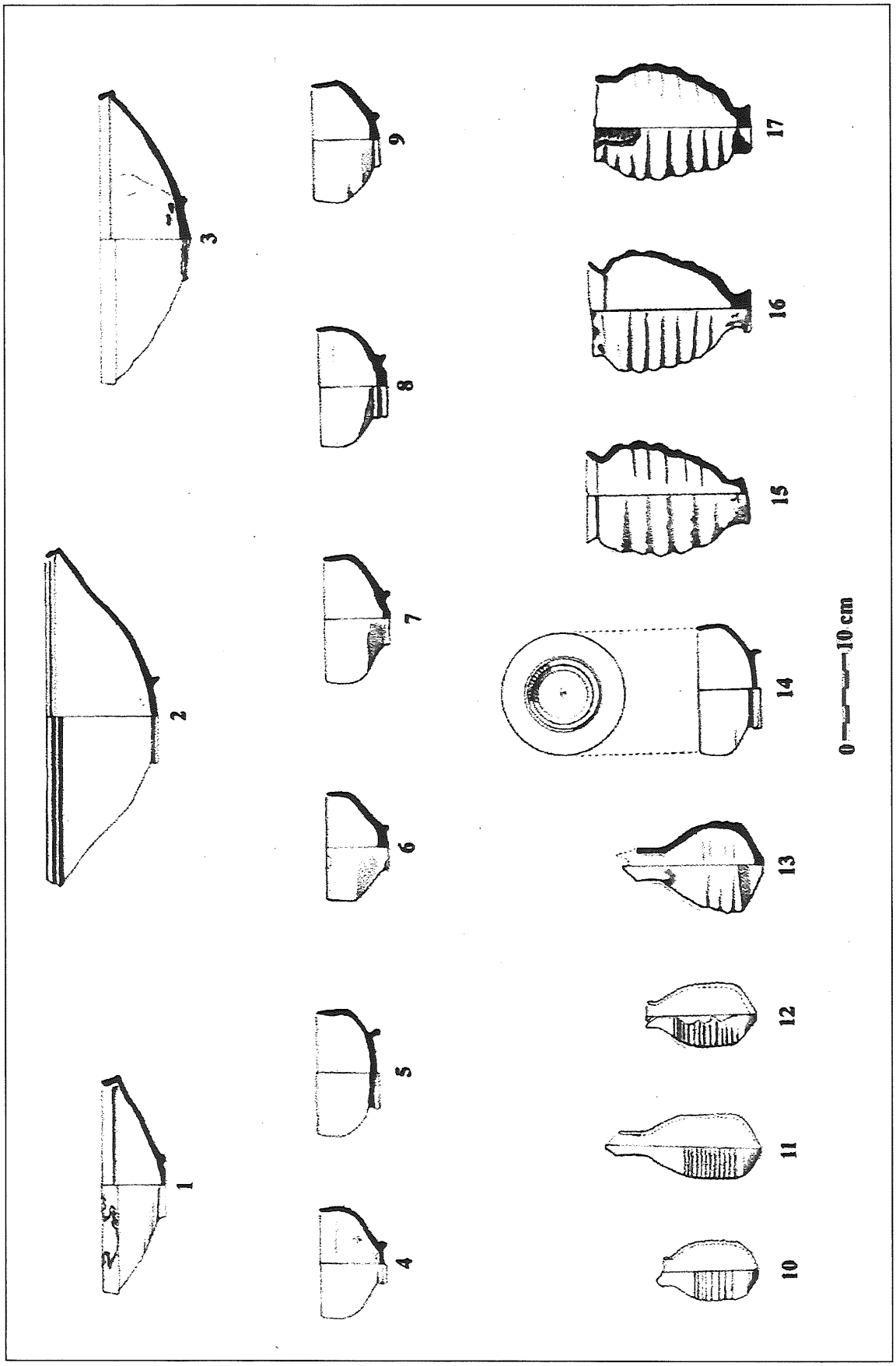
Several courses from the top of the east face near the pillar's northeast corner, the excavators discovered an exfoliating partial lamp, which was determined to be Nabataean, probably from the first century AD, although there is the possibly that it could come from the second. As for the fill inside the cistern, the area in which the test trench was excavated in the southeast was predominantly comprised of soil with some stone inclusions. This suggests that the cistern was filled, at least partially, by debris washing down through the entry shafts. Because the remaining upper cistern fill, from around the bedrock column to the west wall consisted of large stones, it would appear that this was an intentional fill. The wash down probably only reached its greatest height in the southeast, and for some reason, perhaps for support, it was necessary to intentionally fill in the rest of the cistern with large stones particularly in the north and west. These stones could not have dropped in naturally by chance, and are not fallout from the ceiling, as this remains entirely intact and plastered. These stones must have been thrown in intentionally from the southwest opening through the shaft. This would have served to stabilize the architectural features of the room, and prevented the collapse of the bedrock ceiling upon which the Upper Temenos East Plaza was constructed. When the cistern was no longer filled with water, its structural integrity could have been very precarious, and the stability of the ceiling would have been immeasurably decreased.

In the east bedrock escarpment, 2.85m above the opening of the cistern, was a bedrock chamber with what appears to have been a domestic installation, appointed with a chiseled out bedrock basin and an oven. The excavation of this deposit, known as SP 84, was also under the supervision of Christian F. Cloke. There were considerable amounts of Nabataean ceramics found associated with these features. Shown in **Fig. 11**, theoretically, these vessels constitute a homogeneous group. Located to the south and associated via a filled-in stairwell, this hollowed out bedrock chamber demonstrates several phases of use including that of its initial purpose, relating to the temple precinct, and a later re-use as a residential capacity, and then its final destruction and covering. There is a very real possibility that this installation was purposefully created to serve the cistern below it, and we assume that room and cistern are coeval.

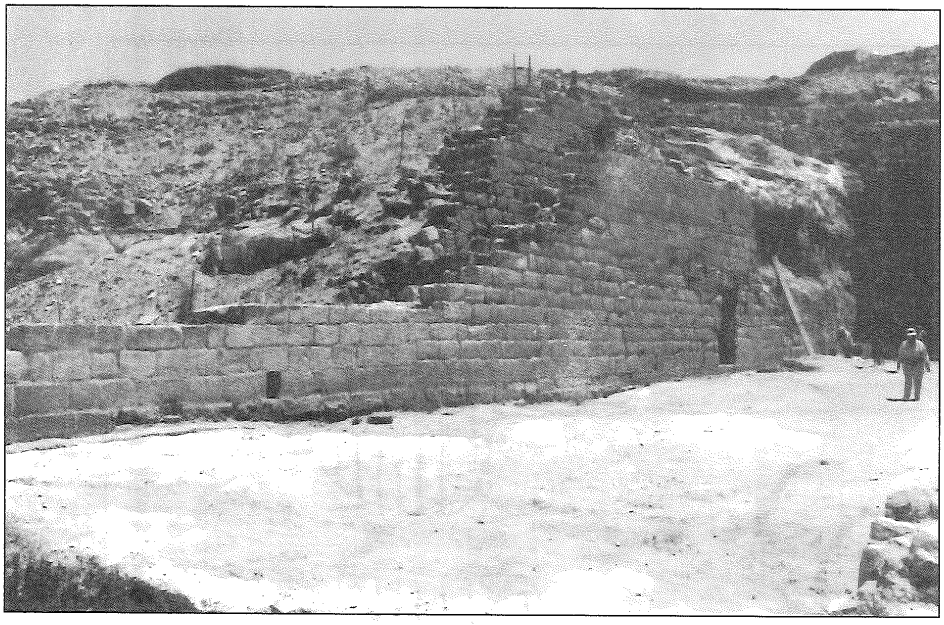
The overall area of this room installation was roughly 6.00m north-south x 5.60m east-west when measured from the far east wall of the bedrock room to the western extent of the fill that obscured features on the ground (such as the cistern cut into the bedrock). In the earliest site phase, there was the quarrying of cuts in the bedrock for the cistern and its feeder channels — the canalization beneath the pavement and the cuts in the bedrock creating a room and a well niche. In a later phase there was the construction of a well and the East Perimeter Wall. Included in this phase were the plastering of the well, the walls, threshold and doorway in the bedrock room, and the addition of a basin. In a penultimate phase there was the partial destruction of the room and habitation represented by the accumulation of fill, the covering of the basin and the addition of an oven. The last and latest phase is represented by the destruction and abandonment of the room, and the accumulation of washed down debris from the hillside above.

The East Perimeter Wall Rooms

The purpose of excavating Trench 84, measuring 19.60m x 5.80m, was to continue the work of the excavation seasons of 1999 and 2000, in order to better understand the function and design of the East Perimeter Wall architectural elements. We also wanted to find out more about the relationships between the parallel interior and exterior East Perimeter Walls, both of which can be seen in **Fig. 12**. After having recorded, dismantled and moved the partially collapsed vaulted arch which crowned the exterior section of the East Perimeter Wall, the area was deemed stabilized enough for excavation to continue below. Trench 84 was excavated by José I.



11. Pottery from the rock-cut room over the Cistern (drawing by Christian Cloke).

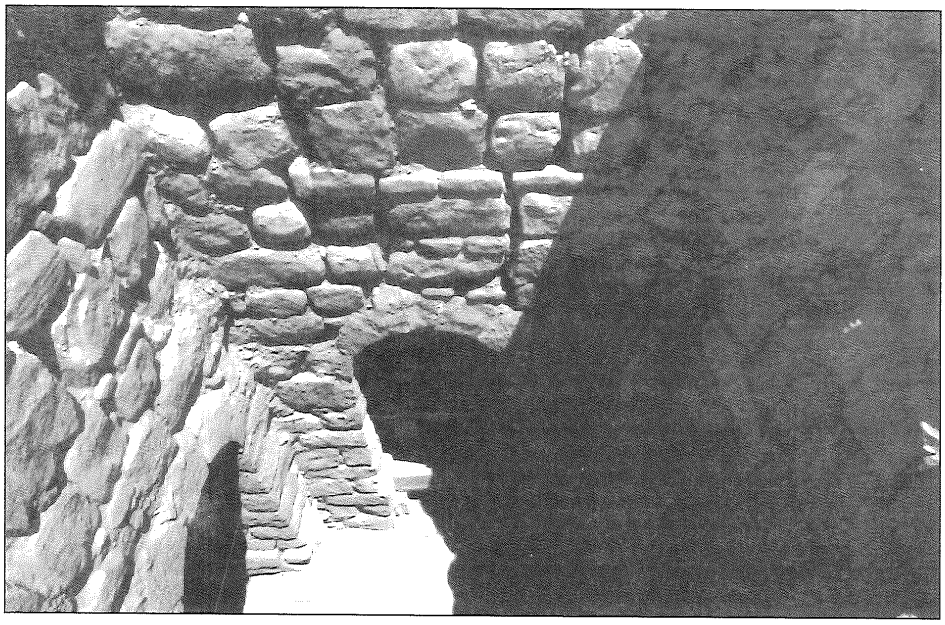


12. Upper Temenos East Perimeter Walls with doorway (photograph by A.W. Joukowsky).

Fusté, who first targeted the area inside the flat lintel doorway, discovered in 1999, of the interior East Perimeter Wall. Here was a small square room, Room A, with high arched niches, and the later installation of an oven and a trough shown in **Fig. 13**. Also excavated was a north-south long, narrow rectilinear room, Room B, to the south of the water reservoir discovered in the 1999 excavations.

The phasing for both rooms is the same in the earliest phase consisting of the manipulation of bedrock and the initial wall construction. The Nabataean masons cut the bedrock and leveled out the bedrock floors. The phasing of these deposits in a second phase consists of the construction of walls directly on the bedrock and the placement of stone floor-pavers inside both Rooms A and B. The next phase saw the domestic reuse of both rooms with the removal of the floor-pavers, and following that was a second domestic reuse of arched Room A inside the East Perimeter Wall. And, finally, the latest phase was represented by the abandonment of the structures and the accumulation of a fluvial erosion deposits covering both rooms. I will discuss the particulars of Room A to be followed by Room B.

After the bedrock was prepared there was the creation of the East Perimeter Wall with its exterior vaulted arch, extant to a 9.29m height, surmounting the most eastern section of the East Perimeter Wall and extending over the west section of the wall. In the building of the west section of the East Perimeter Wall, Room A, measuring approximately 2.50m square was constructed behind



13. Upper Temenos East Perimeter Wall Room A interior (photograph by A.W. Joukowsky).

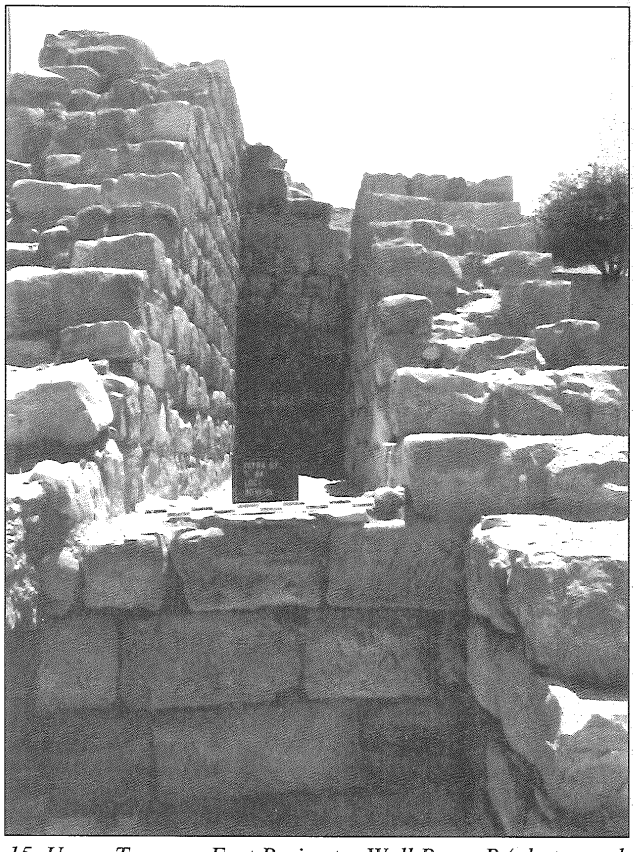
the west wall between the interior and exterior East Perimeter Wall, facing the East Plaza. Room A walls stand to a 7.71m height — and the north and east walls are embellished with very high, 3.40m in height finely crafted niches surmounted by arches. Based on the stratigraphy and the ceramics, it is posited that these two beautifully arched niches ceased to serve their primary function during the first century BC. A later phase saw the removal of deteriorated stucco on the walls and the construction of a plastered water basin set into the east arch niche. A hearth surrounded by rocks was also installed inside of the north arch niche, which left soot-marks on the arch niche, as well as on the bedrock floor and the fill directly above it. Thus at this point in time, Room A functioned as a kitchen with large amounts of cooking pots and a hearth. After enough dirt mixed with ash accumulated, the hearth fell out of use and an oven *(ṭābūn)* was dug into the floor in the southeast corner. This furthers the point supported by other evidence found in the Great Temple indicating that at some time in the building's existence its layout and purpose changed.

In a later phase the doorway from the East Plaza leading into Room A was partially blocked directly above the threshold. There was also the addition of a thick floor packing layer on top of the occupational debris, but the water basin in east arch niche continued in use. During this phase, however, the *ṭābūn* fell into disuse and was instead converted into a storage pit for fine Nabataean pottery, including fine rouletted cups, red slipped jugs with twisted handles and a Nabataean pilgrim bottle **(Fig. 14)**. There was also the addition of a stone shelf over the *ṭābūn* of reused floor-pavers. At some later point in this phase or perhaps in a later phase, the water basin inside the east niche was reused as a trough. Three tethering holes were bored into several ashlars, which is an indicator that at this time the room served to keep animals. It is difficult to establish the chronology for this room in its later phases, for these deposits represent the most recent surviving events before the destruction debris accumulated.

The excavation of Room B **(Fig. 15)** allowed us to be certain that the interior East Perimeter Wall bonds with the most east exterior Perimeter Wall lying parallel to it. Therefore, it was confirmed that these double walls were constructed at the same time. In Room B two small niches were installed on both the east and west interior walls of this long rectangular room. Additionally there was the filling of the room with a raised floor bedding on top of accumulated fill, and the creation of a low retention wall to retain the fill and support the new floor bedding. There was also the construction of the water reservoir outside to the north of Room B, including



14. Nabataean pilgrim bottle found in the Room A deposit (photograph by A.W. Joukowsky).

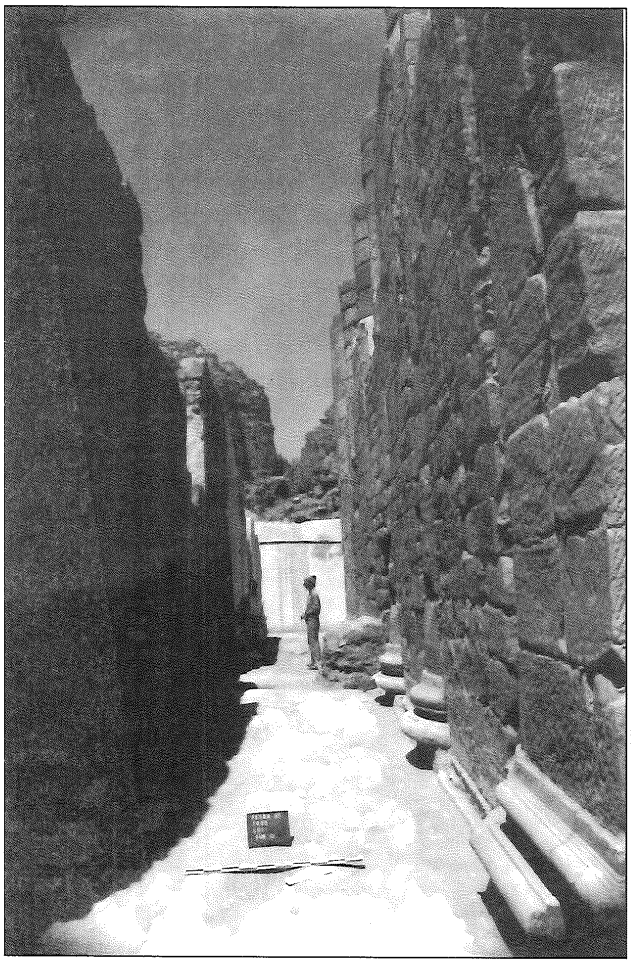


15. Upper Temenos East Perimeter Wall Room B (photograph by A.W. Joukowsky).

its southern wall. Finally, at some later point in time, an infant jar burial was placed on top of the floor bedding. This burial was removed *en bloc* with its jar and awaits the analysis of a physical anthropologist and ceramic specialist. Above the jar burial was a thick deposit of debris from the collapse of the East Perimeter Walls.

Temple — South Corridor

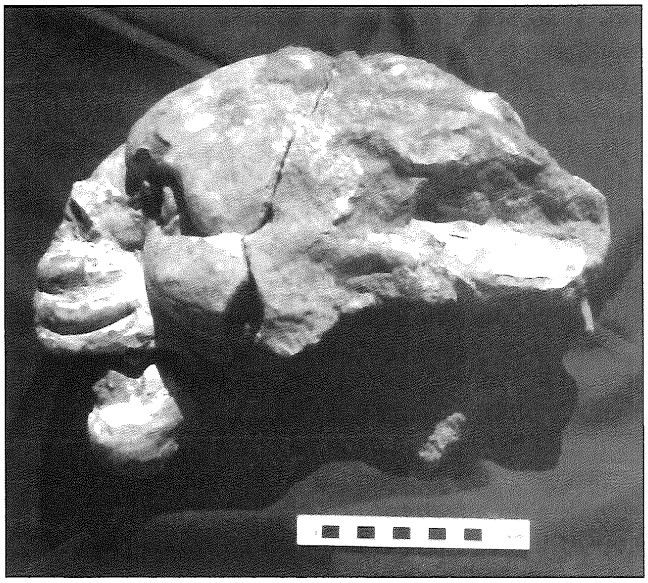
The only large project remaining to be undertaken in the Great Temple during the 2001 season (it has now been completely excavated) was to clear the South Corridor of collapsed debris. Shown in **Fig. 16**, this project, supervised by Emily C. Egan and Emma S. Libonati, revealed the South Corridor wall in its entirety with exquisitely stucco-embellished walls. The trench is located at the rear of the Great Temple itself and measures 2.73m north-south x 17.27m east-west. In the north, Trench 85 is bounded by the temple's southernmost east-west colonnade and its inter-columnar wall system. Between the six rear columns, the inter-columnar wall (2.39m in width) now stands to an average 6.43m height — with some 24 courses of diagonally chiseled ashlars set between the columns. The southern boundary of the trench is the south wall of the Great Temple, and the eastern boundary is the Great Temple East Corridor. In the west, a portion of the South Corridor had been excavated in conjunction with the southern half of the West Corridor (Trench 59) in 1998. Between the south wall segments are three doorways leading into the structure from the South Passageway, which had been blocked with ashlars in antiquity. There are also interior passageways leading into the east and west corridors, and an additional narrow central doorway (2.04m in height x 0.67m) accessing the Great Temple's Central Arch. The canalization system under the Great Temple was also found to continue under the flooring of the South Corridor, but does not as yet seem to connect with the canalization found in the Central Arch.



16. Temple South Corridor (photograph by A.W. Joukowsky).

As for the phasing of this trench from earliest to latest deposits, the earliest phase included the quarrying of bedrock, construction of builders' trenches, and installation of the water channel system. The second phase saw major construction with the building of the southernmost east-west colonnade, the south wall (with open doorways), the east wall, and the decorative plastering of the columns and the north face of the south wall. In the third phase was the redesign of the Great Temple with large scale architectural modifications, including the building of the inter-columnar walls and the south doorway to Central Arch between the columns of the southern east-west colonnade, and the blocking of the central doorway in the south wall. A later phase is represented by the restriction of access and/or fortification with the ashlar blocking of the doorways in the south wall. The penultimate phase is represented with a deposit of fluvial material and a brief domestic occupation, and the latest phase is represented with the debris from the major AD 363 collapse and destruction.

Well-preserved painted plaster with extraordinarily fine molded cornices was found along the north face of the south wall to the east and west of the central doorway. The excellent preservation of this plaster can be largely attributed to the blocking of the doorway, protecting the plaster from falling debris at the time of the Great Temple's collapse. Most surprising here was the recovery in the collapse of two massive sculpted stucco lions which must have been positioned opposite each other above the central doorway leading into the South Corridor. Additionally these sculptures can be associated with the doorway in this wall. One lion, thought to be a male, faced westward and appears to be snarling. The second lion, the female, shown in **Fig. 17**, faced eastward and looks to be smiling. Both lions have open mouths with exposed teeth



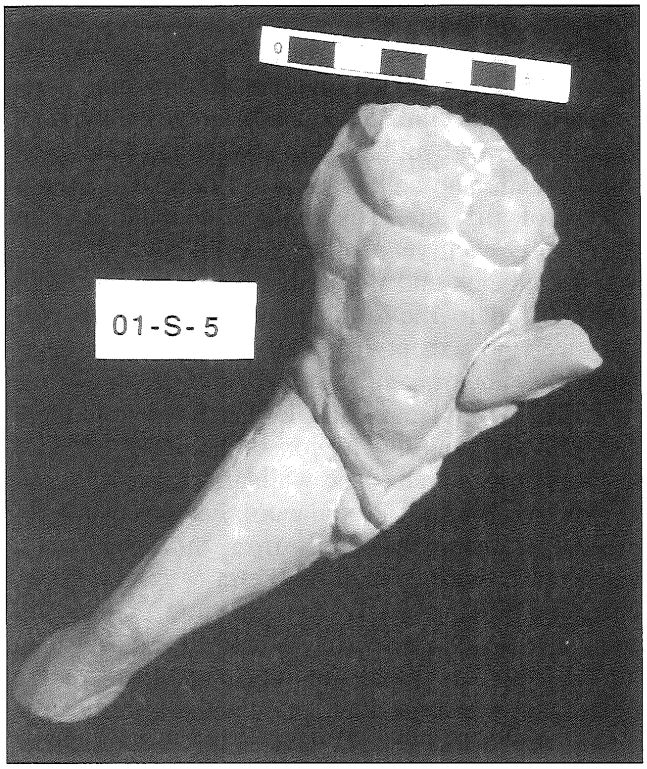
17. Lion from the Great Temple South Corridor (photograph by A.W. Joukowsky).

and a red painted tongue is visible on the lower jaw of the eastward facing lion. Due to their location and massive size, it is thought that the two lions flanked the upper part of the doorway. Further detailed analyses of this decoration has been undertaken by Emily C. Egan, who will report on the excavation and design of these walls, their sculptures and the attendant wall paintings in a separate study.

The South Corridor excavations highlighted a number of architectural problems that perhaps will be resolved now that there has been complete clearance of the structure. Outstanding issues include the bedrock canalization systems and how they interconnected with the system under the Central Arch. Yet another problem addresses the corridor roofing. It may be presumed that the temple corridors were roofed, but how did this roofing work — was it flat or vaulted? Although we have found arch springers in the collapse, no arch springers have been found *in situ* built into the extant walls. It is not altogether clear if the Temple may have had an upper story that rose above the extant walling, or if the roof would have been just above the height of the column capitals.

Artifacts

Besides the artifacts mentioned, recovered were 26 coins, 10 cataloged lamps, 42 additional elephant head components, 14 bone pins and one bone spatula. The stunning small limestone sculpture of a youthful male athlete (15.84cm in height) with his torso, right leg, and part of his left forearm was



18. Limestone sculpture of a male youth (photograph by A.W. Joukowsky).

unearthed in the West Propylaeum (**Fig. 18**). Another sculpture consists of a marble base from a small statue with a booted foot trimmed with a panther head. In the stucco catalog were 11 fragments with graffiti or with gold overlay. Our databases accumulated over nine years of excavation continue to swell with architectural fragments bringing the total up to 9000, and considerable amounts of cultural materials, 275,156, are recorded in our Grosso Modo database.[11]

Small Temple

This 2001 season also saw continued excavations of the Small Temple under the supervision of Sara Karz Reid who recovered approximately 500 marble fragments inscribed in Greek, Latin and Nabataean. The dimensions of this edifice were also redefined. Tentatively it would appear that this small building might have served as a Roman Imperial cult building or hieron. Additional excavations will complete the definition of this structure and are programmed for 2002, and study of the recovered inscriptions is currently underway.

Consolidation 2001-2002

With the beginning of our excavations we quickly realized that the architectural integrity of

11. Sara Karz Reid sampled various marble artifacts and architectural elements for testing their isotope analysis to determine their origins — these are to be reported on in her submission.

the Great Temple was in jeopardy and that consolidation measures would have to be undertaken each year between field seasons. As the amount of recovered architectural data has been overwhelming, Dakhilallah Qublan has been challenged to employ great artistic and architectural skills for the preservation of the site. His team has spent months throughout each year in the consolidation of excavated elements and they have made an enormous contribution to the site's preservation. This year has been no exception as the following projects have been undertaken.

In the Propylaeum and Lower Temenos, there has been the pointing and consolidation of the West Cryptoporticus arches and walls in the West Propylaeum, and the East Propylaeum. For safety we decided to remove the betyls from the Propylaeum and to turn them over to the Petra Museum. However, one of our objectives was to show their *in situ* excavated position, so we decided to replace them with facsimiles so that the public would be aware of their archaeological and architectural presence.

As for the Lower Temenos Triple Colonnade we continued the reconstruction of the columns with the resurrection of the Elephant headed capital on the East Exedra. There was also the consolidation and build-up of the West Exedra engaged column with one of the elephant-headed capitals placed on top. Here too the walls to the west of the west stairway leading up to the Temple Forecourt needed to be reinforced by pointing.

The Upper Temenos had a number of necessary measures undertaken. In the Upper Temenos South we had to undertake the anastylosis of the south wall of the South Passageway, due to the fact it was slumped out of position. Also in the Upper Temenos southwest, the Chapel walls had to be pointed, particularly in the area of the niche and the wall paintings had to be reinforced so that excavation might continue. The south extension of the East Perimeter Wall required pointing; the dismantled East Arch had to be restored and put back into its original position. Also in the East Perimeter Wall Room A's walls required stabilization as well as their arch niches. To the east and south of the cistern originally there had been a double wall of which two courses remained. Thus a supporting double wall had to be erected around the perimeter of the east from the area above the cistern and the south to be approximately 2m in height. And as far as the cistern itself was concerned, a cover had to be constructed to prevent the winter rain water from draining into the cistern.

As for the Great Temple, a number of pointing projects were completed including the north face of the South Corridor South Wall and the South Corridor Wall south face to be pointed from where the pointing stopped in 2001 (ninth course to the floor). The flat lintel of the South Corridor doorway leading into the Central Arch was found to have been in a state of collapse. As it was the support for the upper courses of the inter-columnar wall ashlars above it, it had either to be replaced or to be reinforced. The latter remedy was elected, and it is now hoped that this wall's structural integrity has been achieved. In yet another area of concern was the consolidation of the wall plaster of the north face of the South Corridor Wall. If this fragmented plaster was left unattended it would surely fall, so it has been reinforced.

These considerations highlight a number of outstanding architectural problems that have been resolved through our consolidation efforts, not only for the preservation of the site but also for the safety of those who visit it.

In Conclusion

The completion of the massive Great Temple has now revealed the edifice in its entirety. Understanding the dynamics of the structure on a theoretical level has been continuing as well, but it is most difficult to define certain cultural traits that appear to reflect particular concepts evident in this structure. A considerable level of acculturation must be assumed, but there is a cultural clarity of evidence here: the Petra Great Temple with and in spite of the processes of cultural contact, diffusion and assimilation of architectural ideas, offers its own eclectic Nabataean statement. We will continue to examine the ways in which its architects confronted and challenged this religious edifice.

M.S. Joukowsky
Box 1921, Brown University
Providence RI 02912 USA

References Cited

Parr, P.J.
1970 A Sequence of Pottery from Petra. In J.A. Sanders (ed.), *Near Eastern Archaeology in the Twentieth Century, Essays in Honor of Nelson Glueck.* New York: Doubleday.

Patrich, J.
1990 *The Formation of Nabatean Art: Prohibition of a Graven Image Among the Nabateans.* Jerusalem: The Magnes Press, and Leiden: E. J. Brill.

Schmidt, S.G.
2000 *Petra, Ez Zantur II: Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen*, Teil 1 Die Feinkeramik der Nabatäer. Typologie, Chronologie und kulturhistorische Hintergründe. Mainz: Philipp Von Zabern.

RECENTLY DISCOVERED RELIEF SCULPTURES FROM THE GREAT TEMPLE AT PETRA, JORDAN

Joseph John Basile

Introduction

In excavation and consolidation campaigns in 1997, 1998, and 1999, the Brown University archaeological expedition to the Great Temple at Petra — operating under the auspices of the Department of Antiquities of the Hashemite Kingdom of Jordan — recovered a number of remarkable limestone relief slabs which clearly decorated parts of the temple complex. Consisting of framed panels depicting male and female figures, as well as a triumphal wreath, these pieces represent some of the most important decorative sculptures yet recovered from the temple ruins.

In this article, the author will examine each of the panels, discuss circumstances of recovery, and try to reconstruct how they might have decorated the temple. An attempt will be made to connect the pieces to work already being done on the iconography of the sculptural program of the Great Temple complex, and to the broader context of the history of Nabataean sculpture and its place in the world of Near Eastern, Hellenistic, and Roman art.

The Great Temple Site

The"Great Temple" is dealt with fully in a number of other publications;[1] however, a brief summary of the ruins is in order so that the relief panels can be located relative to the major architecture. The site itself is located in the so-called "Central Valley" of Petra, south of the Wādī Mūsā (وادي موسى)and almost directly opposite from the famous Temple of the Winged Lions. The entire complex is massive, covering 7,560 m^2, and is divided into three main "sections": the Propylaeum or monumental entrance staircase at the site's northern extreme (which climbs from the western end of the famous "Colonnaded Street" south to the Great Temple complex proper), a huge lower courtyard called the Lower Temenos comprising the northern half of the site, and, making up the southern half, the upper courtyard or Upper Temenos, in which is situated the main "Great Temple" building.

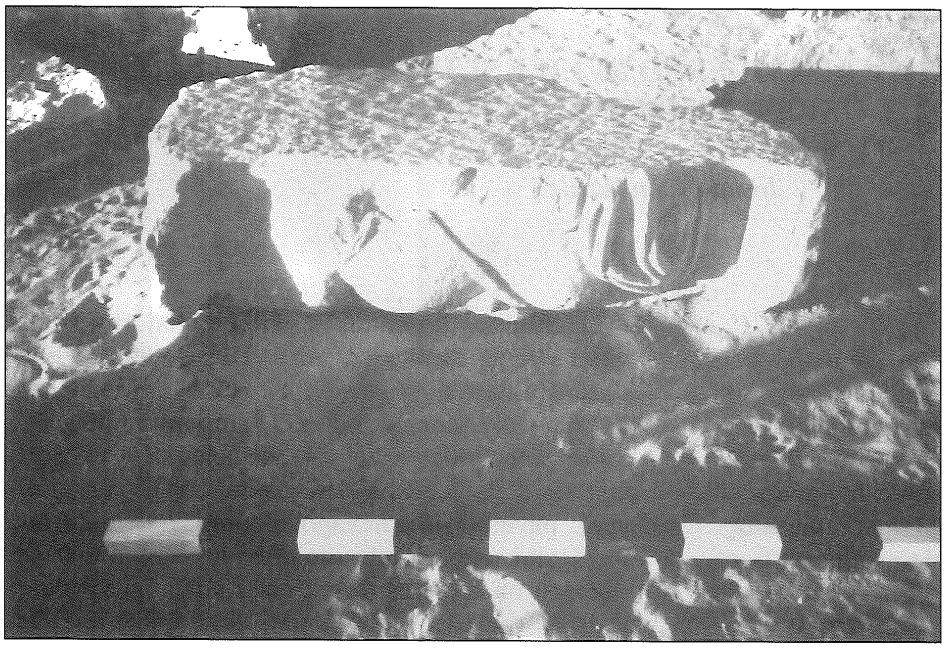
The Lower Temenos is where a majority of the relief panels were recovered. This courtyard consists of a variety of structures: paired *cryptoportici* on the west, north, and east, supporting massive triple colonnades which were decorated with remarkable elephant-headed capitals; a broad courtyard paved with hexagonally-shaped limestone flags, and semi-circular *exedrae* — one on the east and one on the west — aligned with the southern ends of the east and west triple colonnades. Between the *exedrae* was the great sandstone retaining wall of the Upper Temenos courtyard, and three staircases (the central one eventually went out of use and was blocked) leading up to the Great Temple building. It was around the East Exedra, the East Colonnade and the eastern end of the Retaining Wall that most of the relief panels were recovered.

The Sculptures

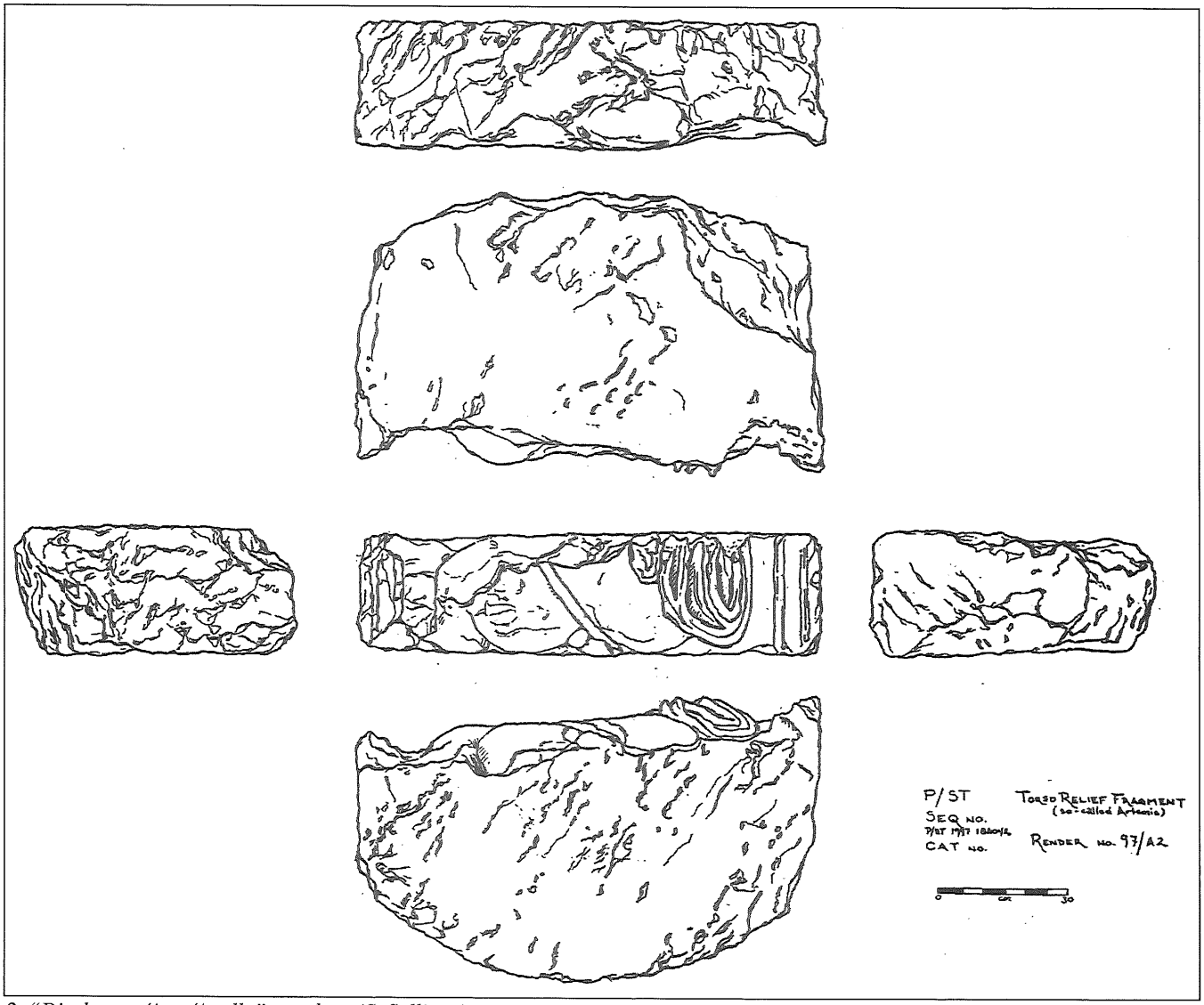
Seven relief sculptures have been recovered from the Great Temple site, and one from alongside the Colonnaded Street, just below the Lower Temenos terrace. All are of the same material (a medium-grained limestone), worked in the same middle relief technique, can be reconstructed as originally being roughly the same dimensions (about 90cm wide), and share important characteristics like a frame of *cyma reversa* with fillet. Almost all the figural reliefs have slots cut for the insertion of the head, which was most likely made in a separate piece (and perhaps executed in a different material, like marble), and depict male and female images in a heavy style that owes much to Hellenistic/Roman naturalism. The iconography and repertoire of figural themes seem classicizing, as are their costumes and attributes, when depicted. All exhibit significant weathering and damage, and almost all were recovered from the northeast quarter of the Great Temple site where they show evidence of reuse in later periods.

The first relief (**Figs. 1-2**) recovered was exca-

1. For the topography of the Great Temple site, see Joukowsky 1998a: 187-234. For the history of the excavations to 1997, see in the same volume: 47-148. For a complete bibliography of publications of the Great Temple excavations up until 1997 see in the same volume: xxxv-xxxix. For annual excavation reports since 1997, see by the same author 1998b: 293-318; 1999: 195-222; 2000: 313-334.



1. "Dioskouros/Ares/Apollo" type bust (A. Joukowsky).



2. "Dioskouros/Ares/Apollo" type bust (S. Sullivan).

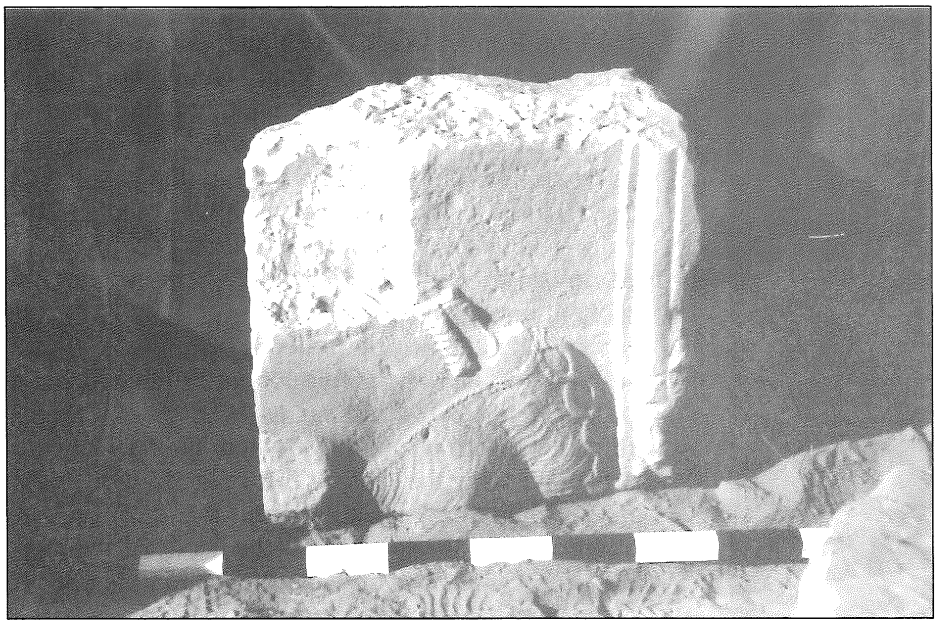
vated in late fill of the Lower Temenos courtyard, just north of the East-West Retaining Wall that separates the Lower and Upper Temenoi, on June 19, 1997 (Schluntz in Joukowsky 1998a: 231-232; Joukowsky 1998b: 298, fig. 8; Schluntz 1999: 69-72). The panel was sawn or chiseled widthwise at some point into a narrow strip, probably in order to reuse it in some fashion, but preserves almost its full original width, and *cyma reversa* borders at both the right and left margins. It now measures 86cm in width, 24cm in height, and 52cm in thickness.[2]

The preserved relief depicts a nude male torso, with heavy, almost pendulous pectorals and broad, rounded shoulders. A strap or baldric, sculpted as a raised band against the surface of the torso, runs diagonally between the pectoral muscles from over the right shoulder proper to under the left breast. Between the pectorals, at the lower margin of what is preserved of the image, is a damaged element that may represent the pommel and part of the handle of a sword or dagger. Over the left shoulder proper is hung a bunched garment with deeply cut folds, perhaps representing a riding cloak (*chlamys*). The iconography suggests one of the Dioskouroi, or perhaps Apollo or Ares, but too little of the sculpture is preserved to be sure.

The second relief (**Figs. 3-4**) was discovered by Assistant Director Erika Schluntz and dig foreman Dakhilallah Qublan in the fall of 1997, during site consolidation (Joukowsky 1999: 209, figs. 13-14; Schluntz 1999: 69, n. 8 and 72, n. 12). This fragment was sawn or chiseled in a rough rectangle for reuse, 53cm in width by 41cm in height by 21cm in thickness, and built into a rough wall laid between the columns of the middle row of the East Colonnade of the Lower Temenos (**Fig. 5**). This wall probably dates from the Late Roman period, and includes a number of reused architectural fragments from the Great Temple ruins.

The panel shows the left side proper of a female figure, clad in an elaborately depicted *chiton*. The garment has a raised border, carved with a suggestion of a woven braid, and four open "loops" on the shoulder, fastened with buttons or clasps. Shallow-cut folds give an indication of anatomy underneath the garment in a "wet drapery" technique, including the shoulder and breast. The neckline of the *chiton* plunges from the left shoulder proper to under the (heavily damaged) right breast, leaving it exposed. Corkscrew "finger curls" rest on the shoulder, and this panel was the first discovered with an open slot where the head would be located — indicating that these elements were carved separately (perhaps of different materials) and then fitted into the panel. A female figure with exposed right breast might represent Aphrodite, an amazon, or a maenad, but too little of the panel is preserved to be certain of such an identification.

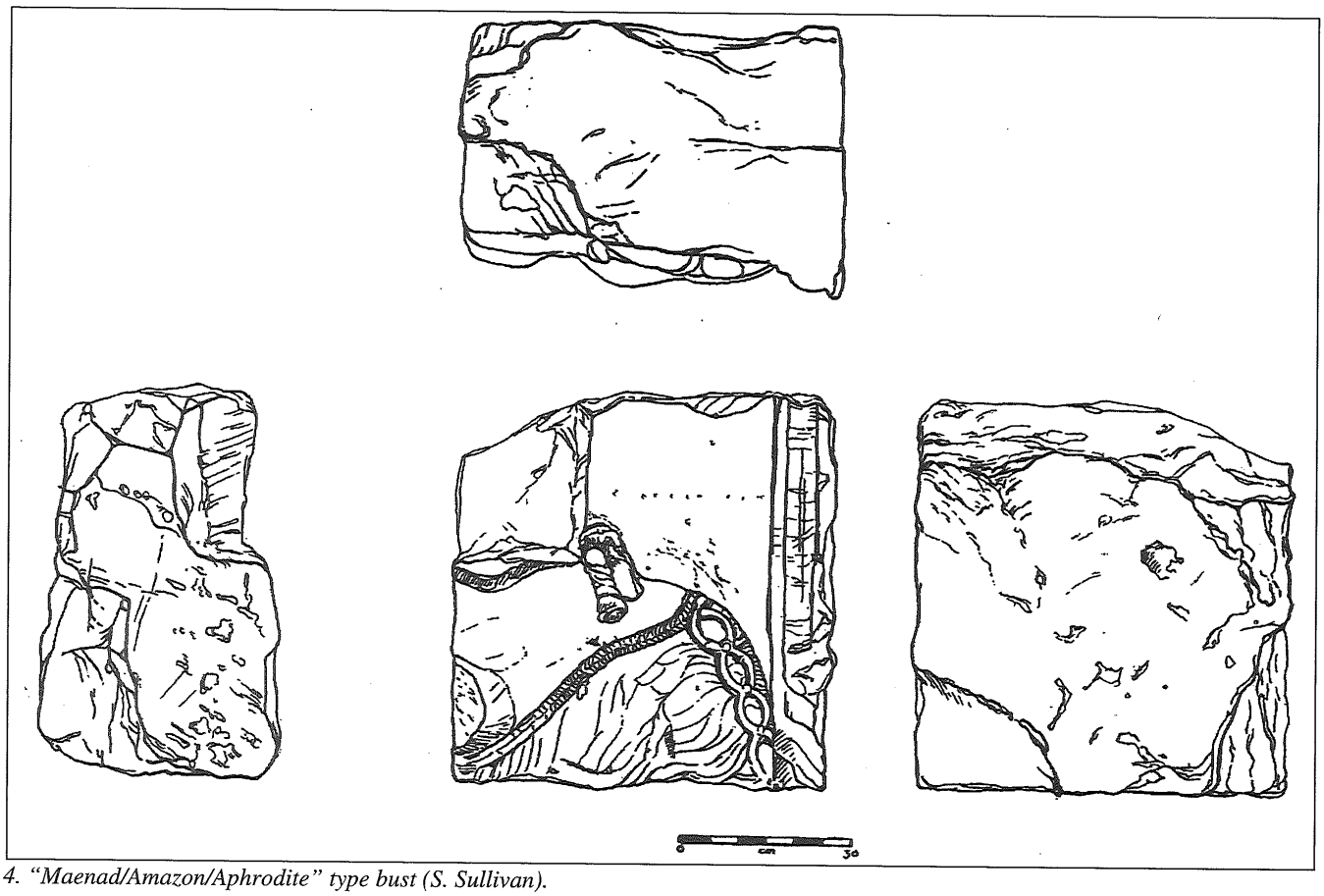
A flurry of discoveries, made primarily by the author and members of his trench crews, occurred in 1998, greatly increasing the corpus of relief panels from the Great Temple site.[3] The first sculpture



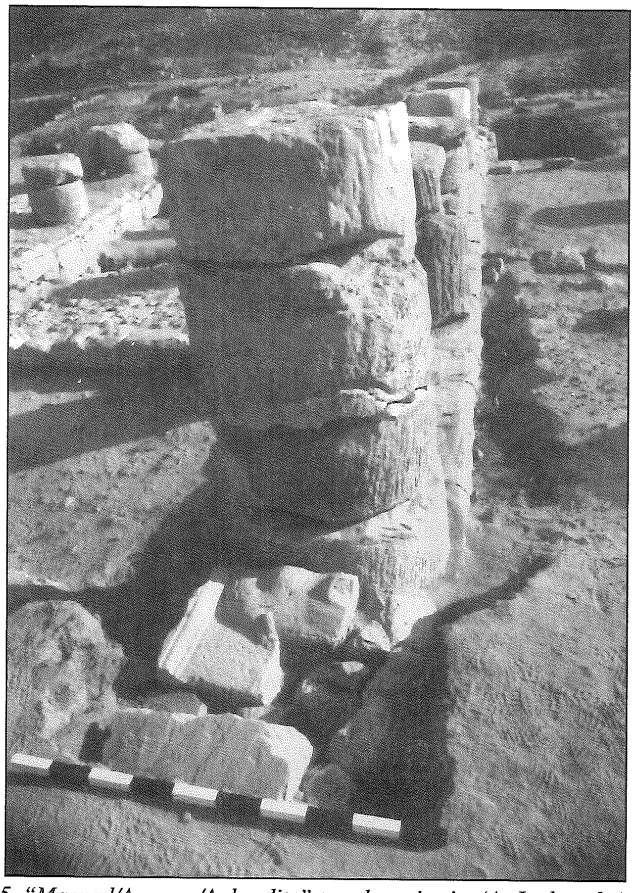
3. "Maenad/Amazon/Aphrodite" type bust (A. Joukowsky).

2. I cannot explain the discrepancies between measurements of relief panels given in this article and in Schluntz in Joukowsky 1998a: 231-232 as well as Schluntz 1999: 69-72. In all cases, measurements in this article come from the Great Temple excavation reports and annual publications in *ADAJ* (supra n. 1).

3. Ms. Monica Sylvester (1997-1999), Ms. Elizabeth Najjar (1997), Mr. Benjamin Kleine (1997), Ms. Hillary Mattison (1997), and Ms. Sarah Karz (1998).



4. *"Maenad/Amazon/Aphrodite" type bust (S. Sullivan).*



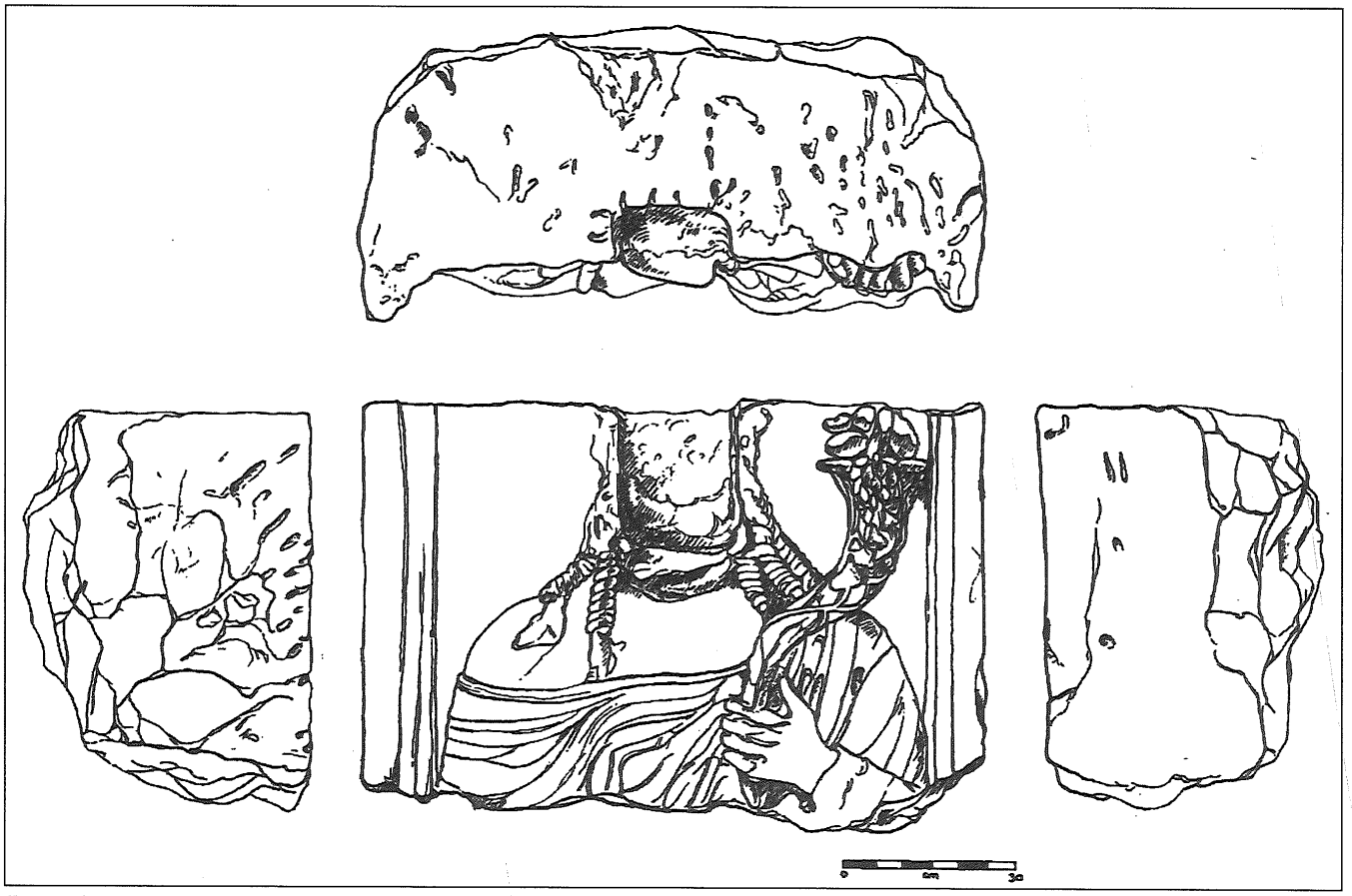
5. *"Maenad/Amazon/Aphrodite" type bust, in situ (A. Joukowsky).*

recovered that season (**Figs. 6-7**) is perhaps the best preserved and most spectacular of the figural panels. Excavated on July 4, 1998, from a layer of dense gray lime (associated with the postulated reuse of the Lower Temenos area as a lime kiln in the Late Roman/Early Byzantine period), it depicts a female figure with cornucopia (Joukowsky 1999: 208-209, fig. 12). The full width of the panel is preserved from left to right frame, and measures 84cm across. The top and bottom of the panel have been sawed or chiseled off, however, and the resulting height of the panel is 52cm. The piece is 38cm thick, and like all the others is roughly worked on the back.

As stated above, the relief is of a female figure in a *chiton*, holding a cornucopia in her left hand proper. The head is missing, as in all the other figural panels, with a rough slot where the neck should articulate with the rest of the relief figure. Some plaster has been preserved in the slot, further strengthening the theory that the heads of the panels were carved out of separate materials and then fitted into the empty socket. Iconographically, the goddess Tyche/Fortuna is suggested — a prominent theme in Nabataean art of the first centuries BC/AD, and in the Hellenistic and Roman Near East in general.



6. "Tyche/Fortuna" type bust (A. Joukowsky).

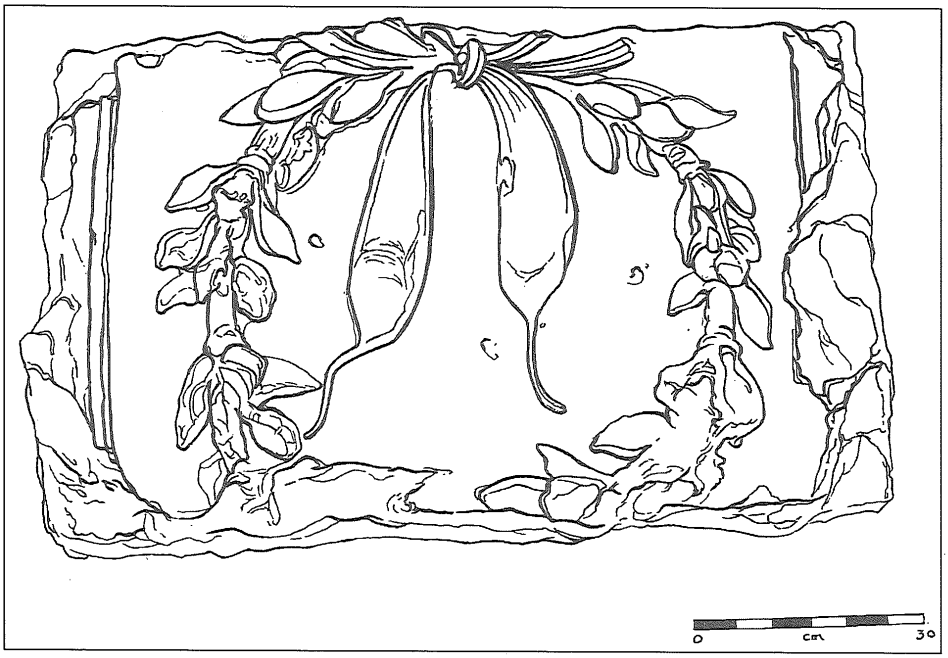


7. "Tyche/Fortuna" type bust (S. Sullivan).

The carving technique is similar to the female figure discovered in 1997, with heavy, rounded features. The folds of the *chiton* are shallow-cut, and emulate the "wet drapery" style. A braided border, similar to that on the garment of the female figure described above, forms the neckline of the *chiton,* which plunges to expose the right shoulder proper. The breast, however, is not exposed. The left hand proper is visible, as the arm is bending at the elbow and the forearm is laid across the left breast. This is the hand that grasps the cornucopia; a thin, "s" curve-shaped horn with a stylized ivy



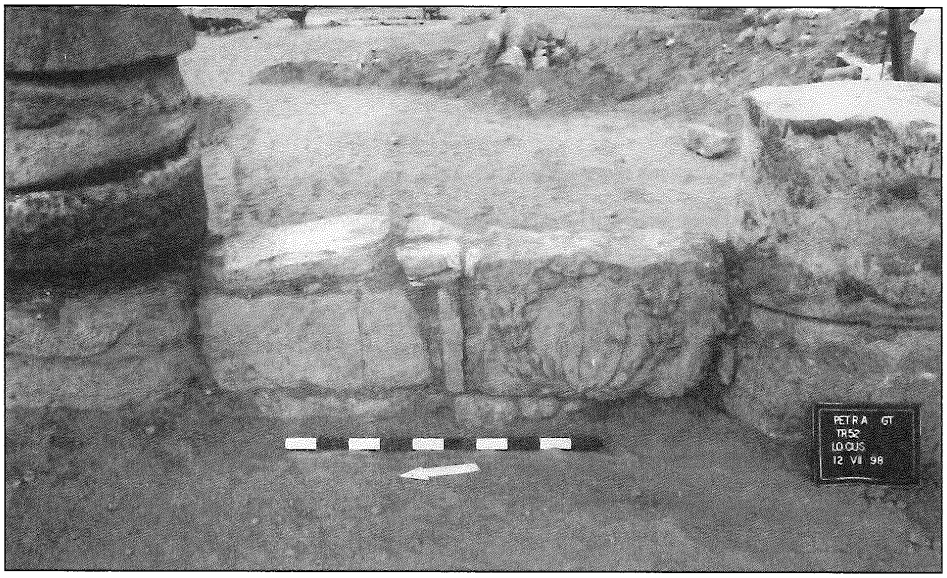
8. Wreath panel, upon discovery (A. Joukowsky).



9. Wreath panel (S. Sullivan).

tendril wrapped round, laid across the left forearm and running to the left shoulder. Fruits are visible coming from the flaring mouth of the cornucopia, and a bunch of grapes can be identified. As on the other female panel, corkscrew "finger curls" are arranged on each shoulder — three on the left proper and two on the right. On the whole, this panel is a tour-de-force of the Nabataean carver's craft.

Shortly after the discovery of the Tyche figure, a panel was recovered (**Figs. 8-9**) which depicted a triumphal wreath with ribbon (or fillet) on July 12, 1998 (Joukowsky 1999: 209, fig. 15). This fairly well preserved panel was built, upside down, into the Late Roman/Byzantine wall (**Fig. 10**), which runs between the columns of the center row of the triple East Colonnade (the same rubble intercolumnar wall into which the first recovered female panel was built, but further south than that panel; see above). Nearly the full width of the panel is retained, as can be seen in the *cyma reversa* framing elements in evidence on both the left and right sides of the piece, and the whole sculpture measures 82cm wide by 52cm in height by approximately 24cm in thickness. The foliage of the wreath depicted (laurel? olive?) is shown more naturalistically than, say, the ivy tendril on the cornucopia of the Tyche figure, and no stylistic connection can be made between the ribbon/fillet and the drapery



10. Wreath panel, in situ (A. Joukowsky).



11. Male bust, in situ (A. Joukowsky).



12. Male bust (S. Sullivan).



13. Second "Tyche" bust (author).

of the figural panels.

Near to the wreath carving another panel was recovered (**Figs. 11-12**), at the end of the same excavation season (August 2, 1998). This relief depicts a male figure, and was built into a diagonal cross-wall of late provenience running southeast to northwest — from the northwest corner of the retaining wall of the monumental pool of the so-called "Lower Market" area to the southernmost column of the middle column row of the East Colonnade (Joukowsky 1999: 209).[4] The panel is cut down on top and bottom and somewhat damaged, though the figure is clear and readable: a male figure in a chiton or chlamys thrown over the left shoulder proper, executed in the heavy style noted on the other panels; the anatomy of the left shoulder is somewhat visible underneath. Generalized musculature is depicted on the nude right shoulder as well as the right pectoral, while the collarbone is deeply carved. The head, as usual, is missing; the slot where it would have inserted was filled with a large stone when the panel was reused in the late cross-wall. Some of the *cyma reversa* border remains on the left edge of the panel, while the right edge is damaged and no border is visible. Preserved dimensions are 85cm in width by 50cm in height by 40cm in thickness.

While 1998 seems to have been the most momentous year for the excavation in terms of discovering relief panels, two more fragments were discovered in subsequent seasons. At the very beginning of the 1999 campaign, for instance, a damaged and cut-down female panel (**Fig. 13**) was recovered immediately adjacent to the male panel described above: just west and south of it, built into the diagonal cross-wall of late provenience running from the northwest corner of the retaining wall of the monumental pool of the so-called "Lower Market" area to the southernmost column of the middle column row of the East Colonnade of the Great Temple site (Joukowsky 2000: 317). This sculpture is the less well-preserved "twin" of the Tyche panel discovered in July of 1998; a cut down panel some 53cm wide by 40cm high, depicting the left shoulder proper of a female figure, the left arm, the left side of the neck, and the left breast. Heavy folds of a *chiton* are draped over the left shoulder and arm, as in the Tyche panel from 1998; a squarish neckline exposes part of the neck, and the left half of the cut-out slot where the head would be inserted. The left arm is bent at the elbow and folded back below the left shoulder; the worn, chunky left hand holds a badly damaged representation of the cornucopia. While much of the detail evident on the 1998 Tyche is lost here, there is enough to determine that the two panels were identical in several important respects.

Also at the beginning of the 1999 excavation season (June 3), another relief carving was recovered (not illustrated): a well-preserved panel depicting a female bust (Joukowsky 2000: 333). It is in all respects similar to the panels described above and clearly part of the corpus of relief carvings, but was recovered not in the northeastern quadrant of the site (the east side of the Lower Temenos courtyard). Rather, it was excavated by Director Martha

4. For the so-called "Lower Market" see most recently Bedal 2000.

Joukowsky in the southwestern quadrant, on the west side of the raised upper courtyard (the Upper Temenos) in which is set the main "Great Temple" building, built into a late "Bedouin" wall. This bust, preserved to almost its full width of 87cm, a height of 49cm, and a thickness of 22cm depicts a draped female figure of the so-called "maenad/ Amazon/Aphrodite" type described above; it is fairly well-preserved, with a *chiton* draped over the left breast. The anatomy underneath the thick drapery is generalized, with shoulder and breast appearing as mounds under the heavy cloth. The neckline of the *chiton* plunges from the left shoulder proper to under the right breast, leaving it exposed. A strap or baldric runs between the breasts, suggesting an Amazon. Part of the square socket, where a sculpted head would insert, is preserved. Though recovered in a different part of the site, this panel clearly belongs with the others discovered in the eastern part of the Lower Temenos area.

Finally, a panel from the so-called Colonnaded Street (also known as the "Roman Road"), which forms the northernmost boundary of the Great Temple site and above which the Lower Temenos Courtyard is elevated, has been recognized by the author as probably belonging to the corpus of Great Temple relief carvings (**Fig. 14**), based on its dimensions and workmanship. This sculpture, previously published (Roche 1985: 313-317, fig. 1; McKenzie 1988: 94, no. 65), is well-preserved, 90cm in width by 45cm in height, and depicts a female bust with strong parallels to the relief carvings discovered at the Great Temple site. The panel preserves the *cyma reversa* and fillet on the left side (as the viewer sees it); the framing is broken away at right. Between the frames is a draped female bust, with heavy cloak overlying a lighter *chiton* underneath. The *chiton* is depicted as having a braided border at the neckline, with a multitude of vertical folds or pleats running from the neck to where the *chiton* disappears under the heavy cloak. Like the other female busts, the anatomy of the Colonnaded Street panel underneath the thick drapery is generalized, with shoulders appearing as mounds under the heavy cloth. The right arm proper, mostly obscured underneath the thick cloak, seems to be bent at the elbow and drawn across the torso, covering the breasts of the figure. Also, part of the square socket, where a sculpted head would insert, is preserved. However, on this example, the heavy cloak comes up the right side (proper) of the neck, as well as the cut-out socket; suggesting perhaps that the head which was originally part of the panel was veiled. Taken together, the corpus of recently discovered relief panels from the Great Temple site constitutes an important collection of Nabataean sculpture, and may reveal aspects of the history and function of the site, as well as the history and stylistic development of Nabataean carving at Petra.

Previous Scholarship

In her 1999 dissertation on the Great Temple, Erika Schluntz took up the question of the first two relief panels discovered: the male torso and the female figure panel reused in the late intercolumnar wall (Schluntz 1999: 69-72). Schluntz postulated, based on just these two fragments, that the reliefs might have been part of a program that decorated the north sides of the two anta faces of the exterior walls of the main Great Temple building; based on her estimate of the reconstructed dimensions of the panels (about 90cm), the width of the anta faces (1.5m), and the reconstructed height of the Temple façade, she surmised that there might have been as



14. Female bust from the Colonnaded Street (S. Sullivan).

many as five panels on each anta wall, arranged vertically and running from the top of the anta to the bottom (Schluntz 1999: 71). Schluntz also suggested that, stylistically, the panels most closely a group of sculptures recovered by G.R.H. Wright in the area of the Temenos Gate of the Qaṣr al-Bint (قصر البنت) complex, and labeled the "1967 Group of Sculptures" by Judith McKenzie in her recent work on Nabataean sculpture and architecture (Wright 1967-68: 20-29; McKenzie 1988: 85-88, figs. 10-11; McKenzie 1990: 134-135, pls. 60-66; Schluntz 1999: 71-72). She notes the same use of *cyma reversa* fillet, parallels in appearance between the male torso and the "Ares" figure from the "1967" group (Lyttelton and Blagg 1990: fig. 6.9), and similarities in treatment of drapery between the cut down female panel and the veiled female bust from the "1967" group (McKenzie 1988: fig. 11c; Schluntz 1999: 72). Schluntz concludes by stating that these parallels could suggest for the production of the Great Temple reliefs a date similar to that postulated by McKenzie for the "1967" sculptures: before the beginning of the first century AD (Schluntz 1999: 72). This would jibe well with current dating of the main Great Temple building; pottery and stratigraphic evidence suggest that the earliest architecture pertaining to the Great Temple building — and this would include the antae of the main screen walls where Schluntz suggests the panels could have been originally located — dates to the end of the first century BC and the first century AD (Joukowsky 1998a: 133-140; Bestock 1999: 246-248; Joukowsky and Basile 2001: 50).

Though based on only a few bits of information, Schluntz's theories seem to be mostly borne out by the relief fragments discovered after the appearance of her 1999 work. While it is difficult to know for sure where the panels were originally located in the Great Temple complex (and how they were arranged), their size would seem to preclude their placement anywhere but the antae of the Temple building or perhaps its frieze course (as on the Qaṣr al-Bint; see below). The number of panels now recovered approaches Schluntz's estimate of a total of ten,[5] and while quality varies from panel to panel, most exhibit the same stylistic characteristics that prompted her to compare the pieces to Wright and McKenzie's so-called "1967 Group of Sculptures". Similarities in treatment of anatomy and drapery, compositional techniques, and even material make the "1967 Group" still the best parallel for the Great Temple group; although the workmanship in some cases is not as fine (compare for instance the drapery of Great Temple's "maenad/Amazon/Aphrodite" types, or the relief from the Colonnaded Street, with the veiled female bust from the "1967 Group"; see Wright 1967-68: no. 20; McKenzie 1988: fig. 11c), these still constitute the most convincing comparanda. Schluntz's original ideas have clearly been bolstered by discoveries as the Great Temple since 1999.

Context and Function

While Schluntz's theories concerning possible location, dating, and stylistic comparanda continue to be applicable to the increasing corpus of Great Temple reliefs, her suggestions as to the function of the reliefs in the overall sculptural program are more controversial.

In 1997, excavator Leigh-Ann Bedal discovered, in what was supposed to be the *cella* of the so-called "Great Temple" building, the western part of a classicizing *theatron*, added after the earliest phase architecture and complete with horseshoe *cavea* and low *pulpitum* built between the massive porch columns (Joukowsky 1998: 300-309). This discovery threw into disarray the assumption that the Great Temple, so-called since Bachmann's time, was indeed a temple site. In her 1999 dissertation, Schluntz, addressing this new evidence, argues that the "Great Temple" was in fact a royal audience hall in its earliest (pre-Roman annexation) phase (similar to those at Herodian palaces, for instance, like that at Jericho), and then a public assembly space after the addition of the *theatron* arrangement (Schluntz 1999: 82-135). In support of this argument, she interprets the sculptural decoration of the complex as a program designed to speak to the role of the Nabataean royal families (Schluntz 1999: 78-81). Specifically, in regards to the relief panels, Schluntz states that:

> "...the figural relief panels would be serving an appropriate propagandistic function as divine patrons of the Nabataean kings, adorning the main building's façade. Their presence would have actually been less appropriate for a temple façade, which would more likely only display imagery connected to the temple's resident di-

5. A pattern has emerged, however; one that Schluntz could not possibly have known about while preparing her 1999 work. Since *two* Tyche figures have been recovered, and *two* maenad/Amazon/Aphrodite types, it might be suggested that the antae were decorated with *pairs* of relief busts — one of each pair on the north face of the west anta and one on the north face of the east anta, presumably located at the same height. Thus, there may have been two "Dioskouros/Ares/Apollo" types, two "maenad/Amazon/Aphrodite" types, two "Tyche/Fortuna" types, two "draped female bust" types, two "draped male bust" types, and two wreaths, for a total of 12 panels (six on each anta).

vinity" (Schluntz 1999: 79, n. 15).

However, a close look at relief panels similar to those discovered at the Great Temple site shows that this is probably not the case. Indeed, when Nabataean relief panels can be securely associated with architecture, they almost always pertain to *sacred* architecture.

There are any number of sculpted panels, identified as Nabataean in origin, from sites in and around Jordan. Many of these cannot be associated with a particular structure, but some have a secure provenience. Also, many are similar, in overall format, to the Great Temple panels: figures depicted as busts, with upper torso in low relief, heads depicted in high relief (on the Great Temple panels, of course, the heads seem to have been separate pieces sculpted in the round), and distinct borders framing the panel. This evidence suggests that the sculpted panel — typically depicting a god or a supernatural figure in a classicizing, naturalistic style — was an important element in the decorative sculptural programs of Nabataean buildings (Lyttelton and Blagg 1990: 98).

From Petra itself, there are tens of panels and panel fragments — lining the Colonnaded Street, along the walkways leading to the Burckhardt Archaeological Center, the "Old Museum", and the Petra Archaeological Museum west of the Great Temple site, and on the north side of the Wādī Mūsā near the Temple of the Winged Lions and the recently excavated "Petra Church". Catalogued in the very useful 1988 article by Judith McKenzie (90-95), they include unprovenienced stray finds, fragments, whole panels, and important sculptural groups such as the Qaṣr al-Bint decoration and the so-called "1967 Group of Sculptures" discussed above.

However, it is interesting to note that securely provenienced panels from Petra decorate *sacred* architecture only. The most obvious example would be the famous sculpted panels decorating the Temenos Gate.[6] This structure, almost universally interpreted as the gateway to the sacred *temenos* enclosure of the Qaṣr al-Bint temple, is faced with square, framed sculpted panels decorated with relief busts.[7] The Qaṣr al-Bint itself has its antae decorated with raised framed panels — there is no figural decoration (they are merely blank, the frames themselves are the decoration) — but this arrangement has suggested to some (including the author) a possible parallel to the pattern of decorated antae of the Great Temple main building. Of course, massive sculptural panels — depicting various deities as bust reliefs (but only the well-known Helios relief is extant) — have been reconstructed as decorating the "Doric-style" frieze of the temple.[8]

Outside of Petra, sculpted panels with secure architectural provenience also demonstrate an affinity with sacred buildings. The famous sculptural panels of the Khirbat at-Tannūr (خربة التنور) temple, for instance, decorated the façade of the inner shrine of that building.[9] A similar situation is seen nearby at the temple at Khirbat adh-Dharīḥ (خربة الذريح),[10] where relief busts of gods (including the well-known "Castor and Pollux" relief) decorate the frieze course — indeed the panels are stylistically linked to the reliefs of Khirbat at-Tannūr, suggesting to some a local "school" of Nabataean sculptors operating in central Jordan (Lyttelton and Blagg 1990: 100; Zayadine 1991: 57). In both of these cases, the relief panels represent a number of different deities (as is indeed the case with the Qaṣr al-Bint frieze discussed above), seemingly contradicting Schluntz's assertion that a Nabataean temple façade would only be decorated with images pertaining to the god or goddess worshipped inside the temple itself.

Thus, the presence of sculpted panels depicting busts of various deities (and/or other supernatural beings) in relief suggests a *sacred* function for the main Great Temple building, if it indeed was decorated with these panels as postulated above. Whether this "sacred function" is as a "conventional" Nabataean temple (is there such a thing at Petra?), or something else (a "sacred theater" or banqueting triclinium?), is open for debate, but evidence unearthed recently (including a small niche idol, a small "portable" baetyl, a relief "dagger god" idol carved into the cliff face near the southeast corner of the main Great Temple building, a small altar from the Lower Temenos area, a remarkable pair of limestone baetyls recovered

6. For the most up to date discussion and complete bibliography of the Temenos Gate, see McKenzie 1990: 132-134.
7. Some are *in situ*, some have been restored to the Gate, and some are reconstructions. Also, a number of important panel fragments have been associated with the Gate. See Parr 1957: 5-8; 1960: 130-132; Glueck 1965: 466-467; McKenzie 1988: 87-88; 1990: 133-134; Basile 1997: 255-266.
8. For the most up to date discussion and complete bibliography of the Qaṣr al-Bint architecture and decorative program, see McKenzie 1990: 135-138.
9. Glueck's famous 1965 book admirably summarizes not only his work at the Khirbat at-Tannūr temple but also amply illustrates the sculpture from the site, as well as comparanda for those sculptures. For the relief panel busts see Glueck 1965: 122-123, 144-146, 198-207, 222-228, 315-319, 396-399, 410-417, 465-473, 510, pls. 1-3, 12, 25-28, 45, 53, 55-56, 130-132, 136-137, 145-146, 153-154, 157.
10. For a complete bibliography of the Khirbat adh-Dharīḥ site, see Villeneuve 2000: 1543-1555.

from a niche in the West Cryptoportico of the Lower Temenos, and an inscription — dated to the eleventh year of the reign of Aretas IV, or AD 2-3 — referring to a "*theatron* to (the Nabataean god) Dushara" recovered from the Petra Church site but almost certainly moved there from somewhere else, and somewhere nearby) is "piling up" in favor of a religious function for the Great Temple complex (Joukowsky and Basile 2001: 47-49, 51, 54-57).[11]

The Reliefs and Nabataean Sculpture

Though scholars have been exploring Petra's ruins since the beginning of the 19th century, a sophisticated, comprehensive study of Nabataean art is, remarkably, still lacking almost 200 years later. Archaeological studies abound, for sure, and recently important reexaminations of Nabataean rock-cut tombs and freestanding architecture have appeared (most importantly McKenzie 1990). Studies of individual artistic monuments, and small groups of monuments, are published regularly — too many to mention here. And, of course, Nabataean pottery and coins have been studied, due to their unique chronological value.[12] However, an overall synthesis of Nabataean art is still lacking, and synthetic analyses of Nabataean sculptural monuments lag far behind studies of the tomb façades, architecture, pottery, and coinage.

The process has begun, however, and some recent studies may be brought to bear on the Great Temple reliefs in order to say something more definitive about their place in the history of Nabataean art. These studies — McKenzie 1988, Patrich 1990, Lyttelton and Blagg 1990, and Zayadine 1991 — represent the pioneering efforts in an attempt to synthesize what we currently think we know about Nabataean sculpture, and make it possible to go beyond the "local" observations on sculptural fragments commonly found in archaeological reports.[13]

First and foremost is the question of comparanda. As stated above, the so-called "1967 Group of Sculptures" from the area around the Temenos Gate can be cited as having stylistic parallels with the Great Temple reliefs. Since it can be convincingly demonstrated, archaeologically, that this group (or, at least, some of this group)[14] predates the Temenos Gate sculptures, and the Temenos Gate dates from after AD 76 (or 9 BC), therefore the "1967 Group" predates AD 76 (or 9 BC; see Wright 1967-68: 20-29; McKenzie 1988: 85-88, figs. 10-11; McKenzie 1990: 134-135, pls. 60-66; Lyttelton and Blagg 1990: 98-99; Schluntz 1999: 71-72). Furthermore, McKenzie has argued that stylistically, the "1967 Group" most resembles the Helios bust of Qaṣr al-Bint and the relief sculptures of al-Khaznah (الخـــزنة); both of these are monuments dated by several scholars to before the beginning to the first century AD (McKenzie 1988: 86-87, 90-92; McKenzie 1990: 134-135; Lyttelton and Blagg 1990: 106). Additionally, stylistic and chronological links, seen by McKenzie, between sculptures at Petra and Khirbat at-Tannūr (especially relief busts from the Temenos Gate and from the "period II" altar pedestal at at-Tannūr, dated to the first century AD and the first quarter of the second century) expand the typically "local" nature of Nabataean sculptural studies and (potentially) demonstrate a remarkable phenomenon: classical features in Nabataean sculptures at both Petra and Khirbat at-Tannūr are strongest in the *earlier* periods, and become more simplified (showing what Zayadine would call "Graeco-Syrian" and "Parthian-Hellenistic" influences; 1991: 56-57) *later on* (McKenzie 1988: 81, 89). One assumes that a revival of the classical style begins after the Roman annexation, operating in tandem with the more schematic post-annexation styles that persist at at-Tannūr and adh-Dharīḥ (Zayadine 1991: 58).

While McKenzie's theories depend upon a complex "re-reading" of Glueck's interpretations of his own stratigraphy and architectural phasing (McKenzie 1988: 81-85; see also Starcky 1968: 222-223), and perhaps represent "overly neat" or "extreme" statements regarding the chronological role of classicizing models in Nabataean art and architecture,[15] her willingness to compare monuments across sites (as well as across time) demonstrates the potential of such methods. Indeed, some

11. The controversy over the function of the "Great Temple" is dealt with most recently in Joukowsky and Basile 2001: 43-58.
12. See for instance Meshorer 1975; Khairy 1975; 'Amr 1987; Augé 1991; Schmid 1995; etc.
13. Glueck 1965 also attempts a synthesis of Nabataean art, and is an admirable source of photos for comparanda (supra n. 9); however, many of its observations and conclusions are now out of date.
14. For *contra* McKenzie that the "1967 Group of Sculptures" forms one coherent group, see Lyttelton and Blagg 1990:98.
15. McKenzie makes similar arguments regarding the architecture of Petra — in her seminal 1987 article with Phippen, and in her equally groundbreaking 1990 work — and similarly uses comparisons with "provincial" monuments, this time at Madā'in Ṣāliḥ. Lyttelton and Blagg are critical of this approach, stating that: "It seems, however, a somewhat hazardous oversimplification to allow the head of Petra to be ruled by the foot of Mada'in Salih..." (1990: 105).

observations made above regarding the "quality" of the Great Temple reliefs can be brought to bear on McKenzie's theories. For while the "1967 Group" remains closest to the Great Temple group stylistically, as Schluntz originally observed, the workmanship of some of the Great Temple panels — especially in the depiction of drapery, and the anatomy underneath — is inferior to the "1967" sculptures. A comparison of the veiled female bust from the "1967 Group" (McKenzie 1988: fig. 11c), the well-preserved Tyche panel from the Great Temple discovered 4 July 1998 (see above), and the "bust of a female with cornucopia" from the Temenos Gate (McKenzie 1988: fig. 12d), is especially instructive. While the Great Temple relief has more in common, perhaps, with the "1967" piece, in a way it stands in the middle of the sequence: the drapery is more classical than the Temenos Gate panel, but of a quality inferior to that of the "1967" panel (McKenzie's progression from "rounded folds of various depths" to "series of flat surfaces"; 1988: 88). The preserved "ringlets" or "corkscrew curls" on the Great Temple panel, as well, are more well-executed and fully realized than the stylized curls of the Temenos Gate panel, but are more schematic than the undulating hair of the "1967" bust (move to "repetitive" elements in the depiction of hair; McKenzie 1988: 88). If McKenzie's sequence is correct, then it could be suggested that, stylistically, that the Great Temple panels should come somewhere between the "1967 Group of Sculptures" (dated to before the beginning of the first century AD, stratigraphically as well as stylistically due to the similarities of this group with the Helios bust of Qaṣr al-Bint; McKenzie 1988: 92) and the Temenos Gate group (after AD 76, or 9 BC, depending upon how you read the stratigraphy; McKenzie 1988: 91). Since, as stated above, pottery and stratigraphic evidence date the main Great Temple architecture to before AD 100 (i.e. Joukowsky and Basile 2001: 50, etc.), and, as stated above, the Great Temple relief panels are reconstructed as belonging to the main architectural phases (Schluntz 1999: 69-72), this would jibe with McKenzie's scheme of "...a simplification of the earlier more classical forms as a Nabataean style develops..." (McKenzie 1988: 88).

The next important question concerns influences and origins. From where does the Nabataean "bust relief panel" arise? This is not a commonly seen class of sculpture. *Commemorative* relief busts exist, of course, in the Roman Republic, and persist into Imperial times. Such commemorative reliefs also occur in the Imperial provinces and on its periphery — the Palmyrene funerary reliefs would be one well-known example. The panels, in a way, resemble metope decoration, and indeed some panels did function as metopes, like the Helios bust of Qaṣr al-Bint and its postulated cousins. In the final analysis, however, the Nabataean relief busts simply are not the same thing as conventional Graeco-Roman metope decoration, which tends to provide for multiple figures and, indeed, narrative content. Thus it could be argued that relief busts depicting deities and supernatural figures, though those figures are often from Graeco-Roman mythology, constitute an important *native Nabataean* sculptural type.

Stylistically, general parallels are more apparent, and some have already been suggested for the "1967 Group of Sculptures" especially. As previously discussed, McKenzie in her 1988 article sees these sculptures as standing at the beginning of a process whereby classical traditions become more schematic and generalized; therefore, the "1967 Group", along with the al-Khaznah reliefs and the bust of Helios from Qaṣr al-Bint, are the most classicizing and naturalistic. Lyttelton and Blagg are more explicit still, calling these busts "...wholly Hellenistic...without any obvious Nabataean reference..." (1990: 99). Exactly where Hellenistic influences on Petra and the Nabataeans originated from is also now being stated more explicitly: several of the important recent studies on Nabataean art and architecture, including those of McKenzie and Lyttelton and Blagg, look increasingly towards Alexandria (Lyttelton 1974; Schmidt-Colinet 1980; Lyttelton and Blagg 1990; McKenzie 1990). Alexandrian influence is seen generally in the "baroque" architecture (like al-Khaznah) that some of these authors would date to the second half of the first century BC or the first half of the second century AD (not to the second century AD, when the Roman High Imperial baroque style reaches its climax; see for instance Ward-Perkins 1981: 331-334; *contra* Lyttelton and Blagg 1990: 100-104, 106), and specifically in such objects as the distinctive "floral-type" capitals that appear on several key monuments at Petra (including al-Khaznah, and for that matter the Great Temple; Lyttelton and Blagg 1990: 94-95; Schluntz in Joukowsky 1998a: 226-231; Schluntz 1999: 57-68). Indeed, an important theme running through McKenzie's entire 1990 study is that of Alexandrian baroque influence on Petra's earliest architectural monuments. While connections with other important Hellenistic centers, like Pergamon, can also be expected (Lyttelton and Blagg, for instance, see Pergamene influence in the "floral scrolls" and "weapons friezes" that appear on several Petra monuments; 1990:

96-98), it would seem that Alexandrian contacts might account for the extreme classicism of not only the "1967 Group of Sculptures" but perhaps the Great Temple reliefs as well.

There is also the more complex question of Roman influence. Rome in the first century BC (and perhaps in the beginning of the first century AD) was, in many respects (especially in respect to art and architecture) a Hellenistic state, so to look for Hellenistic and Roman influences in Nabataean art is, in some ways, to seek the same thing. As Lyttelton and Blagg have said of the period from the reign of Aretas III to Aretas IV (ca. 87 BC-AD 40; the period when they see a number of key monuments being built at Petra): "...many of the elements in the art of Petra which have been regarded as 'Roman' have probably been interpreted as such because Roman ornament was being influenced [by Hellenistic models] at approximately the same time" (1990: 105). Thus, we see that we need not wait for annexation to look for Roman influence — and Roman influence in the first century BC and the first half of the first century AD would include Hellenistic elements.

The mechanisms through which Roman artistic models could be made available to Nabataean craftspeople would certainly include trade and political contacts — the same mechanisms that would have brought Alexandrian and Pergamene ideas to Nabataea as well. However, there is another important possibility, in the person of a "middle man": Herod the Great. Herod's role as a builder and patron of the arts is well known; recently, Roller has offered an exhaustive examination of this legacy (1998). Lyttelton and Blagg see a possible connection between Herod and the building programs of the later Nabataean kings (especially Aretas IV; 1990: 106), and Schluntz, advancing her argument that the "Great Temple" was, in fact, a royal audience hall in its first phases, sees parallels between the main Great Temple structure and Herod's palaces, like the famous "Winter Palace" at Jericho (1999: 106-113). The so-called "Lower Market", located immediately to the east of the Great Temple site, has been shown by Bedal to be a garden and pool complex with Herodian "overtones" (again, parallels with Jericho; see Bedal 2000). And, if in fact the "Great Temple" was a sacred site, as argued by this author and by Joukowsky (Joukowsky and Basile 2001), possible Herodian links are still to be seen: the architecture of the Lower Temenos, which the author contends is (ultimately) modeled on the Roman sanctuary/imperial forum type (like the Sanctuary of Hercules Victor at Tivoli, the Sanctuary of Fortuna Primigenia at Praeneste, and the Forum of Julius Caesar and the Forum of Augustus in Rome, which all predate or are contemporary with the main architecture of the Great Temple site; Basile in Joukowsky 1998a: 204-206), may also be related to Herod's own versions and interpretations of this type. As Roller demonstrates, the Temple of Augustus at Sebaste (Samaria) was probably influenced by the Kaisareia of Antioch and Alexandria and the Forum of Julius Caesar, though at Sebaste he did not enclose the temple structure within the portico, making it instead into a "forecourt" (1998: 92). The Roman sanctuary/imperial forum type is also seen as influencing the design of Herod's rebuilding of the Temple at Jerusalem (Roller 1998: 93; Jacobson 2002: 23-27, 60). Thus, we see that Petra, in the first centuries BC and AD, stood at the nexus of a number of important artistic influences, all of which trace at least some of their origins ultimately to the traditions of the Hellenistic Near East. The classicism of the Great Temple relief panels is a reflection of these influences.

Conclusions

While there is much that cannot be known about the remarkable Great Temple relief panels, the following hypotheses can be forcefully advanced, based on the state of the evidence currently, and on previous scholarship:

1) The Great Temple panels represent some of the finest relief sculptures recovered from Petra's Central Valley;
2) The panels most likely decorated either the antae or frieze course of the Great Temple main building, as per Schluntz 1999;
3) The panels bear stylistic resemblances to the so-called "1967 Group of Sculptures", and therefore are roughly contemporary (late first century BC, beginning of the first century AD), as per Schluntz 1999 — this would jibe well with the archaeological evidence currently available for the Great Temple site, which dates the main architecture to before AD 100;
4) Functionally, the panels resemble the Temenos Gate panels of Petra, and the relief busts decorating the temples of Khirbat at-Tannūr and Khirbat adh-Dharīḥ; that is, decorating sacred architecture;
5) Comparisons between important sculptural groups — the "1967 Group", the al-Khaznah reliefs, the Helios bust of the Qaṣr al-Bint, the Temenos Gate sculptures, the reliefs of Khirbat at-Tannūr — suggest that the Great Temple panels stand in the middle of a progression represented by the "1967 Group" at one end and the Teme-

nos Gate sculptures at the other, as per McKenzie 1988, perhaps further refining the dating of the Great Temple reliefs to between 1 BC and AD 76;

6) Stylistically, the classicism of the Great Temple panels suggests Hellenistic and Roman influences, although the relief bust of Graeco-Roman deities and mythological figures, used to decorate antae faces, pilasters, and friezes, is not generally known outside of Nabataea.

Hopefully, as more excavation takes place at the Great Temple site and at other sites in the Petra Central Valley, these hypotheses can be further tested. However, even if no more evidence can ever be brought to bear on the Great Temple relief panels, they will remain some of the most impressive examples of Nabataean relief carving yet recovered from the Rose City.

Acknowledgments

This article was written, primarily, in 2001, with the assistance of many persons: Martha Joukowsky, director of the Brown University Great Temple Excavations, who gave me the opportunity to join the excavation team in 1995 and many opportunities to write about our remarkable discoveries since then (even though I promised her that this article would be finished in 2000); Artemis Joukowsky, who took the majority of the excellent photographs that illustrate the article; Simon Sullivan, who made the drawings; and the crews who worked with me in recovering the busts in 1997, 1998, and 1999. Most importantly, however, I must thank my wife and partner, Monica Sylvester, who not only encourages my efforts but was by my side as many of the relief busts described above were discovered; and my son Nicholas, now almost two, who did his best to distract me from my work and keep this article from being published for yet another year.

J.J. Basile
Dept. of Art History
Maryland Institute College of Art
1300 Mt. Royal Ave.
Baltimore, MD 21217 USA

Bibliography

'Amr, K.
1987 *The Pottery from Petra: A Neutron Activation Analysis Study*. BAR Int. Ser. 324. Oxford: British Archaeological Reports.

Augé, C.
1991 Les monnaies antiques de Pétra. *Les dossiers d'archéologie* 163: 46-47.

Bestock, L.D.
1999 Nabataean Pottery from the 'Cistern': Some Finds from the Brown University Excavations at the Petra Great Temple. *ADAJ* 43: 241-248.

Basile, J.J.
1997 A Head of the Goddess Tyche from Petra, Jordan. *ADAJ* 41: 255-266.
1998 The Lower Temenos. Pp. 189-208 in M. Joukowsky (ed.), *Petra Great Temple, Volume I: Brown University Excavations 1993-1997*. East Providence (RI): E.A. Johnson.

Bedal, L.-A.
2000 *The Petra Pool-Complex: A Hellenistic Paradeisos in the Nabataean Capital*. Unpublished dissertation, University of Pennsylvania, Philadelphia, PA.

Glueck, N.
1965 *Deities and Dolphins*. New York: Farrar, Straus and Giroux.

Jacobson, D.
2002 Herod's Roman Temple. *Biblical Archaeology Review* March/April: 19-27, 60-61.

Joukowsky, M.S.
1998a *Petra Great Temple, Volume I: Brown University Excavations 1993-1997*. East Providence (RI): E.A. Johnson.
1998b The 1997 Brown University Archaeological Excavations at the Great Temple at Petra. *ADAJ* 42: 293-318.
1999 The 1998 Brown University Archaeological Excavations at the Great Temple at Petra. *ADAJ* 43: 195-222.
2000 The 1999 Brown University Archaeological Excavations at the Great Temple at Petra. *ADAJ* 44: 313-334.

Joukowsky, M.S. and Basile, J.J.
2001 More Pieces in the Great Temple Puzzle. *BASOR* 324: 43-58.

Khairy, N.I.
1975 *A Typological Study of the Unpainted Pottery from the Petra Excavations*. Unpublished Ph.D. thesis, Institute of Archaeology, London.

Lyttelton, M.B.
1974 *Baroque Architecture in Classical Antiquity*. London: Thames and Hudson.

Lyttelton, M.B. and Blagg, T.
1990 Sculpture in Nabataean Petra, and the Question of Roman Influence. Pp. 91-107 in M. Henig (ed.), *Architecture and Architectural Sculpture in the Roman Empire*. Oxford University Committee for Archaeology, Monograph No. 29.

McKenzie, J.S.
1988 The Development of Nabataean Sculpture at Petra and Khirbet Tannur. *PEQ* July-December: 81-107.
1990 *The Architecture of Petra*. New York: Oxford.

Meshorer, Y.
1975 *Nabataean Coins*. Qedem 3. Jerusalem.

McKenzie, J.S. and Phippen, A.
1987 The Chronology of the Principle Monuments at Petra. *Levant* 19: 145-165.

Parr, P.J.
1957 Recent Discoveries at Petra. *PEQ*: 5-16.
1960 Excavations at Petra 1958-59. *PEQ*: 124-135.
Patrich, J.
1990 The Formation of Nabataean Art: Prohibition of a Graven Image among the Nabataeans. *Aram* 2: 185-196.
Roche, M.-J.
1985 À propos d'un bas relief inédit de Pétra. *Syria* 62: 313-317.
Roller, D.W.
1998 *The Building Program of Herod the Great.* Berkeley: University of California Press.
Schluntz, E.L.
1998a The Upper Temenos and the Great Temple. Pp. 209-224 in M. Joukowsky (ed.), *Petra Great Temple, Volume I: Brown University Excavations 1993-1997*. East Providence (RI): E.A.
Johnson.
1998b The Architectural Sculpture of the Great Temple. Pp. 225-234 in M. Joukowsky (ed.), *Petra Great Temple, Volume I: Brown University Excavations 1993-1997*. East Providence (RI): E.A. Johnson.
1999 *From Royal to Public Assembly Space: The Transformation of the "Great Temple" Complex at Petra, Jordan.* Unpublished dissertation, Brown University, Providence, RI.
Schmid, S.G.
1995 *Die Feinkeramik der Nabatäer Typologie, Chronologie und kulturhistorische Hintergründe.* Dissertation, University of Basel, Switzerland.
Schmidt-Colinet, A.
1980 Nabatäische Felsarchitektur. *Bonner Jahrbücher:* 189-230.
Starcky, J.
1968 Le temple nabatéen de Khirbet Tannur: à propos d'un livre recent. *RB* 75: 206-235.
Villeneuve, F., en collaboration avec Z. al-Muheisen
2000 Nouvelles recherches à Khirbet edh-Dharih (Jordanie du Sud), 1996-1999. *CRAI*: 1525-1563.
Ward-Perkins, J.B.
1981 *Roman Imperial Architecture*. Harmondsworth: Penguin Books.
Wright, G.R.H.
1967-8 Recent Discoveries in the Sanctuary of the Qasr Bint Far'un at Petra. *ADAJ* 12-13: 20-29.
Zayadine, F.
1991 Sculpture in Ancient Jordan. Pp. 31-61 in P. Bienkowski (ed.), *The Art of Jordan*. Liverpool:

STUCCO DECORATION FROM THE SOUTH CORRIDOR OF THE PETRA GREAT TEMPLE: DISCUSSION AND INTERPRETATION

Emily Catherine Egan

Introduction

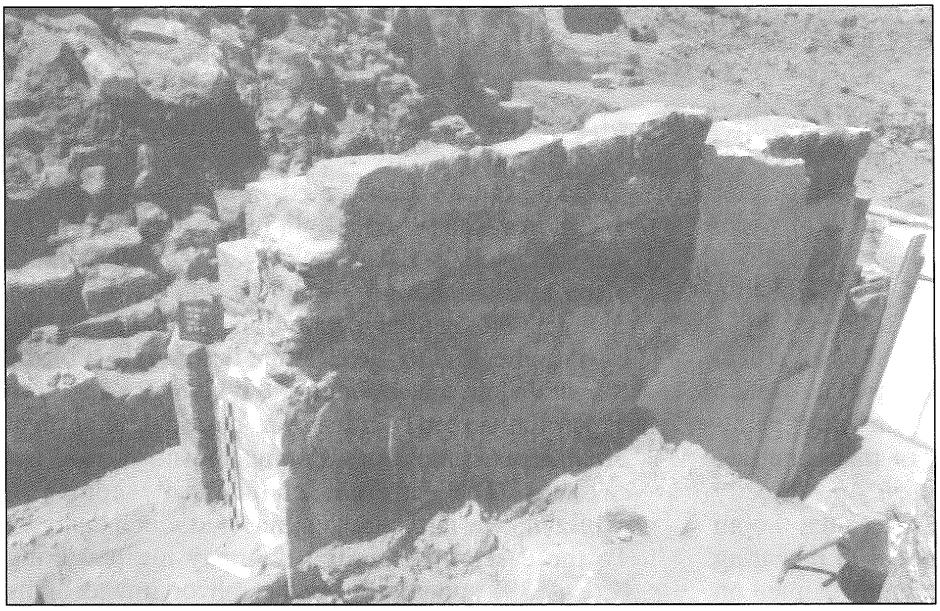
Beginning as early as the 1993 inaugural season, excavation efforts at the Petra Great Temple revealed the presence of architectural and decorative elements rendered in stucco. Discovered throughout the temple complex, molded architectural fragments were found in significant quantities both *in situ* and mixed in among fallen structural debris. During the first three seasons, from 1993 to 1995, stucco finds consisted largely of isolated fragments of painted column plaster and molded capital repairs concentrated in areas of conspicuous column collapse. Recovered pieces, while often brightly painted, were extremely fragmentary and offered little insight into the temple's artistic decoration. However, in later seasons, from 1996 through 2001, with the excavation of the perimeter corridors, these relatively meager stucco finds grew substantially in number and expanded artistically to include a more varied and complex canon of painted and molded styles. This heightened artistic complexity is exemplified best by the finds from the South Corridor during the 2001 season. Excavation of the South Corridor, measuring 2.73m north south-by-17.27m east west, revealed a number of intriguing plaster elements, four of which will be discussed here. Particularly notable for the various cultural influences apparent in its design, I will examine the *in situ* plaster flanking the central doorway as well as the three main decorative forms found in collapse: the egg and tongue[1] molded cornice pieces, the painted marbled fragments, and the molded lion body parts.

In Situ Wall Plaster Decoration Flanking the Central Doorway

As it stands, the wall decoration found on either side of the central doorway in the South Corridor of the Petra Great Temple represents some of the best-preserved stucco decoration in the temple complex. As such, the motifs and styles depicted here give great insight into the overall decoration of the corridor.

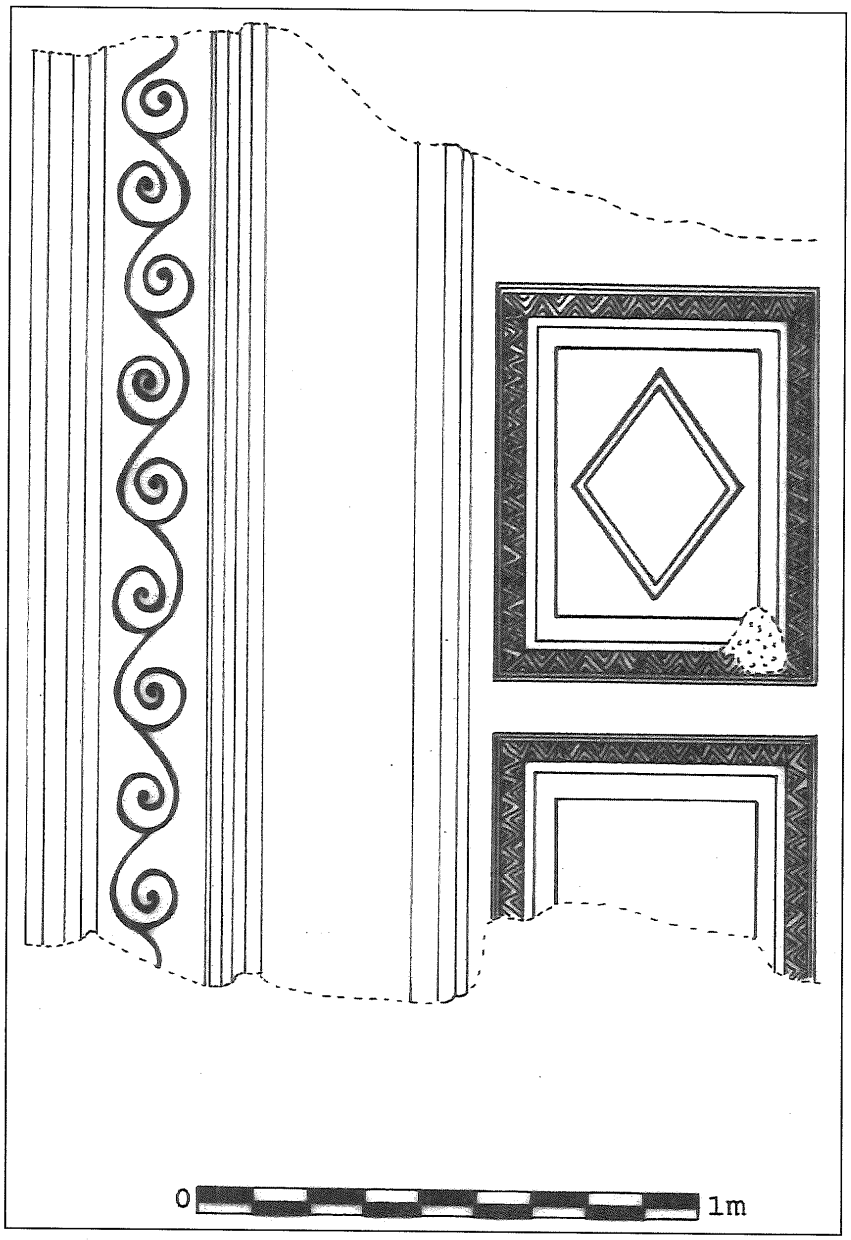
Mirror images of each other stylistically, the stucco to either side of the central doorway on the northern face of the south wall exhibits multiple artistic patterns arranged as a series of vertical panels separated by vertical *cyma reversa* molded cornices (**Fig. 1**). From east to west, the visible decorative scheme to the west of the central doorway (Locus 16) (**Fig. 2**) can be described as follows:

To the immediate west of the central doorway



1. View of in situ plaster in the South Corridor from the north. Photo by A.A.W. Joukowsky.

1. Cornice pieces with the egg and dart motif were chosen for exclusive study due to their recognized potential for stylistic comparison with pieces from other sites.



2. Line drawing of in situ plaster to the west of the central doorway in the South Corridor. Drawn and drafted by Emily Catherine Egan

are three painted vertical bands: red (0.03m wide), dark blue (0.04m wide), red (0.03m wide), followed by a vertical light blue (0.04m wide) *cyma reversa* molding abutting a flat panel (0.22m wide) that features a black spiraled vine pattern on a white background. Further west is a vertical thin molded white band (0.01m wide) followed by a vertical black stripe (0.03m wide) next to a vertical green (0.04m wide) *cyma reversa* molding which connects to a second flat panel (0.29m wide) painted a solid dark blue. To the west of this panel are the remains of two raised cassettes, one directly above the other. The top cassette measures 0.60m in width and is light blue with a border of repeating sets of three interlocking black chevrons painted on a white background. In the center of the cassette is a painted red diamond framed by a black and a white band. This cassette is positioned on a red background. Directly beneath this first cassette is a second, more deteriorated, cassette measuring 0.60m in width set on a light blue background. The cassette itself is red in color with an interlocking black chevron border similar to that on the upper cassette. No central decoration is visible on the lower panel due to the extreme deterioration of the cassette's surface. Bounding the vertical panel into which the cassettes are set are large white vertical *cyma reversa* moldings sloping inward toward the cassettes. The eastern band is mostly complete, while the western band has suffered much damage. To the east of the central doorway the plastering (Locus 39) appears to be the mirror image of its counterpart in the west structurally, though with reversed coloration.

Examining the designs as they move outward from the doorway, the narrow vertical red and blue solid-colored bands show no clear stylistic ingenuity and are of little stylistic significance. In contrast, the curling vine motif, elevated slightly and framed by two small inward sloping blue and green *cyma reversa* moldings, demonstrates an established artistic style. A culturally important symbol, the vine was used prominently by the Nabataeans in their art and architecture. Associated with the Dionysian god Dushares and the Syrian vegetation goddess Atargatis, two primary gods of the Nabataean pantheon, the vine was commonly depicted in both sacred and secular art. In stucco, painted vines are visible in the decoration on the vault of the so-called "Painted House" (dated to the first or second century AD) at Sīq al-Bārid (سيق البارد). Here, the vines, laden with grapes and flowers, crawl across the room's ceiling creating a "tapestry like" effect that is asymmetrical and free-flowing. In contrast to the fluidity of the Painted House stucco design, the vine pattern in the South Corridor demonstrates a stylized symmetry evident in its regular alternating spirals that extend the full length of the preserved vertical panel. Recognized by Phillip C. Hammond (1996: 83), symmetry and stylization were dominant factors in the representation of the vine, as were stylized rosettes that commonly appeared amongst the vines' curling leaves. The unadorned, formalized appearance of this painted vine, unlike the more naturalistic appearance of the painted vines from Sīq al-Bārid and carved examples on Corinthian capitals and exterior friezes, demonstrates the non-realistic, non-representational style characteristic of much Nabataean art.

Turning next to the molded cassettes, the *in situ* fragments found in the South Corridor closely resemble those uncovered in the West Corridor during the earlier 1999 season. Both sets of cassettes stand one on top of the other and are contained within vertical alternating solid blocks of blue and red. Plaster specialist Ueli Bellwald reconstructed the full decorative program for the West Corridor at the end of the 1999 season (Joukowsky 1999: 333). As indicated in Bellwald's design, the cassettes were likely part of a vertical panel to the west of the doorway, forming part of the central shaft of a segmented pilaster. The construction of plaster pilasters to mark doorways was common in the Nabataean world. As noted by McKenzie (1990: 88), pilasters originated in Greece in the fifth century BC and became more widely used by the fourth and third centuries BC. Baroque in style, and a central element of façade decoration, pilasters likely reached Nabataea through the spread of Hellenism to the Near East in the late fourth century. The most striking example of stucco pilasters in Petra is seen in the molded decoration on the exterior of the north and east walls of Qaṣr al-Bint (قصر البنت). On the north face of Qaṣr al-Bint, on the far west side of the northwest anta, are the remains of segmented molded pilasters which have been reconstructed as a series of square molded cassettes decorated with alternating circular and octagonal molded patterns (Zayadine 1987: pl.13). The South Corridor pilasters are similarly segmented, though broken into rectangular cassettes instead of square ones. The geometric style of the decoration in the centers of the Qaṣr al-Bint cassettes is also reflected in the painted diamonds seen in the centers of the cassettes from the South Corridor.

On the east face of the Qaṣr al-Bint, the stucco pilasters are broken into a series of long thin rectangular panels, outlined by *cyma reversa* moldings, and stacked vertically on top of each other. Here, the panels have no cassettes, are more elongated than the South Corridor examples, and do not flank a doorway. However, along with the pilasters from the north face of Qaṣr al-Bint, they comprise some of the only other examples of segmented plaster pilasters known in Petra's temple architecture.

In stone, numerous examples of Nabataean pilasters exist, many with carved cassettes. The best examples are those seen flanking a decorative niche inside Room 468 at Petra (McKenzie 1990: pl.112). The example from Room 468, essentially a niche contained within two carved façades, shows four pilasters — two marking the extent of the outer façade, and two flanking the interior niche. The outer pilasters are segmented, each carved into a series of six raised cassettes contained within a *cyma reversa* molding very much like that depicted in the South Corridor and in Bellwald's reconstruction.

The inner pilasters show a striking resemblance to the South Corridor decoration as well. In Room 468, the inner pilasters are smaller, deeper set than the outer two, and display no molded decoration. This design mirrors closely the structure of the vine panel from the South Corridor discussed above. As such, it seems very possible that the South Corridor doorway was flanked by double pilasters: a segmented outer one with interior raised cassettes and defined at either edge by two deep *cyma reversa* moldings, and a smooth inner one with a painted vine design defined by two shallow *cyma reversa* moldings. Further, the solid dark blue sunken panel between the pilasters could be interpreted as an attempted depiction of negative space — accentuating the two pilasters by simulating a deep space between them similar to that cut

between the pilasters in the Room 468 niche. In *The Architecture of Petra*, McKenzie (1990: 98-99) comments on the use of blue paint in Alexandrian tomb painting and Second Style Pompeiian wall painting and its role as a device to enhance perspective. Traditionally, in Egypt and Italy blue paint was used in wall decoration to give painted scenes a greater sense of depth. Emulating the distant horizon, blue paint was a commonly used as a background color and sustained the illusion of extended space behind painted architectural features. The blue painted panel in the South Corridor creates a similar heightened sense of depth — enhancing the three dimensional projection of the pilasters by visually depressing the area between them.

Other examples of carved pilasters appear on a niche adjacent to Façade 66 in Petra (McKenzie 1990: pl. 168). Like Room 468, Façade 66 has two sets of pilasters to either side of the niche, one large outer pair and one smaller inner pair. The decoration on these pilasters, however, is reversed from the Room 468 example. The outer set has a smooth, non-segmented appearance, while the inner pair is broken into a series of stacked cassettes; three of a probable six remain. Below the Façade 66 niche is carved an alternating band of *bas*-relief circles and diamonds that are vivid reflections of the geometric motifs seen painted onto the South Corridor stucco decoration.

In addition to stucco and stone-carved examples in Nabataea and surrounding regions, segmented pilasters similar in style and decoration to those from the South Corridor are most readily visible flanking entries in Second Style Italian wall paintings. Included within the first century BC illusionist architecture on the walls of the Torre de Annunziata at the Villa of Poppaea Sabina at Oplontis is a doorway flanked by segmented columns. The individual panels on these columns, like the cassettes on the pilasters from the South Corridor, are decorated with a central diamond design. Comparable diamond designs are also present on the painted columns in the House of the Labyrinth and in the wall decoration in the atrium of the Villa of the Mysteries, both at Pompeii. On the wall of Oecus 43 in the House of the Labyrinth is a painted depiction of a tholos flanked by a broken pediment. Supporting the pediment at either side are a series of columns, each divided into seven vertical sections. Of these, every other section is decorated with a central diamond design outlined by an illusionist raised molding. In the atrium of the Villa of the Mysteries large painted blue diamonds flank the entry to the peristyle. These diamonds, though not part of pilaster or column decoration, closely resemble the diamonds on the cassettes from the South Corridor in their accentuated double-outline design. The prominent single dark outlines of the diamonds from both Oplontis and Torre de Annunziata and the raised moldings around those from the House of the Labyrinth, while stylistically different from the borders of the South Corridor diamonds, also serve to give the decorations a noticeable accentuated quality.

One last point of stylistic comparison with the painted diamond designs from the South Corridor are the painted diamonds found decorating the lower parts of the walls at Herod's Northern Palace at Mas'ada/Masada. Dated by Yigael Yadin (1988: 202) to the mid-to-late first century BC, the walls of the lower terrace of Herod's palace are decorated with large colorful orthostata panels, marbled panels, and others that now show fragmented diamond designs very similar in style and coloration to those from the South Corridor. Visible in surviving portions of the plaster decoration is a red diamond, outlined by a black and white line, contained within a blue panel edged in red (Yadin 1988: 49). This design very closely parallels that seen on the cassettes in the South Corridor in both color and in orientation. Due to this high degree of similarity, it is possible to infer that the program of the South Corridor decoration (as a unit of which the diamond decoration is a part) is more essentially Roman, and not Nabataean, in design — a conclusion that cannot be drawn based on the wall paintings from Oplontis and Pompeii. These represent more general decorative parallels and therefore only imply *potential* Roman artistic influence in the South Corridor designs.

Dated by the historian Josephus Flavius to the first century (37-31) BC during the Roman Empire, Herod's Masada Northern Palace provides a source of relative dating for the construction phases of the Petra Great Temple. If the temple was initially constructed and decorated in the last quarter of the first century BC *following* the construction of the Masada palace, as suggested by M.S. Joukowsky, it is possible that the diamond decoration in the South Corridor was directly influenced by Roman (perhaps specifically Herodian) presence at the site. On the other hand, if the Petra Great Temple was built and decorated prior to the last quarter of the first century, *before* the Masada palace was built, it is possible that the decoration was Nabataean in origin and was absorbed conversely into the Herodian artistic repertoire by local or imported artisans. If the South Corridor plastering was influenced by the designs at Masada and not vice versa, the date of 37-31 BC for the Masada Northern Palace becomes a potential *terminus post quem* for the sug-

gested architectural redesign (and related re-decoration) of the Petra Great Temple by the Romans. In the manner of plaster re-decoration at Petra evidenced by the appliqué floral motifs, red painted diamond decorations, and blue and black line designs added to the columns of the Temple of the Winged Lions during the remodeling stage of the temple (Hammond 1996: 14, 78),[2] it is possible that the plaster decoration in the South Corridor was Nabataean in its early form but was later embellished following increased Roman influence in the area. The revamping of the stucco decoration in the Petra Great Temple South Corridor is plausible particularly in light of the suspected change in the use of the space following the addition of the arguably Roman theatron. Once the theatron was built, the temple South Corridor may have taken on a new character, possibly one of more importance than it had during Nabataean times. As such, perhaps there was a need to "Romanize" the area, now linked to the theatron, by adding characteristically Roman decorative touches, such as the diamonds, to existing artistic elements. This scenario also accounts for the notable absence of the diamond motif on the fragmented molded cassettes uncovered in the West Corridor and reconstructed by Bellwald. The western corridor, of potentially less or unchanged importance in Roman times, may not have been considered a priority for redecoration and was left in its original Nabataean decorative state.

A final point of stylistic consideration for the *in situ* South Corridor stucco is the interlocking chevron pattern visible along the sides of the molded cassettes. The use of black interlocking chevrons as a decorative pattern does not have any known parallels in Nabataean architectural wall painting or stone carving.[3] As such, the closest contemporary stylistic parallels I could find are the large black interlocking chevrons painted on some of the Fourth Style panels on the walls of Peristyle 29 and Cryptoporticus 41 at the Villa of Popaea Sabina at Oplontis dated to the mid-first century BC. The wall paintings at Oplontis, described as stylized simulations of cut slabs of marble with "extreme transverse veining" in Jacqueline and Maurice Guillaud's book, *Frescoes in the Time of Pompeii* (1990: 62), may reflect the Nabataeans' desire to create the effect of marbling along the edges of the South Corridor cassettes. The use of marbling as a form of wall decoration is also seen in conjunction with the diamond patterns on the east wall of the atrium at the Villa of the Mysteries and at the Masada North Palace — in both instances tying the two geometric motifs together in an entryway context as they exist in the South Corridor.

Egg and Tongue Cornice Pieces

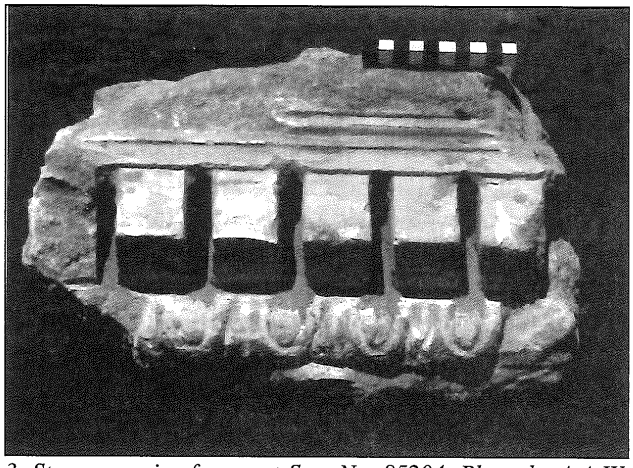
Judging from the architectural fragment data collected on site, the molded cornice/wall decoration pieces with the egg and tongue motif were found in eleven different varieties differentiated primarily by color scheme and precise decorative image (**Table 1**). All pieces recovered appear to have been carved *in situ* due to the irregularity of their molded elements and the rough surface of their reverse faces (which would have been chinked directly into the uneven surface of the south wall). Taking into account both color and visible motif, three similar styles can be gleaned from the ten unique forms of egg and tongue. Group numbers 2 and 8 possess the common pattern of a yellow egg and tongue band directly above a painted blue band. Group numbers 4, 5, 6, and 11 all display a row of uncolored dentils directly on top of a row of colorless egg and tongue. Numbers 5 (**Fig. 3**) and 6 (**Fig. 4**) have the additional commonality of a blue band above the row of dentils. Lastly, group numbers 2 and 7 both have a molded, uncolored vine pattern surmounting a thin, colorless band that is directly above a row of egg and tongue. The noted similarities of both the motifs and colors displayed on the fragments give some insight into what the full appearance of the cornice band (or bands) may have looked like. However, as the pieces of stucco recovered from the South Corridor have been exposed to over two thousand years of degradation and decay, it is unreasonable to assume that they accurately display their original coloration today. Thus, a second means of comparison, looking only at the molded schemata, must be used.

By this method many more commonalities are readily visible. First, group numbers 1, 6, 8, and 10 all display an egg and tongue pattern above a single thin band. Group numbers 4, 5, 6, and 11 all show three thin bands above a row of dentils above a single thin band above a row of egg and tongue. The above two sets of similarities can be combined; the smaller decorative pattern evident in the

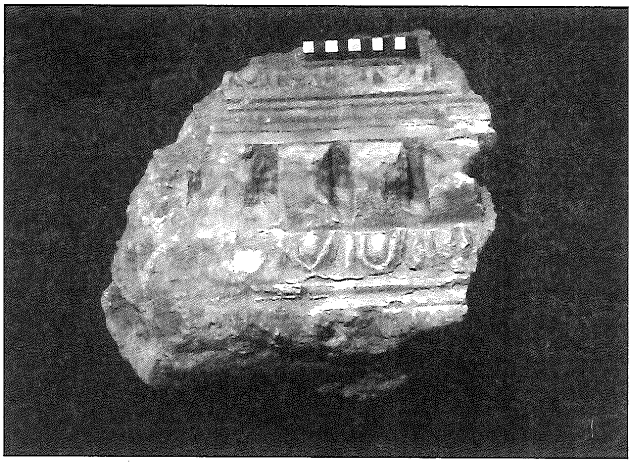
2. Hammond dates this remodeling at the Temple of the Winged Lions to sometime early in the reign of Malichus II from AD 40-70, well past the beginning of informal Roman occupation of the area in 64 BC. Hammond suggests that the motivation behind the plaster redecoration is to "remove the more strictly Hellenistic ritualistic decoration and replace it with simple painted panels, indicating cultic or socio-political expressions" which indicates the prominent influence of a new people, perhaps the Romans, in the area.
3. Interestingly, the diagonal slant of the design closely resembles the diagonal Nabataean tooling commonly cut into masonry surfaces as a plaster key.

Table 1: Groupings of similarly styled cornice fragments.

GROUP NO.	SEQ.#	QTY.	FEATURE OR FUNCTION	PAINT COLOR	DECORATIVE MOTIF	LENGTH RANGE: (IN METERS)	WIDTH RANGE: (IN METERS)	THICKNESS RANGE: (IN METERS)	COMMENTS
1	85130 85146	2	WD	BLUE	EGG AND TONGUE	0.12-0.17	0.10-0.13	0.07-0.08	EGG AND TONGUE ABOVE A THIN BLUE BAND
2	85155	1	CORNICE	BLACK, BLUE, YELLOW	RIBBED, EGG AND TONGUE, VEGETAL ELEMENTS	0.37	0.20	0.12	MOLDED VEGETAL ELEMENTS ABOVE A THIN BLUE BAND OVER A BAND OF YELLOW EGG AND TONGUE ATOP A BLUE DOUBLE RAISED BAND ATIOP A BLACK PANEL
3	85188	1	CORNICE	BLUE, WHITE, RAINBOW	RIBBED, EGG AND TONGUE, VINE	0.18	0.20	0.08	MOLDED VINE (?) ELEMENTS ABOVE A RAISED BLUE BAND OVER EGG AND TONGUE ABOVE A RAINBOW PANEL
4	85194	1	CORNICE	NONE	RIBBED, DENTILS, EGG AND TONGUE	0.28	0.23	0.12	RAISED BANDS ATOP DENTILS ATOP EGG AND TONGUE
5	85204	1	CORNICE	RED, BLUE	RIBBED, DENTILS, EGG AND TONGUE	0.32	0.21	0.17	WHITE, RED AND BLUE RAISED BANDS ABOVE DENTILS AND EGG AND TONGUE MOTIFS
6	85208 85228 85256 (85297 & 85306)	4	CORNICE	BLUE, WHITE, YELLOW	RIBBED, DENTILS, EGG AND TONGUE	0.33-.55	0.29-0.41	0.18-0.21	SMALL EGG AND TONGUE BAND ABOVE TWO RAISED BANDS ABOVE A RAISED BLUE BAND ABOVE DENTILS ABOVE A YELLOW BAND ABOVE A THICKER EGG AND TONGUE BAND
7	85224	1	CORNICE	NONE	EGG AND TONGUE, VEGETAL ELEMENTS	0.24	0.17	0.13	MOLDED VEGETATIVE ELEMENT OVER TOP RAISED BAND OVER TOP EGG AND TONGUE BAND OVER SHORT CARINATED PANEL
8	85232	1	WD	BLACK, BLUE, YELLOW, WHITE	EGG AND TONGUE	0.11	0.10	0.08	YELLOW EGG AND TONGUE OVER A PINK AND BLUE BAND OVER A WHITE PANEL WITH A BLUE PAINTED ARCH
9	85259	1	CURVED CORNICE	RED, YELLOW	EGG AND TONGUE	0.58	0.16	0.09	MOLDED ARCH IN TWO PIECES WITH EGG AND TONGUE RUNNING ALONG TOP.
10	85323	1	CORNICE	RED, PURPLE, BLUE	EGG AND TONGUE, DENTILS	0.26	0.33	0.14	PURPLE/BLACK PANEL ABOVE EGG AND TONGUE ABOVE RED AND BLUE BANDS OVER DENTILS OVER A THIN BLUE BAND
11	85324	1	CORNICE	RED, YELLOW, PURPLE	EGG AND TONGUE, DENTILS	0.30	0.30	0.15	THREE MOLDED BANDS OVER DENTILS ABOVE AN EGG AND TONGUE



3. Stucco cornice fragment Seq. No. 85204. Photo by A.A.W. Joukowsky.



4. Stucco cornice fragment Seq. No. 85208. Photo by A.A.W. Joukowsky.

first set of examples bring present within the larger program of the second set. Therefore, group numbers 1, 4, 5, 6, 8, 10, and 11 can be identified collectively as parts of one cornice with the following decorative scheme from top to bottom: one thin band of painted yellow egg and tongue above three alternating white, red and blue thin bands in the *cyma reversa* style atop large, square dentils atop a medium-sized band of egg and tongue over a double undecorated *cyma reversa*.

The matter of group numbers 2 and 7 is more difficult. Judging by their appearances, neither of these fragments fit comfortably with the decorative program noted earlier. Displaying a unique vegetal design (above which there is no evidence for a second motif), a thin egg and tongue design, and a tapering at the base into a flat panel below the egg and tongue, these two fragments appear to comprise an entirely separate stylistic arrangement from that illustrated above. Group number 3, also displaying the vegetal design and the egg and tongue motif, appears to fit with this group, with the lower panel extending out to a carinated edge or drip cornice. Due to noted similarities, it seems likely that group numbers 2 and 7 also had this carinated edge/drip cornice in antiquity, but it has since broken off leaving only the flat upper portion.

The curved group number 9 fragment presents a similar difficulty of placement as it also does not visibly connect stylistically with any of the other cornice fragments. The unusual curvature of this piece can be interpreted in a variety of ways. The piece may be part of a semi-circular arched "Syrian Style" architrave or entablature similar to that drawn by Clarence S. Fisher in his plan of the Period III[4] eastern exterior façade of the Nabataean Temple at Khirbat at-Tannūr (خربة التنور) (Glueck 1965: 143 plan B). In his plan, Fisher places overtop the temple entrance an arched stone cornice attached at either end to a band cornice that extends along the front of the building. While Fisher's drawing is of an exterior façade and not of an internal room, the position of the South Corridor as a direct point of access into the Great Temple's Southern Passageway shrine gives it the character of a formal entryway that might require such a façade to mark the passage between two distinct sacred areas of the temple. Parallels for semi-circular arched entablatures are visible in southern Italy in the freestanding archways depicted in the Second Style wall paintings in cubiculum 16 at the Villa of the Mysteries, and in triclinium 14 at the Villa of Poppaea at Oplontis. Others include the banded arch over the façade of Tomb 154 and the carved arch seen on Tomb E17 at Madā'in Ṣāliḥ decorated with a large egg and tongue pattern mirroring the decorative motif seen on the fragment from the Petra Great Temple (McKenzie 1990: pl. 9, 156).

A second theory for the placement of the curved cornice is founded in the notion that the piece is not part of an arched, but rather of a segmental, pediment. "Segmental" pediments are defined by McKenzie (1990: 88) as those pediments that "involve a curve which is a segment of a circle or a section of an ellipse, rather than a semi circle". As noted by McKenzie (1990: 88-89), contemporary examples of segmental pediments exist both in standing architecture and in paintings dating to the Ptolemaic period. Examples from this period include carved segmental pediments from the western cemeteries in Alexandria including Hypogea 2 and 5 at Anfoushy. Located along trade routes stretching from southern Arabia to Syria, Petra

4. Glueck defines Period III at Khirbat at-Tannūr to the first quarter of the second century AD, just prior to the Roman annexation of Petra in AD 106.

would have had ample access to Ptolemaic artistic styles and traditions. Therefore, the use of segmental pediments in Nabataean architecture is not at all unusual.

In Petra, rock-cut examples of segmental pediments with plain banded decoration are visible over the second doorway from the north of the Corinthian Tomb, atop the flanking niches on the lower orders at both the Bāb as-Sīq Triclinium and the Palace Tomb, crowning the Renaissance Tomb, and over top Façade 849 at Bayḍā (بيضا). Examples of segmental entablatures and pediments with carved dentils include those seen on the second order of the rock-cut façade of the Tomb of Sextius Florentinus (AD 129) and the plaster façade rendered on the exterior face of the south wall of the Qaṣr al-Bint, the closest in proximity of all the aforementioned monuments to the Petra Great Temple itself.

Segmental pediments are also seen outside of Petra proper in the rock-cut tombs of Madā'in Ṣāliḥ. Tombs B19 (dated to AD 1), C14 (dated to AD 60), and A6 all possess arched stone pediments supported at either end by carved pilasters flanking the tomb's entry. In examples B19, C14, and A6, the segmental pediments are carved as plain bands with no ornamentation. The presence of such curved decorations above entryways during the Nabataean period corroborates the possibility that the curved cornice fragment from the Petra Great Temple was placed in a similar orientation, either as part of a semi-circular cornice or segmental pediment, over the central doorway of the South Corridor.

Returning now to the earlier discussion of the running egg and tongue cornice fragments, I will here propose three scenarios for the position of this cornice in the South Corridor. One possibility is that one large cornice extended, uninterrupted, along the uppermost portion of the northern face of the south wall of the South Corridor. While uniting the two distinct styles noted above is difficult, it is not impossible because decoration, if any, above the thin egg and tongue band noted on the examples from group numbers 1, 4, 5, 6, 8, 10, and 11 is not detectable due to the broken edges of the fragments. As such, it is possible to link this group with group numbers 2, 3, and 7 by positioning the drip cornice from the lower part of the second group above the egg and dart of the upper part of the first group as is characteristic of Ionic entablature. The combined result would be an immense triple egg and tongue cornice punctuated by other decorative motifs including the vines on the uppermost band of the cornice and the modillion decoration on the drip cornice.

Found in incomplete form on multiple fragments, small five-petaled yellow flower modillions hung from the drip cornice. Few examples of flower modillions in Petra have been documented. Generally, modillions are uncommon but are seen alternating with rosettes on an unprovenanced cornice fragment (McKenzie 1990: pl. 39) and are speculated to have existed on the Qaṣr al-Bint. Serving as comparative models, McKenzie (1990: 93, pl. 215c, d) discusses the presence of molded flowers between the modillions on two unpublished cornice fragments from the Greco-Roman Museum in Alexandria. Glueck (1965: pl. 172) observes two examples of inter-modillion floral decoration on cornice fragments from the Khirbat at-Tannūr Temple.

Complete with inter-modillion flowers, a massive cornice style such as described above would have worked structurally in the South Corridor of the Petra Great Temple. As noted in **Table 1**, many of the stucco cornice fragments recovered were in excess of 0.15m in thickness. This immense thickness would have been necessary in the South Corridor both to securely anchor the large cornice pieces into the rough surface of the wall and to ensure visibility of the pieces from the floor by the viewer. Clarity was notably an issue of concern for the craftsman carving the Petra Great Temple cornice. In the fragments found, the different decorative elements are boldly rendered and brightly painted enabling the cornice to be viewed from a considerable distance.

Despite its architectural feasibility, I could find no parallels for a triple egg and tongue cornice in Nabataean architecture. The use of large, elaborate double egg and tongue cornices, however, is common. Influenced by Hellenistic and Roman models, the double egg and tongue cornice style is visible along the top of the central doorway of the vestibule of al-Khaznah (الخزنة). On al-Khaznah, the egg and tongue bands are separated by a painted band of dentils, drawn in the long, narrow style that is traditionally Hellenistic. In contrast, the dentils in the South Corridor fragments are carved and more square, suggesting either a local adaptation of the Hellenistic motif, or the influence of Roman design.

A second example, also demonstrating the thin Hellenistic style, is the pillar capital from the north arch of the Temenos Gate. This example, with fully carved dentils, comes closer to the style of the South Corridor pieces. The most notable difference between the al-Khaznah and Temenos Gate examples and the South Corridor fragments is the apparent compressed nature of the lower egg and tongue bands and the dentils in the South Corridor examples. In these, the three bands appear in close proximity to one another, while on the al-Khaznah and

Temenos Gate examples they are placed further apart. It seems likely that this arrangement occurs due to the considerably more confined space within which the artists of the South Corridor were working — particularly in comparison to the al-Khaznah or Temenos Gate structures, which were two of Petra's larger monuments.

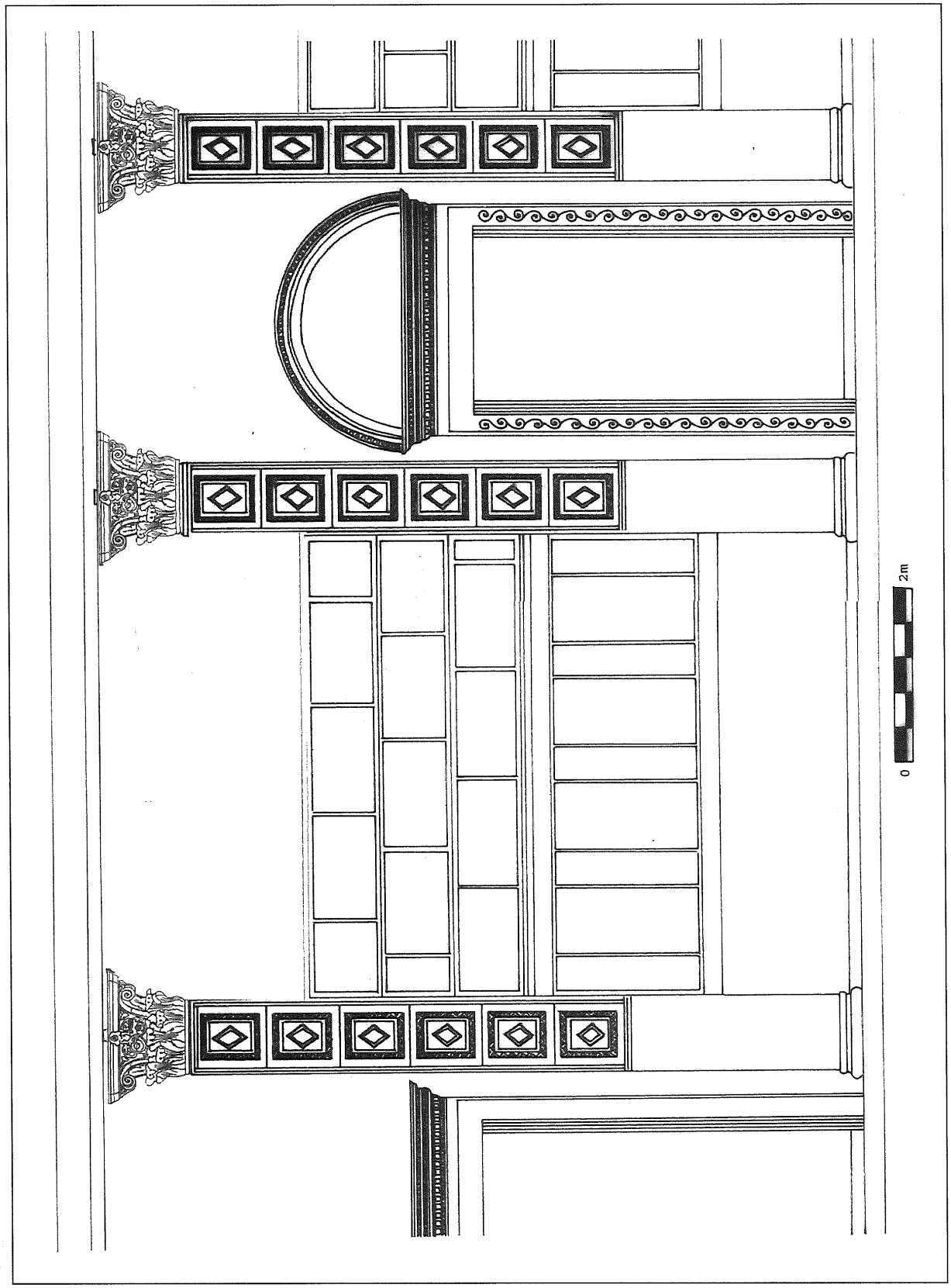
Ignoring the apparent lack of precedent for a triple egg and tongue cornice, a second potential arrangement for the South Corridor cornice decoration is one large cornice band split into two sections along the south wall, one between the east wall and the center door and one between the center door and the west wall. Extending overtop the pilaster decorations the two bands would have approached the center doorway from either side of the corridor and terminated in a semi-circular arch over the central doorway similar to that seen in the proposed Period III exterior façade of the Khirbat at-Tannūr Temple. Stylistically, there is little comparison for this specific cornice arrangement used in the *interior* decoration of a building. However, it is my assertion that the interior stucco decoration, specifically the cornice pieces, in the South Corridor of the Petra Great Temple was intentionally modeled to mimic the appearance of an exterior façade. The combination of the projected immense height of the doors in the rear wall of the temple with the unusually large and complex decorative program strongly reinforces the idea of the South Corridor as an internal threshold. As mentioned earlier, situated in the rear of the Petra Great Temple, the South Corridor provides the most direct means of access between the temple proper and the rear shrine in the Southern Passageway. In this position, the south wall of the South Corridor serves as an exterior façade for the shrine area, perhaps justifying its closer stylistic resemblance to monumental exterior Nabataean tomb and palace architecture than to more-subtle interior décor.

As additional support for the theory of the South Corridor as a religious threshold, it is important to note that the closest overall stylistic parallel to the decoration in the South Corridor is the niche in Room 468 described earlier. Presenting such a striking parallel, it is possible to argue that the purpose of the decorative "façade" in the South Corridor is parallel to that of the façade of the niche — to designate the passage into sacred space.

Drawing its inspiration again from the al-Khaznah and Temenos Gate examples cited above, a third possible (and in my opinion most likely) placement for the cornice band in the South Corridor is over the doorways. Judging from the frequent placement of cornices over entryways in Petra such as the elaborately carved examples on al-Khaznah and the Temenos Gate, as well as those cut beneath the arched and segmented entablatures at Madā'in Ṣāliḥ Tomb E17, and the Renaissance Tomb, the presence of cornices over the doorways in the Petra Great Temple South Corridor would not be unprecedented.[5]

The placement of the cornices over the doorways also works particularly well in combination with the arched entablature discussed under the second reconstruction. While imagining a curved entablature connecting either end of a running cornice is not difficult with the Khirbat at-Tannūr reconstruction in mind, it is difficult to orient this program around the existing pilasters that flank the central (and likely the eastern and western) doorway. If the curved-entablature/split-cornice model existed it would have to have been placed above the capitals of the pilasters to prevent disruption of the pilaster design. In his reconstruction of the stucco decoration in the Petra Great Temple West Corridor, Bellwald precludes the possibility for such a design as he shows the pilasters rising to nearly the full height of the corridor wall, leaving little room for a surmounting cornice and fully-arching entablature. However, based on the preponderance of examples of Nabataean tombs exhibiting carved pilasters in conjunction with cornice-topped doorways surmounted by curved entablatures such as those seen at Madā'in Ṣāliḥ Tomb E17, the interior niches on ad-Dayr (الـديـر), the outer niche of Façade 66, and particularly on the Tomb of Sextius Florentinus and the Renaissance Tomb, I would argue for a similar arrangement in the South Corridor: taking form in one of three ways. *Scenario one*: The south wall of the temple is much higher than projected in Bellwald's construction, possibly to support the rear of the theatron structure. This additional height would easily allow for a surmounting arch resting on the tops of the segmented pilasters, possibly attached to a running cornice band as described above. *Scenario two*: The projected height of the south wall is unchanged, but the six raised cassettes carved into the outer pilasters begin at the base of the pilasters rather than one third of the way up the shaft as they do on Bellwald's model. By starting the cassettes

5. The possibility for a plaster cornice overtop the doorways in the South Corridor is also supported by the archaeological data. The estimated combined length of the plaster cornice fragments recorded as architectural fragments is 3.23m, a number very close to the combined width of the east and central doorways (the west doorway is beyond the boundary of Trench 85) which is 3.76m.

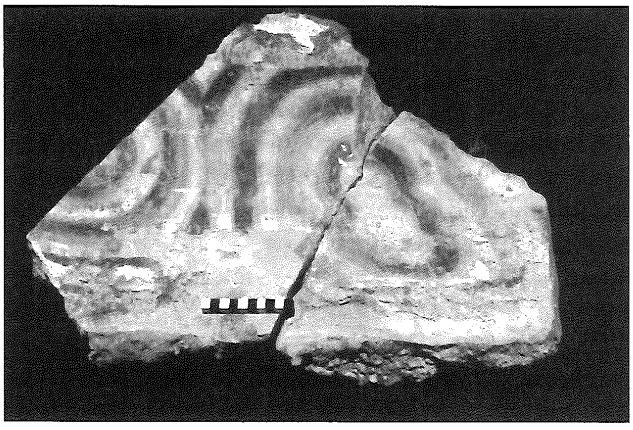


5. Possible reconstruction for the South Corridor decorative program including "First Pompeiian Style" wall decoration. Drawn and drafted by Emily Catherine Egan.

lower down, the height of the pilasters would diminish by one third, again allowing room above for an arching entablature. *Scenario three*: As there is no precedent for pilasters to begin their carved decoration at floor level, and it is unlikely that the rear wall of the temple is considerably higher than projected, it is likely that instead of extending over the tops of the segmented pilasters, the arched entablature may have rested on top of a cornice overtop the doorway, which would overlie the inner, vine-decorated pilasters (**Fig. 5**).

Painted Marble Fragments

Comprising a significant portion of the larger plaster fragments recovered from the South Corridor at the Petra Great Temple, pieces of wall decoration painted to resemble panels of marble are unusual in Nabataean art. Marbling, a typical motif for First Style Pompeiian wall decoration, is commonly depicted in domestic Italian, palatial Palestinian, and Ptolemaic tomb wall painting. From the corpus recovered, the most recognizable fragments of marbled plaster are Sequence Nos. 85120 and 85121 (**Fig. 6**). Part of the same piece, these fragments display a cloud-like veining pattern consisting of concentric purple curls, edged in blue, on a white background which is most likely an emulation of the circular bands in alabaster. Noted by Roger Ling (1991: 12) in his book, *Roman Painting,* wall plaster painted to imitate stonework was commonly used as a decorative device in both Hellenistic and Roman times. Referred to generally as "masonry style" and known more specifically in Italy as "First Pompeiian Style", simulated ashlar masonry originated in Greece in the fourth century BC and had spread considerably around the Mediterranean by the second century BC. Well-preserved examples of the masonry style are visible in the west at Pompeii and Herculaneum and further east at Pergamum, Sardis, Delos, Thera and Alexandria. As noted by Ling (ibid.) "the essential characteristic of this [masonry] style is that it employs stucco as a medium for imitating ashlar blockwork; these are modeled in relief, the margins of the blocks having been recessed in the manner of undressed, or 'drafted' masonry; and colors are applied to suggest the use of different types of stone".



6. Marbled stucco fragment Seq. Nos. 85120 and 85121. Photo by A.A.W. Joukowsky.

In the Mediterranean, the creation of false masonry falls into two stylistic categories: that used in the west (i.e., at Italian sites including Pompeii and Herculaneum) and that used in the east (i.e., Greek sites including the islands and sites in Asia Minor). The eastern style is dated earlier than the western style and follows a rigid visual scheme. Bearing close resemblance to exterior masonry, from base to top the eastern style, as appears at the House of the Comedians, Room Q on Delos, is as follows: a narrow plinth below large square or vertical rectangular orthostata under a thin stringcourse and/or frieze, below a series of isodomic courses. In addition to its structural realism, the eastern model also adheres closely to natural coloration patterns — tinting each course a single color in emulation of a known stone. Examples of such homogeneous marbling occur on the lower order orthostata along the walls of the Tomb at Sidi Gaber and Anfoushy Hypogeum 2 in Alexandria and on the walls of the lower terrace building of Herod's North Palace at Masada. Marbling as a decorative motif occurs frequently within the model, but is confined to the stringcourse and less commonly to the orthostata.

Presenting a noticeably more artistic approach, the western, Italian masonry tradition, known as "First Pompeiian Style", followed a distinctly different visual program from the original Greek plan. Judging by the example from Insula VI Oecus N at Pompeii, from base to top the "First Pompeiian Style" appears as follows: a large, tall socle below a thin string course below a series of narrow vertical orthostata and finally a thin frieze below a series of isodomic courses beneath the upper frieze. In many examples, a molded cornice appears above both the lower and upper friezes. This style, while adhering loosely to an architectural model, incorporates many unique elements that make this design, more so than the 'masonry style', suitable for interior decoration. First, the color scheme of "First Pompeiian Style" is erratic. Unlike the monochromatic courses characteristic of the 'masonry style', the individual panels of the all the courses in the "First Pompeiian Style" are painted different colors. Reds, yellows and blacks are mingled together with marbled panels to create a more irregular, less regimented artistic pattern.

Unfortunately, due to the paucity of sizable flat

painted stucco fragments recovered from the South Corridor of the Petra Great Temple, it is difficult to tell whether the marbled/alabaster panel fragments listed above belong to a 'masonry' or "First Pompeiian" style wall decoration, or if they existed in an entirely unique decorative context. Considering the sheer degree of western versus eastern influence in other decorative elements recovered from the South Corridor, there is no notable preponderance of either style as the Nabataeans tended to glean artistic styles from many different cultural sources. As noted above, the segmented pilaster design is common both in painted Alexandrian tomb architecture as well as in Italian "Second Pompeiian Style" wall paintings. Additionally, the numerous cornice fragments pulled from the fill in the South Corridor would seem to argue for the Pompeiian model in which cornices were commonly used. However, the cornice fragments recovered are much larger in size than the thin Ionic style typical of the Pompeiian style and probably had a more prominent architectural role.

Due to the recognized lack of a definable east or west style in other elements, the only clear evidence for the position of the marbled fragment is the archaeological context in which it was found. Located about four meters up from the floor in fill, the marbled fragment, assumed to have fallen from a place higher on the wall would have, if it adhered to an established decorative scheme, been located approximately at the level of the isodomic courses in either the 'masonry' or "First Pompeiian" style. Relying on Ling's model, the rigidity of the 'masonry style' precludes the presence of a marbled panel in the upper isodomic courses. Therefore, by process of elimination, it appears plausible that the fragment fell from the irregularly painted upper courses of a "First Pompeiian Style" wall design. However, it is impossible to conclusively argue for the existence of a known decorative style in the South Corridor due to the extreme lack of archaeological evidence. As such, it is equally possible that the masonry style decoration in the South Corridor is unique — deriving its style both from Greek and Roman models, but existing as a distinct cultural amalgam not falling securely within either style.

Molded Lion Body Parts

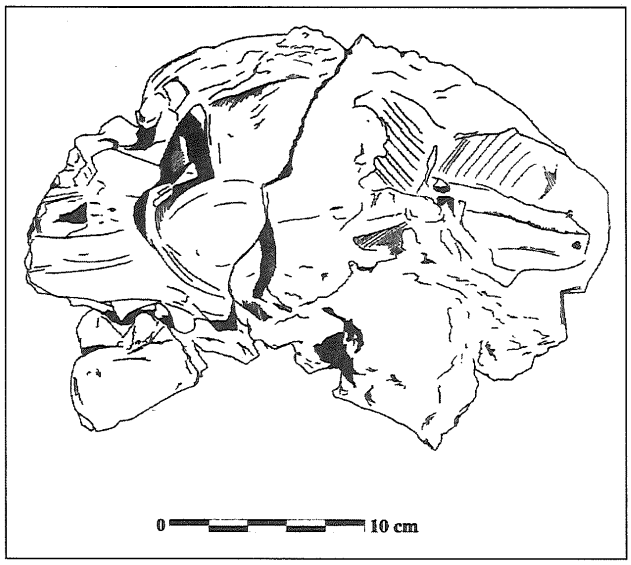
Perhaps the most unique and intriguing elements recovered from the excavations in the Petra Great Temple South Corridor are the molded plaster lion body parts. Specifically, seven parts from what appear to be two sculpted lion protomes include two heads, one facing east and one facing west, each with a detached mandible, two fragments of mane or fur, and a small detailed paw carved almost fully in the round.

Judging from the smooth surface and cut dowel holes on the reverse surfaces of the lion heads it is likely that the lion protomes were affixed separately onto a thick layer of foundation plaster on the northern face of the south wall rather than being carved *in situ*. Evidence for preparatory carving is unique to the lion parts and is not apparent in any of the stucco elements from the South Corridor discussed above. The lack of mold lines on their surface also suggests that the lion parts were not made from molds but were carved by hand.

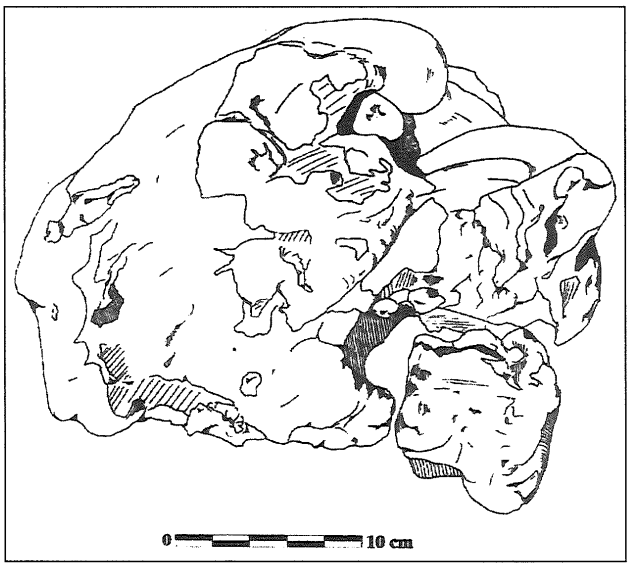
Looking first at the artistic rendering of the lions, it is interesting to note the overall character of their appearances. While portrayed with open mouths and bared teeth and tongues, the demeanor of the two lions appears to be complacent. Lacking the ferocity of snarling, narrow-eyed Assyrian lions, the lions of the South Corridor appear closer in style to Parthian examples. With rounded jaws and fleshy noses, particularly evident on westward facing lion, the South Corridor lions closely resemble the lions affixed to the exterior cornices from Qaṣr ar-Rabbah (قصر الربة).

While presenting a similar overall countenance, it is important to note that each of the two lions has a distinctive personality. The west (eastward facing) lion (**Fig. 7**), Sequence No. 85154, appears to be the more pacific of the two and likely, as suggested by Dakillalah Qublan, represents the female of the pair. Carved in profile and broken into two pieces, the west lion retains remnants of blue paint on its eye, flecks of red on its bared tongue, and has two deep cuts at the back and base of its head where additional pieces of plaster, perhaps parts of a neck or mane, may have been attached. Reed impressions also remain in the upper cut, suggesting the use of vegetation to reinforce the plaster application to the surface of the head. The eye of this lion is low set beneath a thin, arching brow and above a prominent, rounded cheek.

The east (westward facing) lion (**Fig. 8**), Sequence No. 85283, has a noticeably larger face and appears to be the male of the pair. The forehead of this lion arches upward and the eye is deep set beneath a thick, rounded brow. While the westward lion is rendered in direct profile, this lion is carved in a near three quarters view — its head turned slightly outward toward the viewer. The jaw on this lion, again like the west example, is detached from the head and no paint is visible on the tongue. The nose, like the forehead, arches upward as does the flesh of the mouth, curling around the nose in a half snarl. No evidence of reed depressions are visible on this lion head, though the plaster away from



7. Line drawing of west stucco lion head. Drawn and drafted by Emily Catherine Egan.



8. Line drawing of east stucco lion head. Drawn by Christian F. Cloke and drafted by Emily Catherine Egan.

the face is worn down suggesting perhaps the overlay of a mane or some other decorative element in antiquity.

The lion heads were likely positioned on either side of the center doorway in the South Corridor,[6] as speculated by foreman Dakillalah Qublan (**Fig. 9**). This was reinforced archaeologically due to the find spots of these pieces. This central placement, flanking a major entry and exit of the temple complex, likely indicates that the lion protomes served a purpose beyond pure decoration.

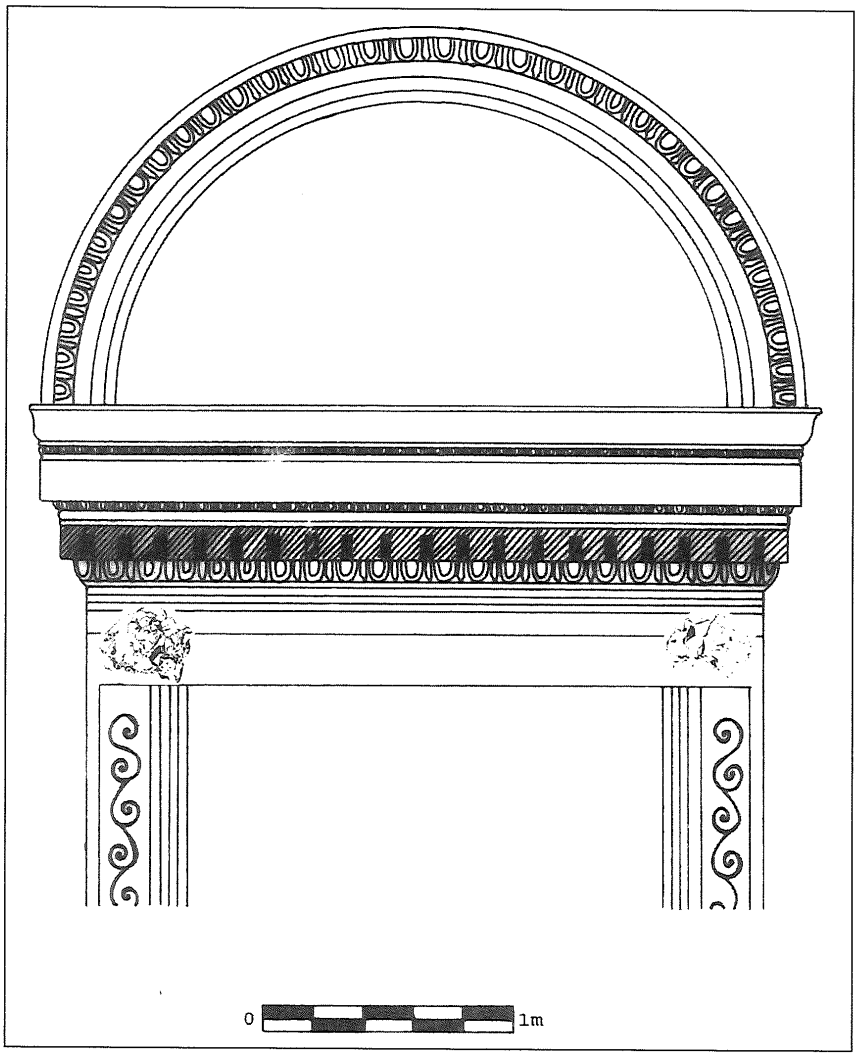
As suggested by Persian and Hittite examples of lions guarding major gateways, the dual lions in the South Corridor may be apotropaic in function. Flanking the doorway, the lion heads, with open mouths and bared teeth, maybe serve as a visual defense for the temple, warding off evil and promoting a sense of power and majesty complementing that created by the elephant heads carved onto the capitals of the triple colonnade in the temple's Lower Temenos. Nearby examples of lions poised as guardians are seen predominantly in tomb architecture and include the carved striding lions flanking the doorway to the Lion Triclinium in Petra and those sitting atop the entablature at Tomb B17 at Madā'in Ṣāliḥ. Carved lion heads are also seen in the forms of gargoyles and fountain fixtures rendered in high relief at Khirbat at-Tannūr and Qaṣr ar-Rabbah — each serving an explicit apotropaic function (Glueck 1965: 286).

A second possibility for the role of the lions is that they represent the consorts[7] of the Syrian goddess of vegetation, Atargatis. Atargatis, along with Dushares, was one of the primary gods of the Nabataean pantheon and was commonly accompanied by two lions, resting or seated alongside each of her feet, in cultic iconography. This possibility becomes more probable based on the known prominence of the deity in the Petra area, as well as the striking physical similarities noted between the South Corridor lions and examples of lions carved on an Atargatis stele from Khirbat at-Tannūr. Seated to either side of her throne, the lions, as described by Glueck (1965: 270), each possess a "low sloping forehead, deeply grooved eyes with protruding irises and perforated pupils, rounded cheeks, [and a] flattened nose with flaring nostrils". This description matches almost identically the style of carving visible in the South Corridor (particularly on the western) lions and lends validity to their potential role as consorts of the deity.

The possibility that the South Corridor lions are directly linked with the goddess Atargatis brings to light again the interesting notion of organization of sacred space within the Petra Great Temple complex. As expressed earlier, the exceptionally ornate decoration of the South Corridor may be related to its role as a threshold space marking the boundary between the inner cult area of the temple sanctuary and the outer cult area defined by the numerous small shrines built into walls and cut into the bedrock in the Southern and Eastern Passageways. The apparent presence of this secondary sacred area to the rear and side of the temple provokes explora-

6. Dakhillalah Qublan also speculates that lions flanked all of the exterior doorways in the temple complex, though no evidence of such decoration was found during excavation.

7. Glueck (1965: 286) also alludes to the possibility that lions may stand for the goddess Atargatis herself and not just her consorts. Due to the non-representational character of Nabataean art, animals or amorphous shapes often served as stand-ins for the true forms of the gods of goddesses.



9. Possible reconstruction for central doorway showing lion protomes in situ.

tion of at least two possible scenarios for the choice of decoration in the South Corridor. First, if the rear shrines and the temple proper were contemporary areas of cultic activity (perhaps to Atargatis?), it is likely that elaborate decorative elements such as the molded lions are examples of original Nabataean carving emphasizing the point of passage between these two distinct sacred areas.

A second, perhaps more radical, possibility is that rear and side shrine areas were the true "sacred" areas of the complex, and the temple itself served a civic, rather than religious, function. In this case, the elaborately decorated South Corridor door would do more than mark the transition between two sacred areas, it would mark the passage between a *secular* and a *sacred* area — a passage perhaps much more worthy of decorative distinction.

A third, and less likely, possibility is that the shrines to the rear and side of the temple represent the marginalization of the sacred aspects of the temple to the rear and side of the complex following its redesign under the Romans. In this case, the elaborate doorway decorations of which fragments now remain, are the result of Roman intervention, perhaps with the intent to enhance the entry to the now-sacred rear and side areas via decorative flourishes including the addition of the lions heads and the diamond patterns mentioned earlier.

If not representations of the consorts of Atargatis, a final possibility is that the lions in the South Corridor served as solar symbols — representatives of Nabataean cosmological and astrological beliefs. Present at such Hellenistic sites as Ba'albak and Timnā', the use of the lion as a solar symbol became a hallmark of Hellenistic influence. Closely associated with the Syrian goddess of the spring, Atargatis, the role of lions as markers of the changing of the seasons, namely the vernal equinox, is well represented in Near Eastern art. The depiction of the lion as the harbinger of a new season is perhaps best illustrated on the façade of the eastern staircase of the Apadana at the Persian festival palace at Persepolis. On the Apadana, the lion of spring is shown biting the bull of winter, marking the changing of the seasons through the tri-

umph of the lion over the bull. Interestingly, this same iconography is present in Nabataean mythology in the two main gods of their pantheon, Dushares and Atargatis whose respective consorts are the bull and lion. As such, the prominence of the lion (and the absence of the bull) at the Petra Great Temple may indicate the presence of a solar cult to Atargatis, whose worship would bring the fertility of spring to the land.

Conclusion

Looking at the various decorative elements found both *in situ* and within the fill during the excavation of the South Corridor of the Petra Great Temple, the most striking characteristic common to all pieces is the vast stylistic cultural repertoire from which they are derived. Drawing inspiration from Rome, Pompeii, Herculaneum, and the Villa of Oplontis to the west, from Hellenistic Alexandria to the south, Roman Arabia to the north, the Persian and Parthian empires to the east, as well as numerous local sites, the decoration in the South Corridor represents a unique blend of foreign and local design characteristic of a people whose empire was fueled by trade. As such, possessing both extensive cultural mobility and craftsmen of remarkable skill, the Nabataeans created an artistic canon impossible to fully define. As such, while the above reconstructions are firmly rooted in the stylistic, structural, and technical character of culturally accessible sites, they are in no way definitive, and more likely than not exist as a stylistic amalgam as of yet unfounded in its particular design.

E.C. Egan
Brown University
Box 5933
Providence, RI 02912
USA

Bibliography

Glueck, N.
1965 *Deities and Dolphins*. New York: Farrar, Straus and Giroux.
Guillaud, J. and Guillaud, M.
1990 *Frescoes in the Time of Pompeii*. New York: Clarkson N. Potter Inc.
Hammond, P.C.
1996 *The Temple of the Winged Lions Petra, Jordan 1974-1990*. Petra Publishing.
Joukowsky, M.S.
1999 *Petra Great Temple Volume: I Brown University Excavations 1993-1997*. Petra Exploration Fund, Brown University.
Ling, R.
1991 *Roman Painting*. Cambridge: Cambridge University Press.
McKenzie, J.
1990 *The Architecture of Petra*. Oxford: Oxford University Press.
Yadin, Y.
1988 *Masada: Herod's Fortress and the Zealots' Last Stand*. Jerusalem: Steimatzky Ltd.
Zayadine, F.
1987 Decorative Stucco at Petra and other Hellenistic Sites.pp. 131-142 in *SHAJ* 3. Amman: Department of Antiquities.

EXCAVATIONS AT THE PETRA SMALL TEMPLE, 2000-2001

Sara Karz Reid

Introduction

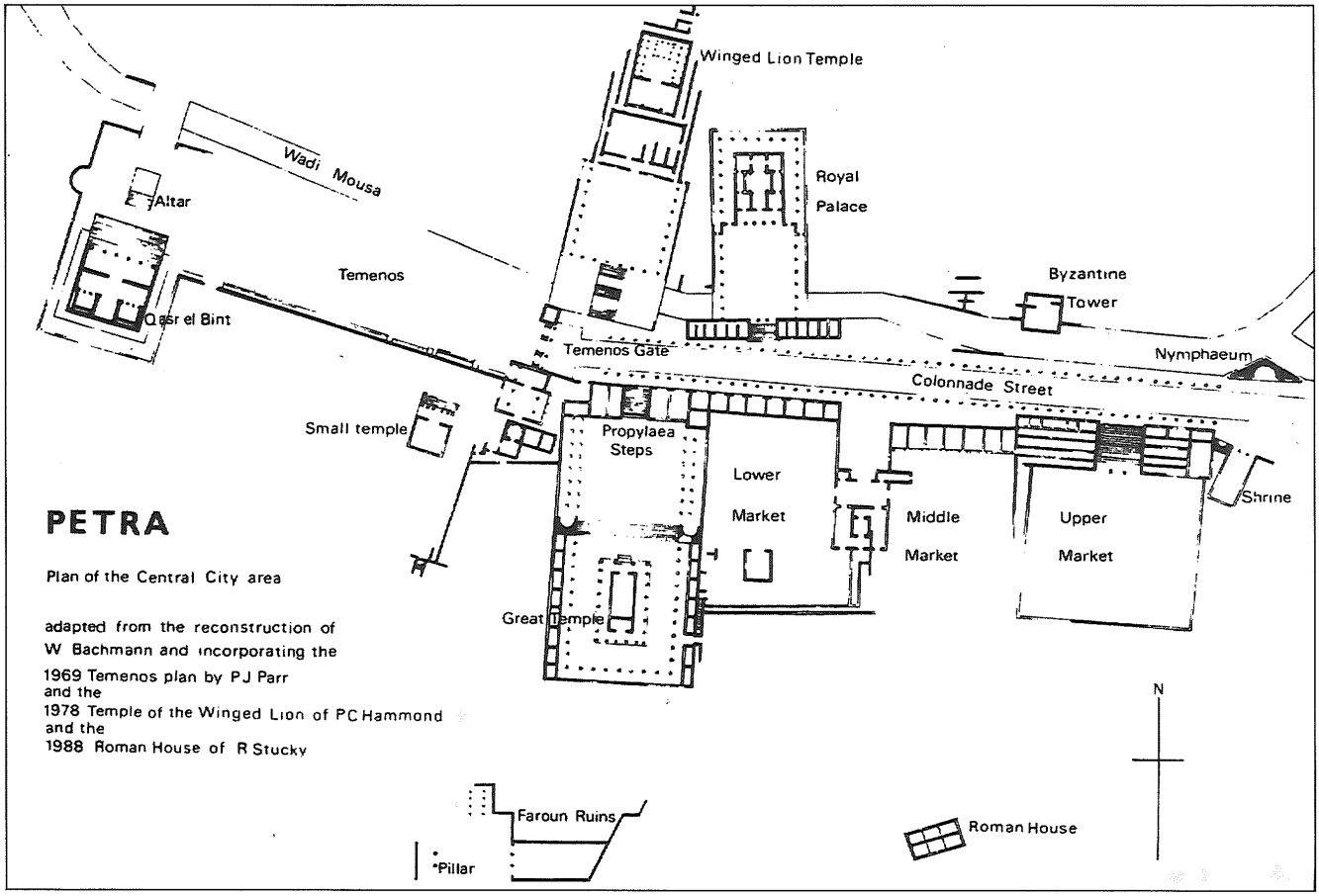
W. Bachmann's map of the central city of Petra is well-recognized today, as are the buildings appearing on it, although several have yet to be explored and excavated. Each structure that has been excavated at Petra has added to our knowledge of the organization of the city as a whole, and how these individual components contributed to Petra's role in trade and commerce in the Near East.

One of the smaller structures on Bachmann's map is labeled the "Small Temple," a name probably first given to it by Wiegand (McKenzie 1990: 108) (**Fig. 1**). Called a temple out of the belief that the building lies within the religious core of the city, this name is used today out of convention. Although the Small Temple, located between Qaṣr al-Bint (قصر البنت) to the west and the Great Temple to the east, has been identified on maps since the early twentieth century, there would be no excavation at the site until the beginning of the next century.

Surveying began in 2000, and the first full season of excavation in 2001, under the auspices of the Jordanian Department of Antiquities and Dr. Martha Sharp Joukowsky of the Department of Anthropology at Brown University. Surveying and excavation of the Small Temple is under the supervision of the author, in order to establish its historical development, function, and relationship to other structures in the center of Petra.

2000-2001 Field Activities

Two seasons of field research have been completed, although the 2000 season was very abbreviated, and 2001 represented the first full season of



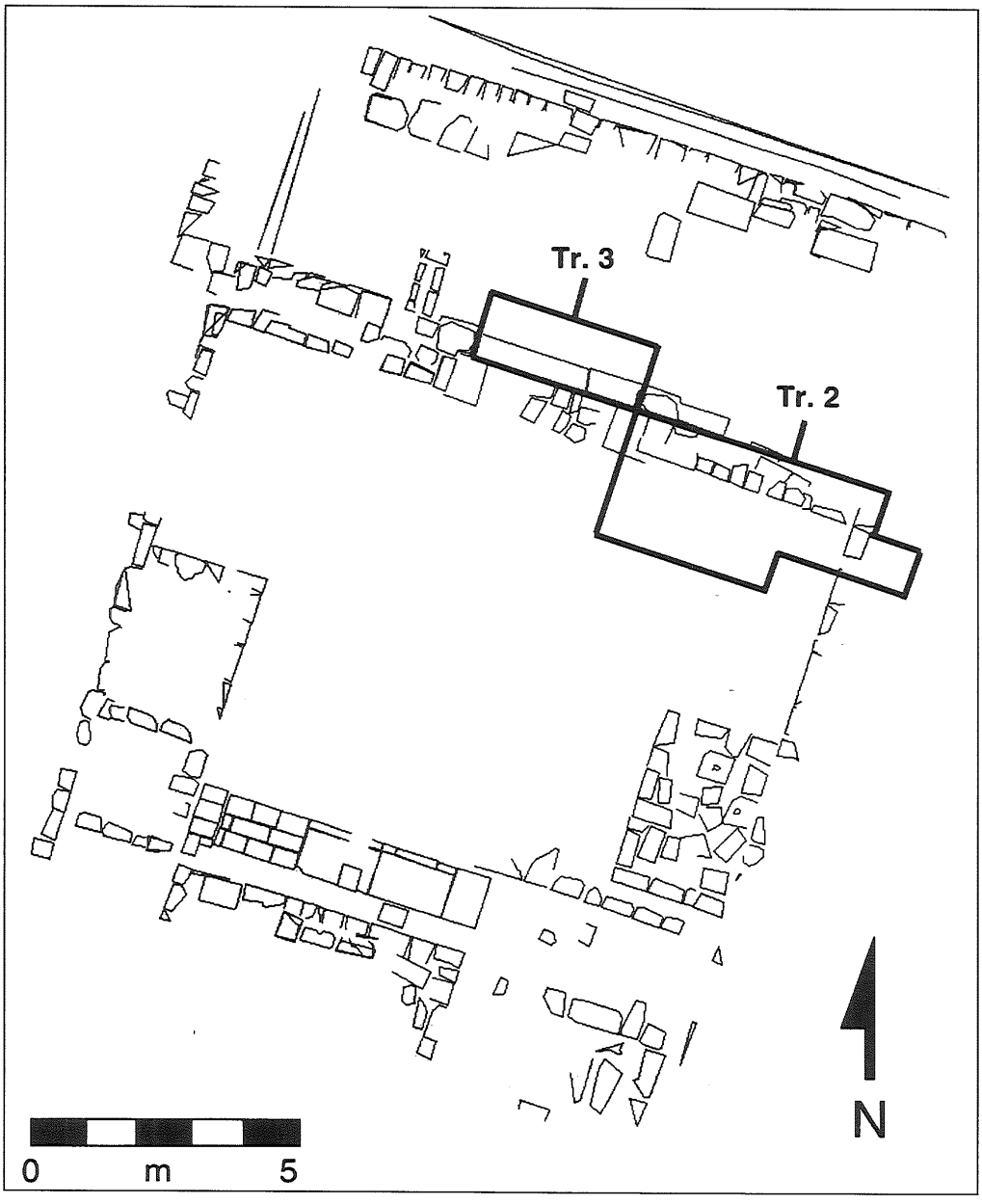
1. Central City Area of Petra, after Bachmann (Browning 1989: 144).

excavation. Surveying for both seasons was conducted with the same Electronic Digital Mapping System (EDM) as used at the Great Temple. The EDM was provided by the Museum Applied Science Center for Archeology (MASCA) of the University of Pennsylvania, and was operated by Brian A. Brown of the University of California at Berkeley.

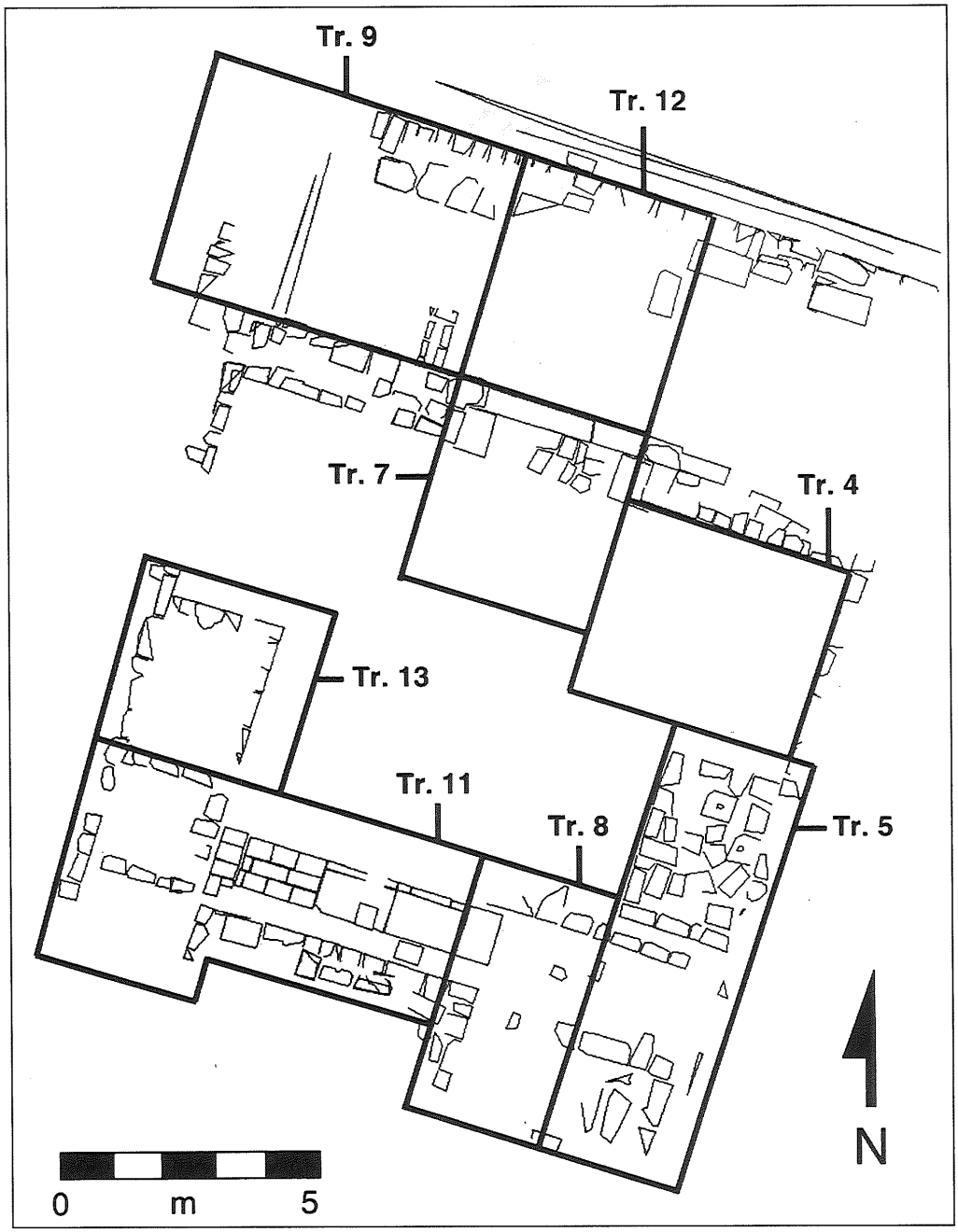
The field recording system used at the Small Temple is also the same system as has been developed by Dr. Martha Sharp Joukowsky for use at the Great Temple. Several modifications have been made that are specific to the recording of the numerous marble inscriptions discovered over the course of excavation.

Activities in 2000 began on August 2 and ended August 10, and focused on surveying visible surface architecture, and the excavation of two test trenches (**Fig. 2**). Test trenches were sunk in order to clarify the dimensions of the north elevation of the building, and also to locate the main entry. The author opened Trench 2 with the assistance Erin E. McCracken in the northwest corner of the building. Steven J. Larson opened Trench 3 within the doorway of the building.

Field activity in the second season, 2001, began on June 10, and ended on August 5. Eight trenches were excavated by the author and Amanda G. Henry over the course of the 2001 season (**Fig. 3**). Goals for 2001 included clarifying the dimensions of the entire building, and following the extent of marble revetment on the interior walls. Six trenches were located within the building, tracing the interior circumference of the main walls. The two re-



2. Petra Small Temple excavated trenches, 2000 (Brian A. Brown).



3. Petra Small Temple Site Plan and excavated trenches, 2001 (Brian A. Brown).

maining trenches were located on the Portico of the Small Temple, further defining the entry in the north.

The Small Temple Complex and Excavation Results

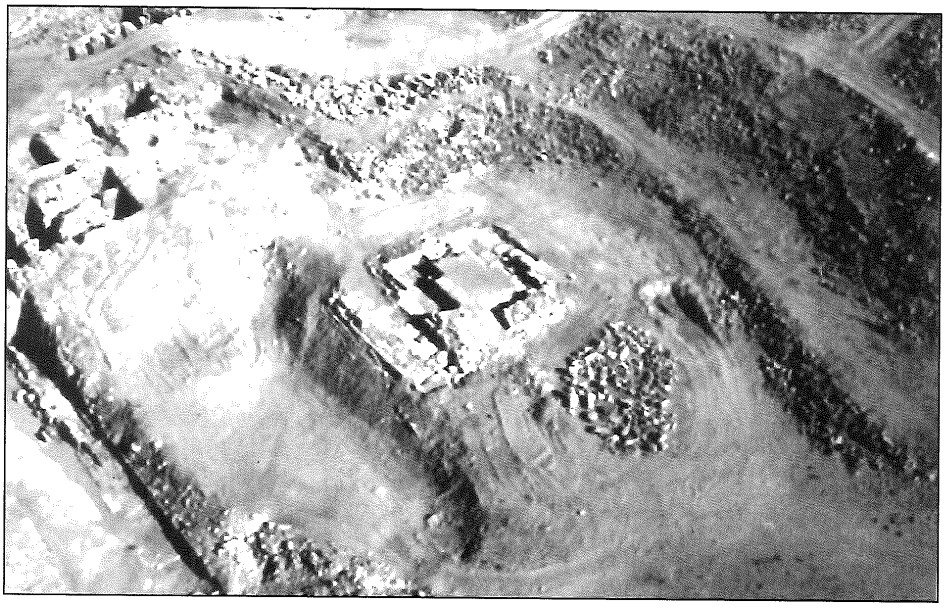
Introduction

The Small Temple is situated on a flat plain, located between the base of al-Kātūta (الكاتوتة) and the Temenos. A slight rise to the south effectively creates the southern border for the precinct. The north is bounded by the Temenos Wall, and the east by an unidentified wall. There is no clear western boundary to the precinct, which currently stretches uninterrupted to Qaṣr al-Bint.

The complex itself incorporates two main levels; the building located on the rise in the south, and slopes down to a Courtyard to the north (**Fig. 4**). The inclined slope between the north side of the building and the south side of the courtyard appears to be a staircase. The approximate overall dimensions of the complex are 75.6m north-south, and 31.1m east-west, although the east-west measurement is necessarily a very rough approximation. These figures give a total area of 2351.16m^2.

Trenches

Excavations so far have focused on the building itself, and the adjacent Portico to the north. The to-



4. Aerial view at the completion of the Small Temple 2001 excavations, looking southeast (Sara Karz Reid; all photographs by the author).

tal area represented by the combined Main Structure and Portico is approximately 255.30m^2. Almost 70% of the Portico and the Main Structure has been excavated. In the Portico, only the portion east of the doorway remains, while in the Main Structure the center and the interior northwest corner have yet to be excavated.

The stratigraphy in the interior of the building generally followed a predictable, set pattern. The top soil locus, or overburden, was typically 0.50 to 1.50m thick, sandy in texture, and contained large, unshaped rocks and the occasional architectural fragment. Below the overburden was a thin layer of roof tile fill, usually less than 0.30m thick, and consisting almost entirely of roof tile fragments, and the occasional marble revetment or inscription fragment. With the removal of the roof tile fill, plain and inscribed marble was found in abundance from this depth to the subfloor level where excavation stopped.

The following section will discuss specific areas in the Small Temple, beginning in the south with the Main Structure, and working north to the Courtyard (**Fig. 5**).

The Small Temple Complex

Main Structure: The Small Temple is a freestanding structure aligned on an axis slightly east of north. The location of the south wall of the building is still in doubt, but current estimates of the building's dimensions are 13.6m north-south, and 13.8m east-west.

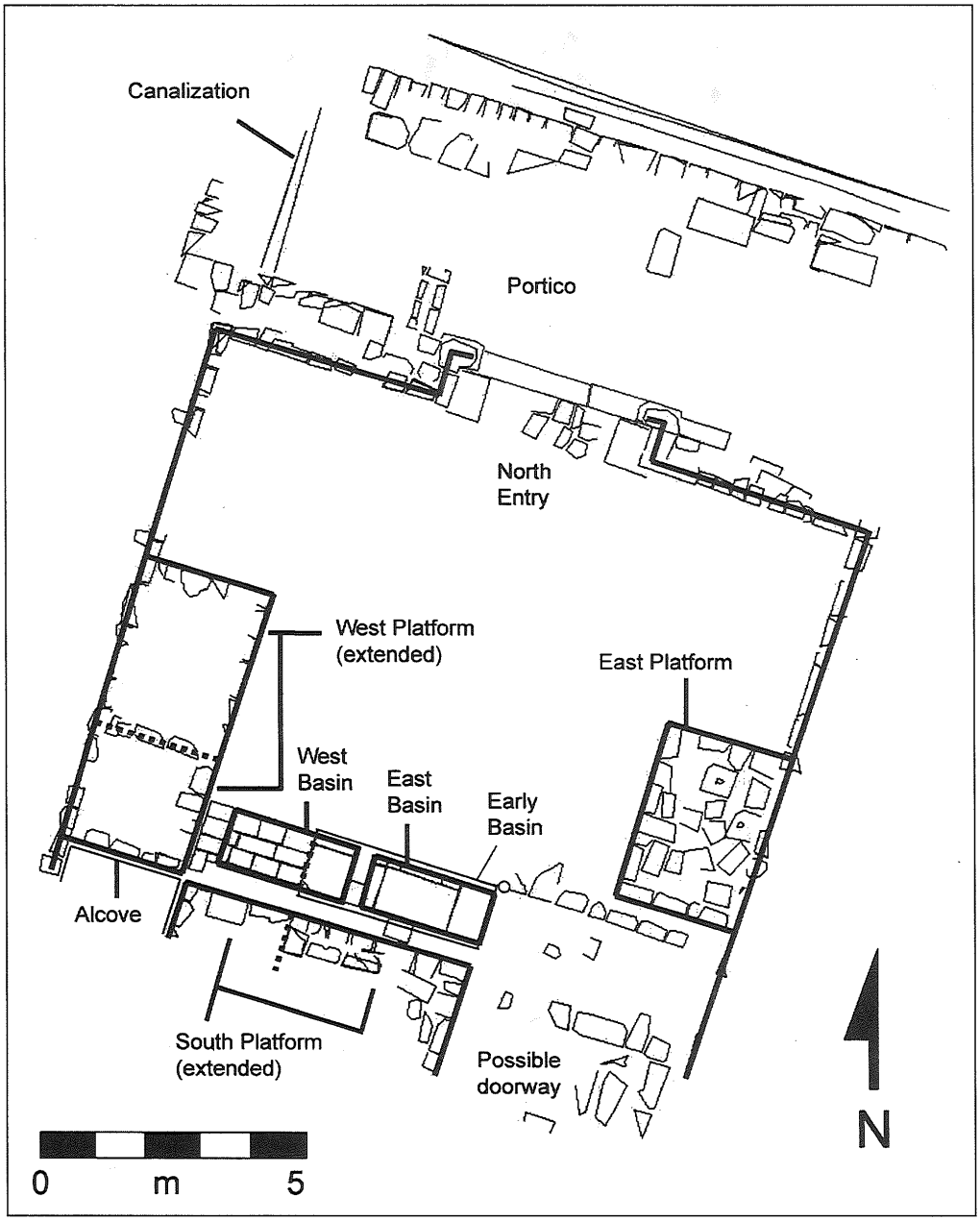
The threshold, centered in the north wall of the structure, measures 3.4m in width, and is constructed of two limestone ashlars, the western ashlar being considerably larger than the eastern.

This threshold is flanked by unadorned, L-shaped doorjambs to the east and west that bond to their adjacent walls, preserved to a maximum height of 1.69m. In the area north of the doorway, four decorated limestone doorjamb capitals were discovered, with an additional three doorjamb fragments later located east of the north wall. These decorated doorjambs fall into two categories; cassettes or floral designs. The floral designs incorporate pomegranate, flower, and vine motifs (**Fig. 6**). While of course there cannot be complete certainty that these were once incorporated in the doorway, their measurements are consistent with the *in situ* doorjambs flanking the threshold.

The doorway on the north side of the building was probably not the only point of entry into the structure. There are also two possible doorways flanking the central axis of the building along the tentatively identified south wall, and a hypothetical doorway in the west wall of the structure.

Seven trenches are located along the inside perimeter of the building, almost completing the entire interior circumference. The three remaining trenches are located outside the north wall of the building, to be discussed in the following section. Although the interior remains unexcavated, it seems likely that the building had an open floorplan because there is no evidence of interior walls bonding or abutting with the outer walls of the structure. The building walls are composed of limestone and sandstone ashlars, very roughly shaped and non-uniform in size.

Along several interior walls, however, these rough ashlars are hidden by marble revetment. Several different colors of marble, including gray and white, and black and white, have been identified *in*



5. Small Temple Components (Brian A. Brown).

situ, affixed to the walls with bronze tacks and a generous layer of plaster approximately 0.10m thick (**Fig. 7**).

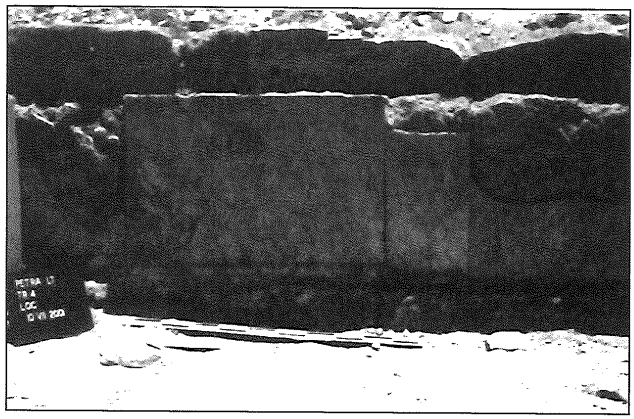
Some of the *in situ* revetment shows a line of red paint, applied as a horizontal line near the bottom of the tile. The purpose of this line is uncertain, but it is possible that it was not meant to be seen, but rather a guide line for the location of additional architectural elements (such as cornices) in the interior of the building. On the other hand, this paint line seems quite bold and wide merely to have been used as a guide line, which leaves the possibility that the red paint did serve a decorative function.

In places where the revetment and plaster are no longer extant, it is possible to see holes drilled into the ashlars to receive the bronze tacks, some of these still *in situ* although the marble itself is no longer present. An upper register of drill holes in the ashlars correspond with holes identified on the backs of many marble cornice fragments, almost two hundred of which were found within the building, but none *in situ*.

A third type of marble discovered in profusion within the Small Temple was fragmentary inscribed marble. Like the marble cornices, none of these were found *in situ*, with two notable exceptions to be discussed later in more depth. Four hundred sixty-nine inscribed fragments were identified, all but 35 found within the walls of the building. These fragments range from small pieces only two or three centimeters long, to much larger



6. Floral doorjamb capital.



7. Marble revetment in situ.

pieces over to forty centimeters across. The identifiable fragments include both Greek and Latin, but no complete inscriptions.

The total number of marble fragments of any type (revetment, cornice, or inscription) is 4669. Four thousand three hundred and sixteen of these fragments, or 92% of the total, were discovered within the building. Almost half of the inscribed fragments are so small that it is impossible to make any determination of language.

Although there are no walls bonding or abutting the main structure, there is a series of platforms; a pair of platforms in the west and east, and another in the south. All three platforms show evidence of having once been clad with marble revetment. The east platform still exhibits revetment *in situ* on its south side. The east platform, the best preserved of the three, consists of two extant courses of ashlars forming its north, south, and west boundaries. The platform appears to have been filled after these three retaining walls were built, and contains a number of identifiable elements in secondary use, including a column capital fragment that originally may have been part of the Great Temple to the east.

The platform in the west exists today as only fill. The retaining walls for this platform have been removed at some point in the past. The west and east sides of the platform in the south line up with the west and east sides of the entryway in the north wall of the building, and is approximately the same width.

Associated with the west and south platforms are sections of wall abutting these platforms, one constructed west of the south platform, and the other south of the west platform. These sections of wall do not quite meet in the southwest corner of the building. The two sections of wall create a small alcove outside the southwest corner, in which 55 fragments of inscribed marble were discovered, along with *in situ* marble revetment on the west side of the wall segment to the west of the south platform.

The last major architectural element in the Small Temple building itself is a pair of marble and limestone basins in the southwest of the building. The two basins are roughly equal in size, and are placed adjacent to each other, although the west basin is slightly larger. The west basin measures 2.57m east-west, while the east basin is only 2.49m. Both basins are 1.09m north-south, and roughly 0.18m deep (although the depth does vary slightly). The volume of the west Basin is thus $0.50m^3$, and the east Basin is $0.49m^3$ (**Fig. 8**). The basins are separated by a ledge constructed of lime-



8. Marble and limestone basins in the south of the building.

stone slabs. The floor of the east basin is entirely gray-and-white veined marble, and the west basin displays a continuation of this gray-and-white veined marble in its eastern portion, however, the remainder of the west basin floor is constructed of limestone slabs. The east edge of the east basin, and the westernmost extent of the marble floor in the west basin line up exactly with the eastern and western extents of the south platform. The two basins exhibit completely different floor patterns; the west basin in limestone and marble, and the east basin in marble alone.

Portico: The excavation of three trenches uncovered much of the Portico of the Small Temple, and cleared the exterior of the north side of the building west of the doorway. This section of exterior wall is not flush all the way across, but includes two small niches. The niches are approximately 1.25m wide, and cut into the wall less than 0.25m. The eastern niche contains a small installation of sandstone ashlars for an unknown purpose, possibly a later reuse of the area.

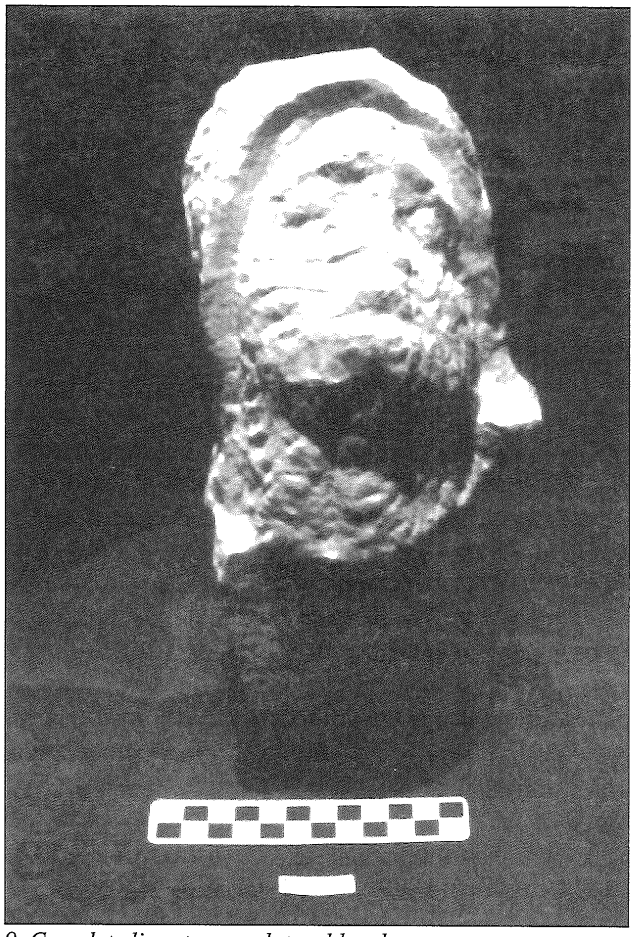
The Portico is paved with both square and rectangular white limestone pavers. The pavers are in varying states of repair. A very few pavers are relatively intact, most are crushed in varying degrees. The floor surface is no longer flat, but looks like a surface of rippled water.

Two important sculptural elements were discovered in the central area of the Portico, near the doorway. Discovered in 2000 was a well-worn sculptural head with a flat reverse side, and a missing nose. The head was found in the doorway, and may be a representation of a veiled male figure (priest or deity) with a beard, gazing to the upper left. The head bears a resemblance in composition to the Hellenistic "Dushara" head in the annex niche of the Petra Museum (**Fig. 9**).

In 2001, the second sculpture fragment was found just beneath the surface directly in front of the doorway in 2001. Also part of a sculptural head, this fragment (although smaller) is in much better condition, and consists of the right eye of a man or woman and part of the hairline. Stylistically, the curls of hair and the lack of a pupil may indicate that this piece is of Nabataean origin (**Fig. 10**). Although it is intriguing that both of these sculptural elements were found in close proximity, there is no firm evidence that either was part of the decoration of the Small Temple. The find spot of the 2001 fragment, very high in the soil profile, may suggest that it simply washed into the precinct at a later date.

The remaining components of the Small Temple Complex have not yet been excavated, but only tentatively identified.

Upper Precinct: The Upper Precinct surrounds the Main Structure on the west, south, and east. The area is bounded to the south by a small rise towards al-Kātūta, and to the east by an unidentified wall. The west boundary is arbitrary, and is not marked by any physical structure or natural feature.



9. Complete limestone sculptural head.



10. Fragmentary limestone sculptural head.

Staircase: The Staircase is located on the north side of the Portico, descending down to the Courtyard below. While there is clear evidence for stair treads immediately in front of the doorway on the north, the exact width of the staircase is unknown.

Courtyard: The Courtyard is located north of the Staircase, and is bounded on its north by the Temenos Wall.

Subterranean Elements: While the area under the subfloor or basins of the Small Temple has not yet been explored, there have been several clues suggesting that there is a subterranean component to the building. The string course of the north wall in Trench 4 near the northeast corner has buckled slightly. After excavation in this trench was completed, small sinkholes began to appear in the subfloor, into which a plumb bob could be dropped to slightly over 0.10m in depth.

There is also evidence for subterranean elements in the Portico. Outside the northwest corner of the building there is evidence of canalization that goes underneath the building, in the form of a stone-lined channel. Where the channel terminates is still unknown, but it is speculated that the entire building and Portico were constructed upon an artificial platform and that the channel may lead to a reservoir under the structure.

Access from the Temenos to the Courtyard: Today, there is no direct access between the Temenos and the Courtyard of the Small Temple, immediately south of it. There is a small bench, or possibly the base of a set of stairs, in alignment with the Small Temple to the south. Iain Browning suggests the evidence for access to the Small Temple from the Temenos is perplexing (1989). He writes, "The axis of the steps is the same as that of the temple but this theory would entail the steps originally passing over the top of the wall or through it if the wall had been carried to any great height. There is no indication in the stonework to suggest that a flight of steps was ever integrated into the wall or had abutted it, which leads one to conclude that the original steps were dismantled when the present Temenos South Wall was built, leaving only the bottom steps. The small temple would then have been isolated from the precinct and without direct access to it. This suggests that the temple and the platform under discussion are of an earlier date than the South Wall" (Browning 1989: 160). Hopefully future excavation will be able to address this issue.

Architectural Elements

The Small Temple, thus far, falls under the classification of a prostyle building, constructed on a podium with steps leading to a portico on one end (MacDonald 1986: 110). One heavily weathered, red sandstone column drum, measuring 1.01m in diameter, may have been identified *in situ* near the northeast corner of the Portico. This drum is plausibly located where one might expect to find one of four columns across the front of the portico. Bachmann's map and later maps of the city center support this conclusion, although it is by no means definitive. Uncertainty about the architecture in the rear, or south, of the building may change the classification. If, in fact, evidence for columns is later discovered in the south, the Small Temple could instead be classified as an amphiprostyle building (Vitruvius 1960). The possibility of two doorways in the south, however, could cloud the issue further.

The architectural decoration of the Small Temple is still uncertain. The lack of architectural elements may be the result of Bedouin agricultural practice in the area in recent decades. With the exception of the doorjamb capitals found in close proximity to the north doorway, no other large architectural fragments excavated at the Small Temple can be closely tied to any specific location of the complex, with the possible exception of one column drum. Several weathered, sandstone column drums were found, but only seven were complete enough to determine diameter, ranging from 0.40 to 1.01m.

Two partial column capitals of interest were discovered outside the southwest corner of the building, in Trench 11. Both fragments were deeply carved with vines, grape clusters, and grape leaves. Unfortunately, the column capitals are so damaged that it is difficult to judge their original dimensions.

Phasing and Interpretation

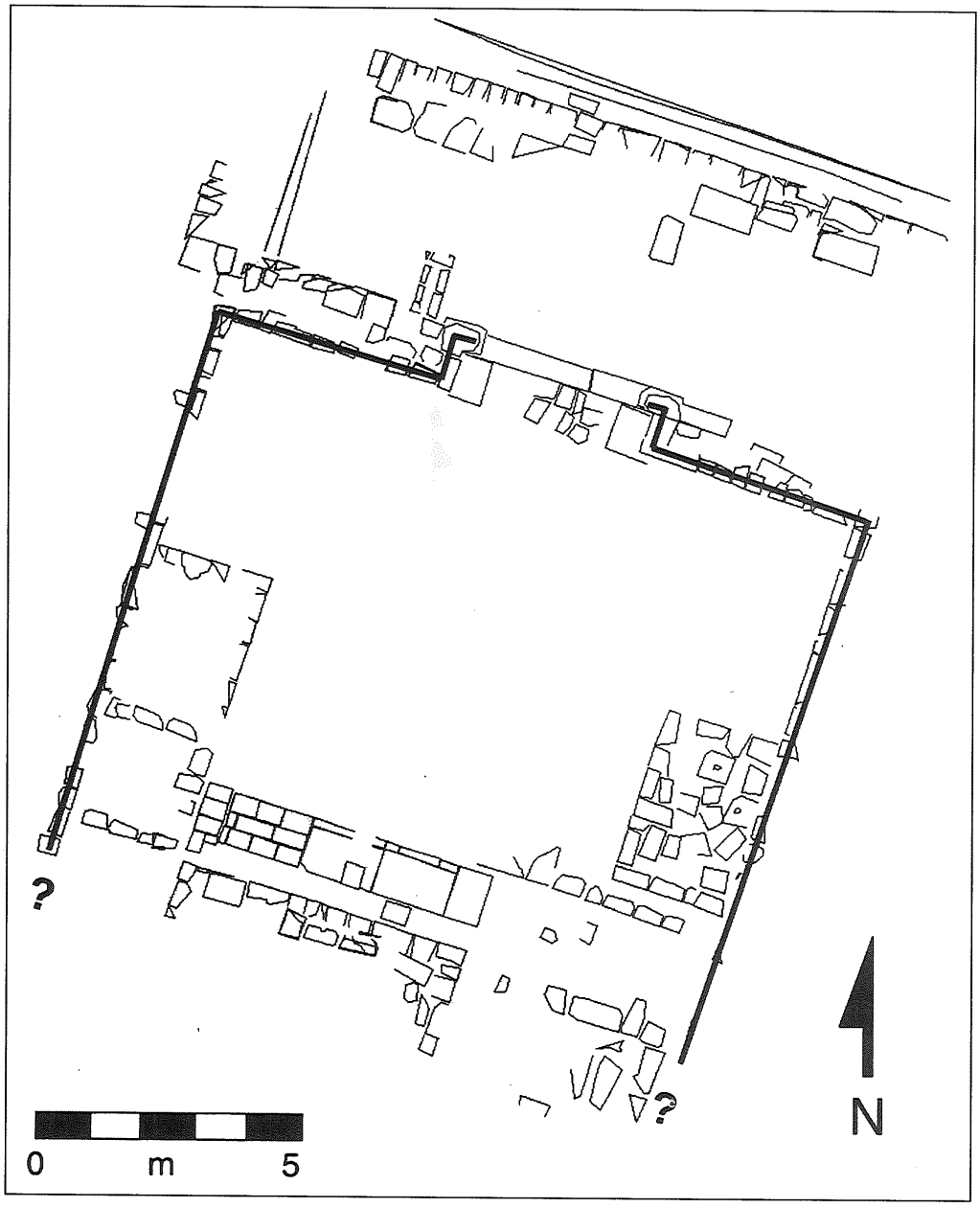
Phasing

The phasing of the building is still open to debate. At the moment, I believe the evidence supports four major construction phases, followed by a series of destruction phases. The first phase consists only of the construction of the shell of the building, and any necessary platform construction. Even in this early phase, the limestone and sandstone ashlars of the building walls probably would have been covered by stucco, or some other material because of their uneven execution. Today, however, no evidence remains of any such covering **(Fig. 11)**.

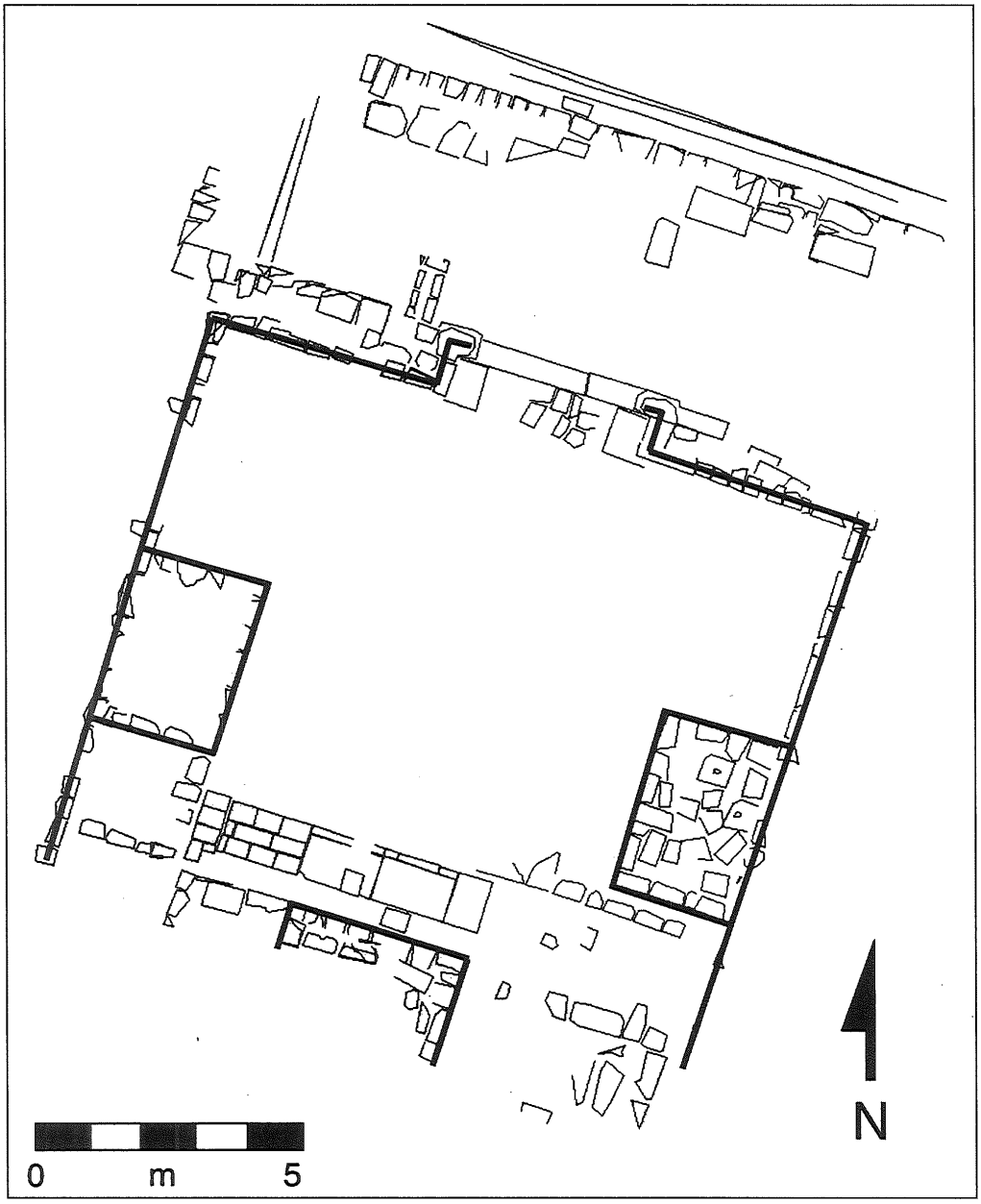
The second phase is distinguished by the addition of the three platforms in the west, east, and south, and the addition of marble revetment throughout. The west and east platforms abut the inside walls of the building, and the platform fill includes reused architectural elements. The marble was attached to the walls with a thick layer of plaster, and bronze tacks. The marble revetment was found *in situ* on the walls, as well as on the sides of the platforms (**Fig. 12**).

The third phase saw the addition of a single rectangular basin in front of the south platform. This early basin, predating the pair of basins briefly discussed earlier, was 3.85m west-east, 1.09m north-south, 0.18m deep, and was constructed of gray-and-white veined marble slabs. This early basin had a volume of 0.75m^3. The south platform probably stood independently of the basin for at least a little while, because of the presence of marble veneer on the north side of the platform, behind the basin wall. To place this marble only to have immediately covered it up would have been a waste of the resource (**Fig. 13**).

The fourth phase, and maybe the final phase of construction before the building went out of use, is more convoluted. Much of the construction activity in this phase relates to the southwest corner of the building. A second basin was built west of the original. It is important to note that the addition of the second basin destroyed the symmetry of the building around its north-south axis. This was accomplished by removing the west wall of the original basin (the early basin), excavating into the subfloor west of the original basin, laying down new basin



11. Petra Small Temple: Phase 1 (Brian A. Brown).



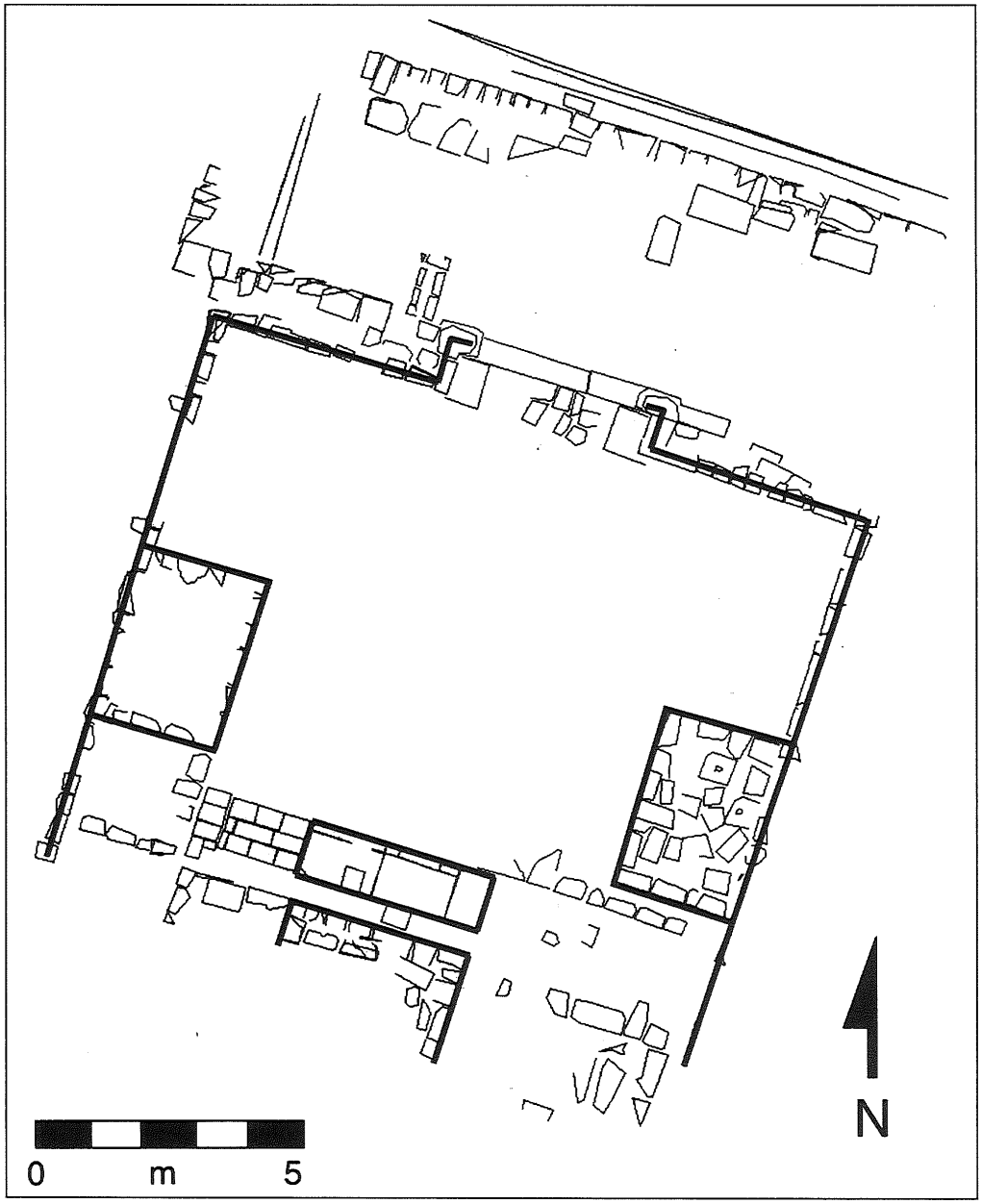
12. Petra Small Temple: Phase 2 (Brian A. Brown).

floor in this newly excavated area, putting in new basin walls (in the north, south, and west only), and then dividing the basin into two separate basins by placing a divider on the basin floor. The resulting two basins are roughly equal in size, although the west basin is slightly larger (**Fig. 14**).

There are several differences between these two basins that allow for such a certain distinction between the two. The new section of basin floor, added west of the original marble basin floor, is entirely composed of a yellowish limestone laid in a brick-like pattern of small tiles. The walls of the west basin on the north, south, and west are variously composed of this same yellowish limestone, the gray-and-white veined marble, and white marble. The floor of the early basin clearly goes underneath the ledge now dividing the two basins. The stone in this ledge is entirely limestone, rather than marble.

A final important element relating to the basin itself is regarding the marble used in the construction of the north wall of the west basin. Three segments of the north wall of the west basin collapsed over the course of the excavation. Two of these sections were inscribed in Greek on the back side; material in secondary use. The level of preservation of these fragments is incredible. Bright orange paint is still visible in the clearly-cut letters (**Fig. 15**).

These Greek inscription fragments point to a renovation of the building that seems to indicate at least two phases during which inscriptions were on display in the Small Temple. During the first inscription phase, the Greek inscriptions later discov-

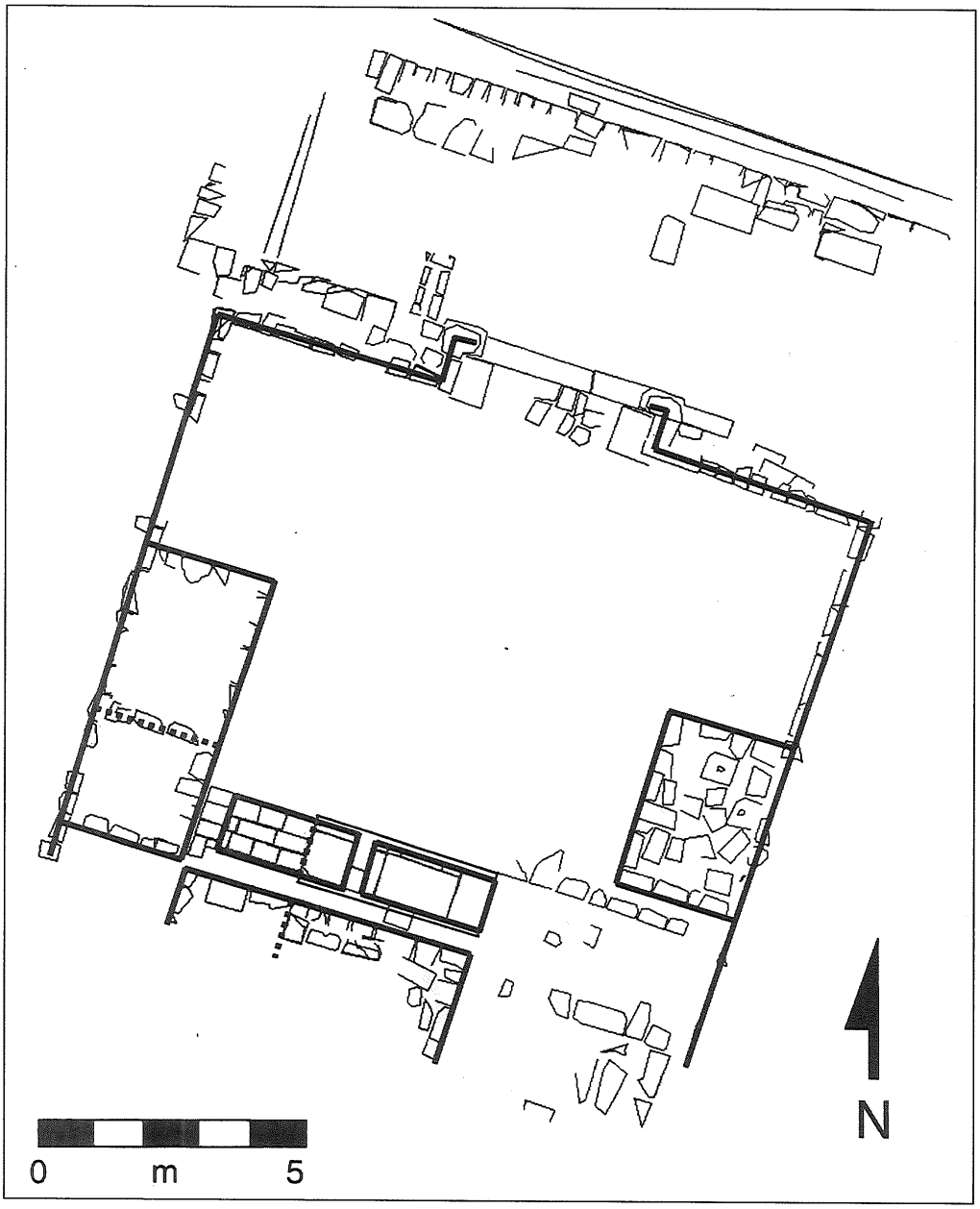


13. Petra Small Temple: Phase 3 (Brian A. Brown).

ered as part of the north wall of the west basin would have been on display. At some point in time, they were no longer relevant and were reused in the expansion of the original basin. It is quite clear that these inscriptions were cut to size specifically for use in the basin wall. One of the basin fragments, for example, clearly shows that a line of text has been cut off to produce a fragment of the correct dimensions.

There is one important point of caution, however, regarding the use of inscriptions in the Small Temple. It is possible that the inscription fragments discovered in the Small Temple were all in secondary use and none of them were ever intentionally on display. I do not think this extreme example is likely to have been the case because almost all of the inscriptions had clean faces, free of the plaster that should have been noted in at least minimal quantities to indicate that the inscriptions had been mounted to the walls or other surfaces of the building. Regardless of how or where the inscriptions were used at the Small Temple, however, it is important to recognize the importance of such an abundance of inscriptions in Petra, where many of the known inscriptions of the city were inscribed on local stone (Tracy 1998: 372).

The existence and placement of several other architectural features are directly related to the expansion and division of this original basin (**Fig. 16**). The original South Platform and basin may have originally been flanked by a pair of openings or doorways to the east and west. The scanty evidence for a south wall of the Small Temple is located in the southwest corner of Trenches 5, as a



14. Petra Small Temple: Phase 4 (Brian A. Brown).

lone ashlar. The construction of the west basin in Trench 11, however, forced a significant architectural change in the southwest corner of the building.

The west basin would have been placed directly in the path of foot traffic of this proposed west doorway. Anyone attempting to walk to the west side of the South Platform after the addition of the west basin would get wet feet. Furthermore, logic dictates that the South Platform, which was clearly related to the original, early basin, be expanded to the west in order to have the same relationship with the new, west basin as well. The South Platform was thus expanded to the west by the addition of a section of wall.

Interestingly, this new wall segment west of the south platform was not constructed across the entire width of the hypothesized west doorway, but only halfway across. The west platform, in Trench 13, was expanded to the south to block the remaining western portion of this hypothetical doorway. The result of these platform expansions, expanding the south platform to the west, and the west platform to the south, was to block this doorway after the addition of the west basin.

There are a few loose ends in this phase of the building, and hints that the builders may not have been expert craftsmen. First of all, the extended platforms do not physically meet in the southwest corner. There is actually a gap of at least 0.07m, which has been filled in with a very thick layer of plaster, maybe to cover the mistake.

The expanded section of the west platform is oddly constructed. The bottom two courses protrude into the Small Temple interior several centi-



15. Greek inscription in marble from the north wall of the west basin.

meters beyond the courses above. The plaster on the bottom courses is very thin here; only 0.03m as opposed to the usual 0.09m or 0.10m. The builders may have forgotten to take into account the thickness of the combination of plaster and revetment (usually totaling 0.11-0.13m in thickness), and how they would encroach on the desired interior dimensions of the building. By using a very thin layer of plaster, they reclaimed some of this space. The upper courses that have been set further back may reflect an attempt to correct the mistake. Doing so would allow the builders to again apply thicker plaster, without giving up floor space.

Another quirk of this phase is that the expansion of the platforms created an alcove outside the southwest corner of the building. This alcove appears intentional because its walls were also clad with marble revetment. If the space in this alcove was not intended for use, why bother mounting any marble? Today, the alcove is defined on three sides; on the north and east by the expansion of the west and south platforms to the south and west, and by the original west wall of the building in the west. The alcove itself contained 55 inscription fragments. Perhaps at some point the niche became a dumping ground for broken or otherwise undesirable and irrelevant inscriptions.

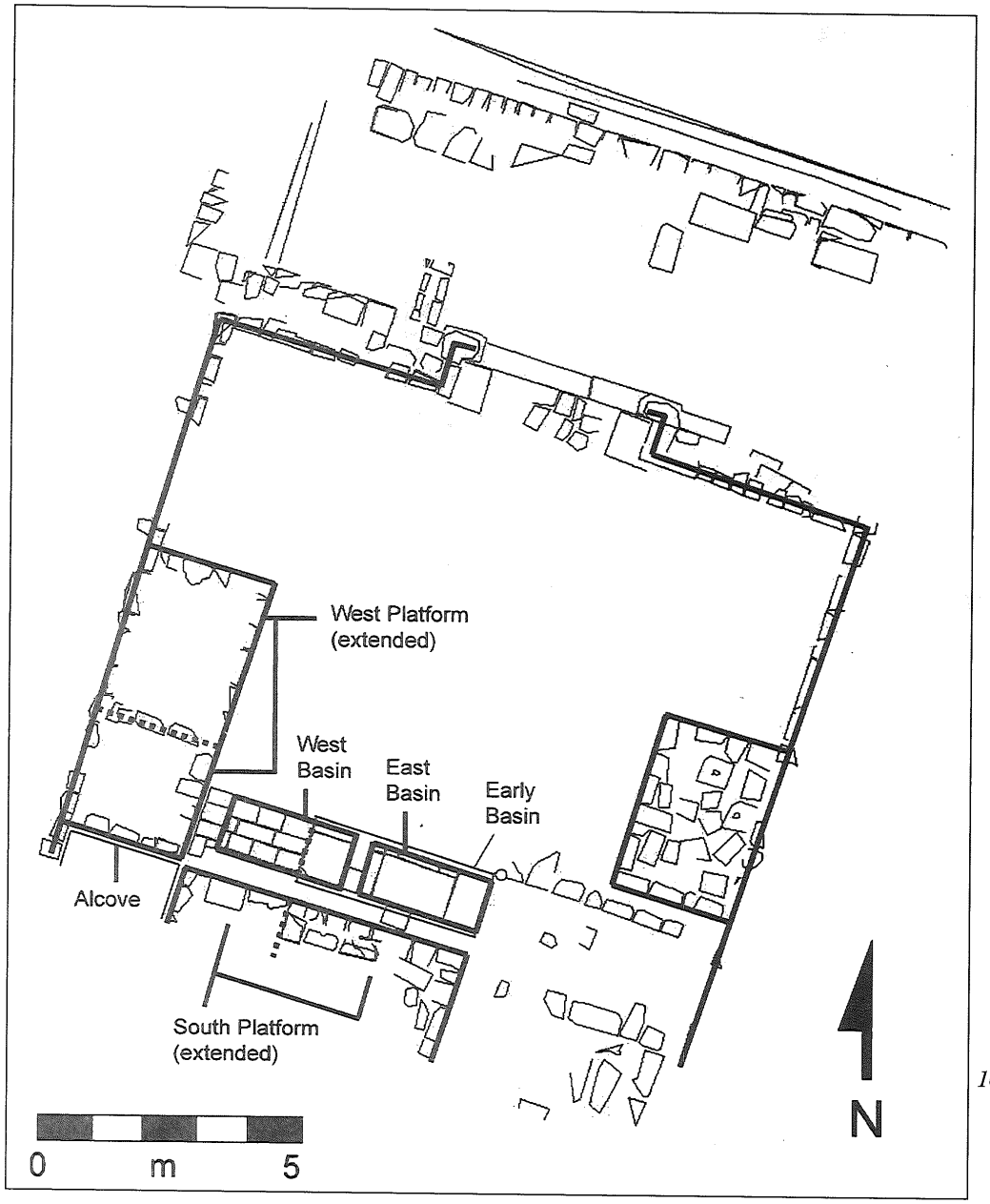
Several specific inscriptions deserve mention. The largest reconstructed panel to date consists of two sections composed of joining inscription fragments, 01-I-103 PLT, and 01-I-104 PLT (**Fig. 17**). This Latin inscription consists of these two sections, as well as several loose fragments. All of the fragments are of dark greenish-gray veined marble, and have consistency in the style and size of the letters. Parts of five rows of text are preserved in the left section, although there are no complete words. Two of the floating pieces, however, contain significant parts of individual words. One fragment may include part of the word "Imperator", while a second clearly says "Caesar". Fragments of this panel have been found in the northeast corner of the building as well.

An inscription consisting of four joining fragments also incorporates fragments from disparate trenches. In this case, two fragments from Trench 11 in the southwest corner of the building join with two fragments from Trench 4 in the northeast corner. This partially preserved inscription, however, is in Greek rather than Latin. The third line of this inscription reads, "ΔPIA," which could be part of the name of the emperor Hadrian, who may have visited the city of Petra in ca. AD 130.

The abandonment and destruction of the building also has several phases, after these four main phases of construction. There is a thin layer of ash at floor level, concentrated in the southeast, suggesting either a small, unchecked fire, or a squatter's camp. The bulk of the marble was discovered above the ash layer. And above the marble layer is a dense, thin layer of roof tile fragments, suggesting the sudden collapse of the roof. This collapse may have deterred people from using the Small Temple as a source of marble after the building was no longer in use. Above the roof tile layer are ashlars, rocks, and fill, hinting at general collapse and a final abandonment.

Interpretation

The mere presence of marble at sites such as Pe-

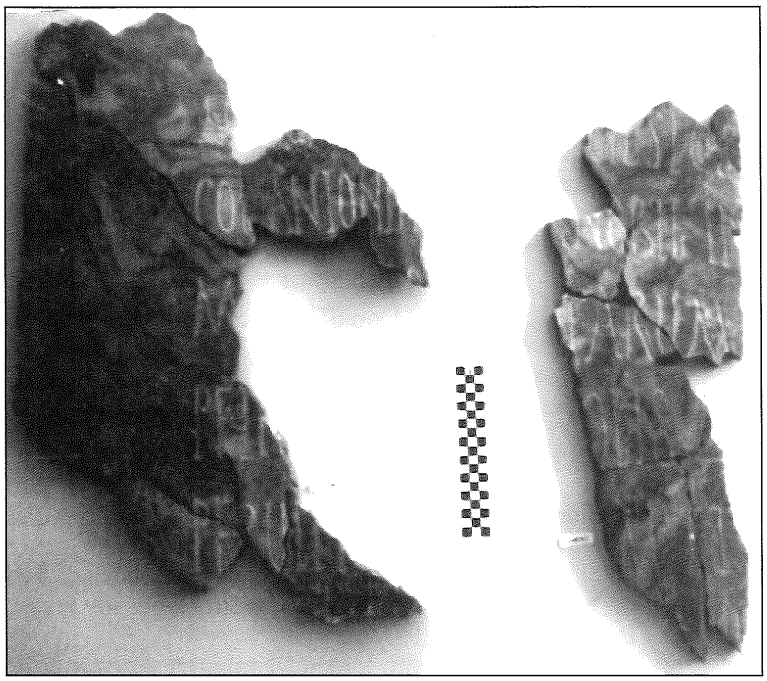


16. Small Temple platform and basin elements (Brian A. Brown).

tra, where none is locally available (Fischer 1988: 162), suggests that any buildings incorporating it were of some importance. Marble at Petra was necessarily imported, which would add to a building's expense, yet it is unnecessary for structural integrity. Furthermore, marble had Roman imperial associations (Fant 1988: 149), which meant that by using the same material valued by Roman dynasts, the builders could hope to add some of the same prestige.

Marble would certainly have been considered a luxury item at Petra, especially because, "land and not sea transport was the critical factor in determining the cost of production of marble; once the goods were on the boat, distance was no object" (Walker 1988: 190-191). According to Fant, "Long-distance trade in stone is an improbable phenomenon. Stone is dense, voluminous, and very expensive to transport. Most kinds of stone were distributed locally; the frequency of finds drops off sharply with distance from the source" (1988: 147). Renfrew proposes something similar with his law of monotonic decrement, stating that, "When a commodity is available only at a highly localized source or sources for the material, its distribution in space frequently conforms to a very general pattern. Finds are abundant near the source, and there is a fall-off in frequency or abundance with distance from the source" (1977: 72).

There is, however, an important caveat to this rather simplistic model. The same straight line distance covered over both land and water requires different amounts of effort. The transport of heavy items, such as marble, would be more easily ac-



17. Inscriptions 01-I-103 PLT (left), and 01-I-104 PLT (right).

complished over water than over land, meaning that you might be more likely to find marble at a more distant location if its transport was accomplished only by trade over water. Petra's inland location would have necessitated the transport of the marble via an overland route after being unloaded from a ship, probably adding to its cost.

But what was the Small Temple, and can dates be assigned to the previously discussed phases? The building's north-south axis is aligned with several other structures in Petra, including the Qaṣr al-Bint, and the Temple of Winged Lions, suggesting that its first phase may correspond to approximately the same time; no later than the first century AD (McKenzie 1990: 108). The closest building to the Small Temple, the Great Temple, does not share this alignment.

The dating of later phases will be heavily dependent on stylistic dating of the inscriptions, although this is problematic because not one of the inscription fragments has been found attached to a wall or other surface. The Latin inscriptions certainly suggest a Roman phase (or phases) of the building, presumably around the time of the annexation of Petra in AD 106, during the reign of the Roman emperor Trajan.

If, however, all of the inscriptions were in secondary use in the Small Temple, scavenged from other locations, and then mounted on the walls inscription-side inward, dating and deciphering the inscriptions will be significantly less useful, although they can help to determine a *terminus post quem* for this phase of marble use.

It is possible that the Romans used the Small Temple as an imperial cult building, dedicated to the worship of the emperor, his family and ancestors, and emperors that came before him (Adkins and Adkins 2000: 104). Imperial cult reached the height of its popularity in the first and second centuries AD, and continued into the middle of the third (Adkins and Adkins 2000: 106). Maybe the basins were reflecting pools associated with sculptures dedicated to the emperor, placed on the south platform. It is also possible that the purpose of the Small Temple, as a pagan building, also contributed to its destruction. In Petra, earthquakes have destroyed many buildings, including those in AD 363, 551, and 658 (Joukowsky 1998). There is reasonable evidence, however, that at least some of the destruction in the Small Temple was intentional.

The examples of joining inscription fragments from opposite corners of the building may be such an indicator. While an earthquake certainly can destroy buildings, removing inscriptions or revetment *in situ* on the walls, it is less likely that an earthquake could scatter such fragments so widely throughout the building. This latter scenario has demonstrably occurred in the Small Temple. It seems much more likely that people tossed these fragments to opposite ends of the building, rather than earthquakes. There are several churches at Petra, including the sixth century AD Byzantine Church across the wadi from the Small Temple. Maybe its congregants destroyed what was to them an offensive pagan building.

Post-Season Research

Post-season research has been primarily focused

on the marble and inscriptions. Epigraphy and palaeography, the study of letter forms, will hopefully prove useful in dating the building, or at least the phases during which the inscriptions were presumably on display. The content of the inscriptions may help in determining the building's purpose.

Isotopic analysis, as written about by Harmon and Valerie Craig (1973), can be used to determine geographic provenance marble. Only small amounts of marble (less than 50mg) are needed for analysis to determine the sample's "signature". This signature is the deviation of the ratio of ^{18}O and ^{13}C, to ^{16}O and ^{12}C, to the PDB (Pee Dee belemnite) isotopic standard (Craig and Craig 1973; Herz and Wenner 1981). These signatures are then compared to already-existing records of signatures associated with known quarries of the Roman world in order to determine marble provenance (Dodge and Ward-Perkins 1992; Fischer 1998; Fischer *et al.* 1992; Herz 1987).

During the 2001 season, 42 drill samples were collected from marble excavated at the Small Temple, including marble from both the 2000 and 2001 seasons. Twenty-five samples were taken from inscription fragments, fifteen samples from plain fragments of marble, and two from marble cornice fragments. The samples were analyzed at the Center for Applied Isotope Studies of the University of Georgia, by Dr. Norman Herz.

The hundreds of inscription fragments have also been approached as a ridiculously large (and heavy) jigsaw puzzle. Partially successful efforts were made during the 2001 season to reassemble the fragments. Modern technology has recently made available another method that might be useful in this effort. Dr. B. Kimia of the Department of Engineering and LEMS (The Laboratory for Engineering Man/Machine Systems) at Brown University has been developing programs for computer vision and image processing. Inscription fragments from the Small Temple are being used as a case study for this project, concerned with the recognition of two dimensional shapes from real images, in this instance, scanned photographs.

Conclusions

The abundant marble finds of the Small Temple can be approached as an indicator of Petra's role in trade and commerce during Roman occupation. By using the marble as a case study of cultural and economic interaction at Petra, and examining the mechanisms of trade that brought marble to Petra, I plan to explore the effects of distance, geography, and transport technology and how they can be used to estimate the effort as opposed to the benefits of trade.

The primary goal of the 2002 field season at the Petra Small Temple, to be under the continued supervision of the author, will be to complete the excavation of the interior of the building. Excavation will also expand into the surrounding area, including the Staircase, the Courtyard, and the Upper Precinct.

S.K. Reid
Department of Anthropology
Brown University
Box 1921
Providence, RI 02903
USA

Bibliography

Adkins, L. and Adkins, R.A.
2000 Imperial Cult. Pp. 104-106 in, *Dictionary of Roman Religion*. Oxford: Oxford University Press.

Browning, I.
1989 *Petra*. Amman: Jordan Distribution Agency.

Craig, H. and Craig, V.
1973 Greek Marbles: Determination of Provenance by Isotopic Analysis. *Science* 176: 401-403.

Dodge, H. and Ward-Perkins, B.
1992 Main Quarries of Decorative Stones in the Roman World. Pp. 152-159 in H. Dodge and B. Ward-Perkins (eds.), *Marble in Antiquity: Collected Papers of J.B. Ward-Perkins*. London: British School at Rome.

Fant, J.C.
1988 The Roman Emperors in the Marble Business: Capitalists, Middlemen or Philanthropists? Pp. 147-158 in N. Herz and M. Waelkens (eds.), *Classical Marble: Geochemistry, Technology, Trade*. Dordrecht: Kluwer Academic Publishers.

Fischer, M.L.
1988 Marble Imports and Local Stone in the Architectural Decoration of Roman Palestine: Marble Trade, Techniques and Artistical Taste. Pp. 161-170 in N. Herz and M. Waelkens (eds.), *Classical Marble: Geochemistry, Technology, Trade*. Dordrecht: Kluwer Academic Publishers.

Fischer, M.L.
1998 *Marble Studies: Roman Palestine and the Marble Trade*. Konstanz: UVK, Universitätsverlag Konstanz.

Fischer, M.L., Magaritz, M. and Pearl, Z.
1992 Isotopic and Artistic Analysis of Corinthian Marble Capitals from Caesarea: a case study. Pp. 214-221 in R.L. Vann (ed.), *Caesarea Papers: Straton's Tower, Herod's Harbour, and Roman and Byzantine Caesarea*. Ann Arbor, MI: Journal of Roman Archaeology.

Herz, N.
1987 Carbon and Oxygen Isotopic Ratios: A Data Base for Classical Greek and Roman Marble. *Archaeometry* 29: 35-43.

Herz, N. and Wenner, D.B.

1981 Tracing the Origins of Marble. *Archaeology* 34: 14-21.

Joukowsky, M.S. (ed.)

1998 *Petra Great Temple: Volume I: Brown University Excavations 1993-1997.* Providence, Rhode Island: Brown University Petra Exploration Fund.

MacDonald, W.L.

1986 *The Architecture of the Roman Empire: An Urban Appraisal.* New Haven and London: Yale University Press.

McKenzie, J.

1990 *The Architecture of Petra.* Oxford: Oxford University Press.

Renfrew, C.

1977 Alternative Models for Exchange and Spatial Distribution. Pp. 71-90 in T.K. Earle and J.E. Ericson (eds.), *Exchange Systems in Prehistory.* New York: Academic Press.

Tracy, S.V.

1998 An Imperial Inscription. Pp. 370-375 in M.S. Joukowsky (ed.), *Petra Great Temple.* East Providence, Rhode Island: Brown University Petra Exploration Fund.

Vitruvius

1960 *The Ten Books on Architecture.* New York: Dover Publications.

Walker, S.

1988 From West to East: Evidence for a Shift in the Balance of Trade in White Marbles. Pp. 187-195 in N. Herz and M. Waelkens (eds.), *Classical Marble: Geochemistry, Technology, Trade.* Dordrecht: Kluwer Academic Publishers.

THE PETRA GARDEN FEASIBILITY STUDY, 2001

Leigh-Ann Bedal

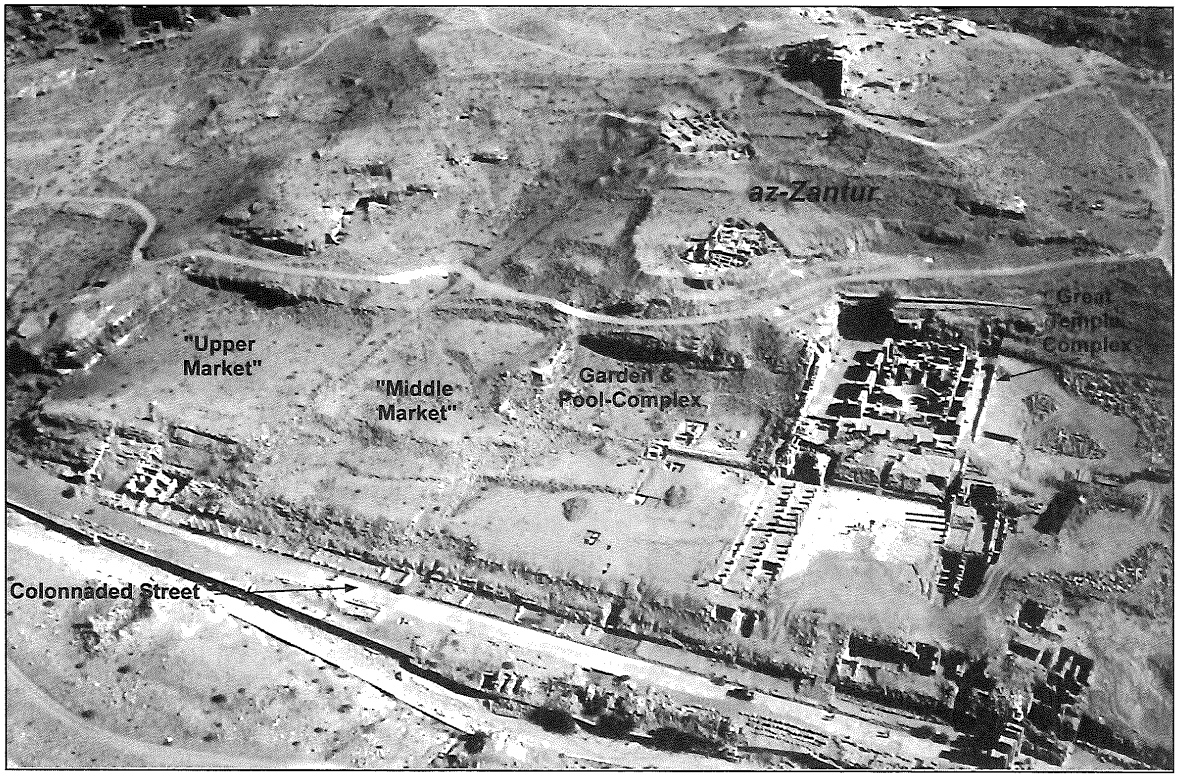
Introduction

In 1998, a preliminary survey and excavation of the so-called ''Lower Market'' in Petra revealed the remains of a monumental swimming-pool with island-pavilion. In association with the swimming-pool are the remnants of an elaborate hydraulic system – channels, pipelines, and a diversion tank (castellum) – that transported water to the pool and irrigated the large garden terrace to the north of the pool (Bedal 1999; 2000; 2001). The Petra Garden and Pool-Complex is located at the heart of Petra's city center, on an artificial terrace overlooking the Colonnaded Street, between the so-called "Middle Market" and the "Great Temple" (**Fig. 1**). Because the Petra Garden represents the only known example of a Nabataean garden in the archaeological record, and because the site is unobstructed by later (post-Classical) construction, it offers an unprecedented opportunity to conduct an intensive investigation of an ancient garden site, one of the very few to be studied archaeologically in the region.

In order to commence the investigation of the Petra Garden, a feasibility study of the garden terrace was carried out in July 2001. The primary objectives of the two-week field season was to identify the major components and layout of the garden and to determine the degree of preservation of its earthen terrace utilizing ground-penetrating radar (GPR) in combination with soil cores and strategic excavation to test the results of GPR. A team composed of specialists in geophysics, agronomy, garden archaeology, landscape architecture, and archaeological mapping, provided an interdisciplinary aspect necessary for the investigation of an ancient garden site.

Ground-Penetrating Radar

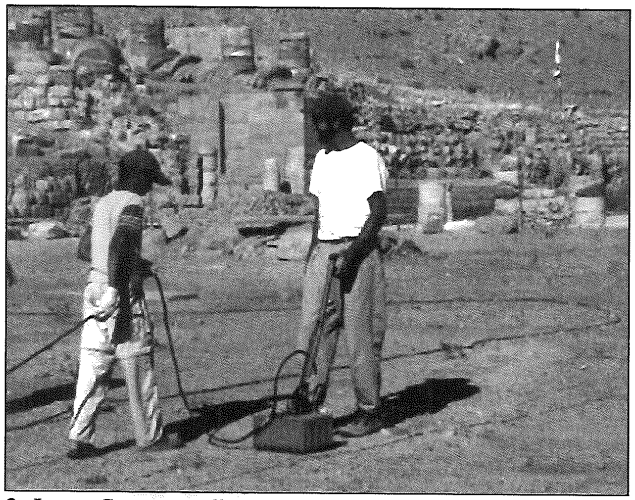
The first three days in the field were devoted



1. Aerial view, looking south, showing the relationship of the Petra Garden and Pool-Complex to other major monuments and spaces within the city center [Photo by S. Karz Reid, 2001].

primarily to the collection and processing of data using ground-penetrating radar (GPR) in order to obtain a subsurface mapping of the garden's earthen terrace which measures approximately 65 x 53m. The GPR team employed a Geophysical Survey Systems Inc (GSSI) Subsurface Interface Radar (SIR)-2000 system that is the latest version of the digital systems that control radar propagation in the ground, and record the resulting reflections.

Grid 1 was laid out over the terrace in an L-shape, avoiding a raised earthen feature (a post-Classical agricultural field boundary) that occupies the southeast portion of the study area (see **Figs. 3, 4**). As the radar antenna was moved along measuring tapes laid out in an east-west direction within the grid, data was collected in transects every 50cm for maximum illumination of subsurface features (**Fig. 2**). Optimum line spacing was based on the known energy transmission cone of a 400MHz dual antenna. Energy propagation occurred to a maximum depth of about 3.5m. A total of 103 transects of reflection data were collected. The resulting reflection data were displayed on a computer monitor in the form of vertical profiles in which we were able to immediately identify the location of major architectural features as well as unbuilt areas (**Fig. 7**). The relationship of these features was further illuminated by importing all reflection transects into an amplitude analysis program that produced horizontal slice maps, each measuring approximately 25cm in thickness. The result was a series of maps showing the overall architectural layout of the terrace at various depths. By the end of the second day, it was clear that the earthen terrace is mostly unbuilt with a series of stone structures laid out along its central north-south axis and another major stone structure along the north-eastern border. In addition, this preliminary data revealed a number of smaller, less defined features in various locations and depths across the site.[1]



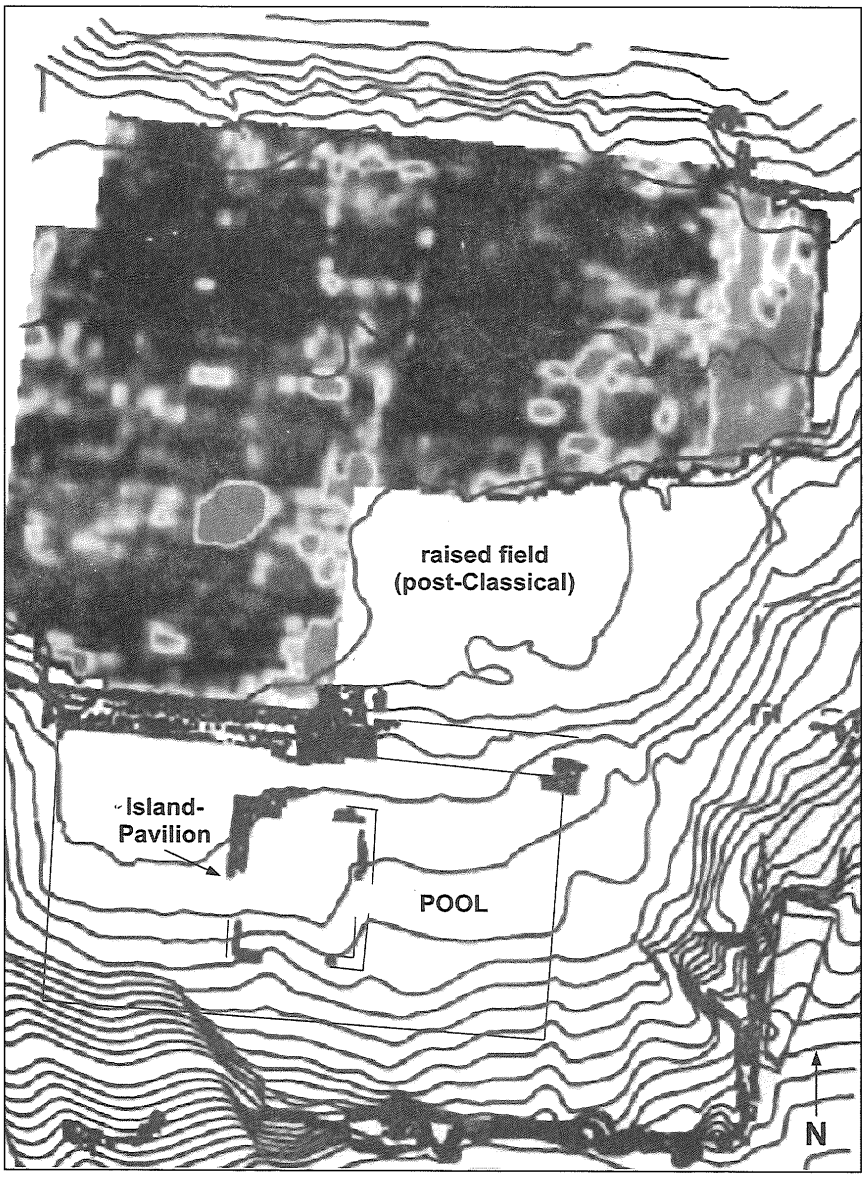
2. Larry Conyers collects data every 50cm across the garden terrace, by pulling a 400 MHz antenna along a transect. The data is immediately transmitted to a nearby computer through the cable that is handled by Ahmed al-Bedoul [Photo by E. Ernenwein, 2001].

After a preliminary examination of the horizontal amplitude slices, one feature – a rectangular structure located in the northern portion of the grid – appeared very pronounced and its segmented walls were potentially consistent with those of a colonnaded pavilion. This feature was chosen for a more detailed GPR study. To produce a detailed set of maps of this northern structure, a second grid of data (Grid 2) was collected using the same equipment, but collecting transects 25cm apart instead of 50cm (as in Grid 1), allowing for finer horizontal resolution. Since we knew from Grid 1 that the structure was aligned with the terrace's main axes, Grid 2 was laid out at an angle (**Fig. 4**) in order to disqualify any chance that the wall lines were a function of the direction the antennas had been moved along the surface, creating linear anomalies that might "look like" buried architecture. A total of 81 profiles were collected in the 18 x 20m grid, which was processed in the same manner as Grid 1 including the production of amplitude slice maps for viewing in the field. The resulting data showed a very distinct rectangular structure (the North Building), measuring 8 x 11m, at a depth of 0.25-1.00m below the surface (**Fig. 5a**). Using the three dimensional capabilities of GPR (combining horizontal slices and vertical profiles), it is possible to produce a reconstruction of the North Building as it is preserved under the ground. Based on this data, three of its walls are segmented – which may represent columns – with one solid wall on the north façade (**Fig. 6**). Extending below the level of the North Building, the GPR shows a distinct line running northeast-southwest and originating from a large, solid structure seen in the upper left corner of Grid 2 (**Fig. 5b**). It is likely that these deeper features are associated with houses date to the third-first century BC that were buried by the construction of the garden terrace, probably during the reign of Aretas IV (9 BC - 40 AD) (Parr 1970).

Strategic Excavation

With the results of the GPR immediately available, three areas were identified for further investigation as per the goals and scope of the feasibility

1. A metrological analysis of the Petra Garden and Pool-Complex revealed the application of harmonical ratios and measuring units for its construction, see C. Kanellopoulos, "The Layout of the Pool and Garden Complex in Petra. A Metrological Analysis," *LA* (forthcoming).

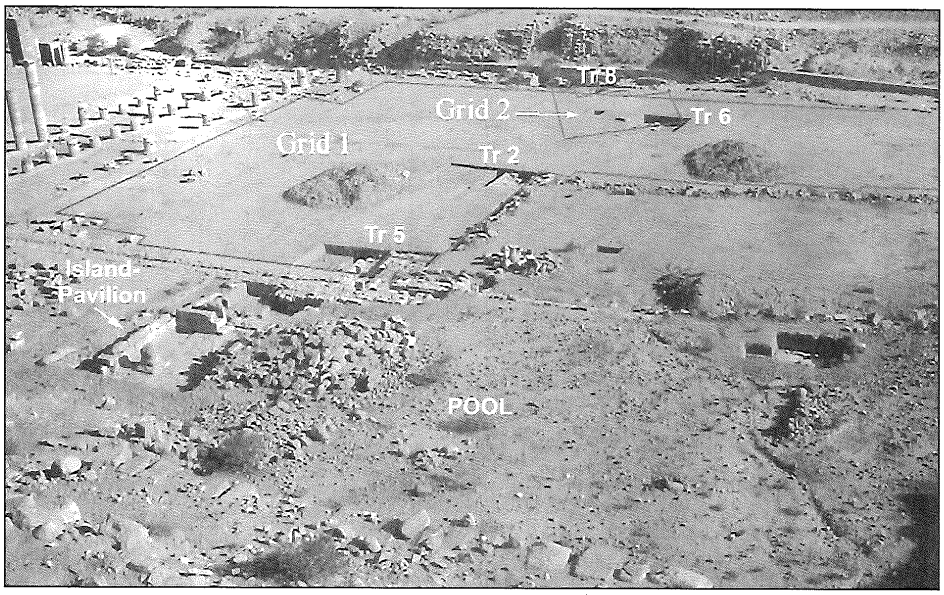


3. A horizontal amplitude slice of the garden terrace generated by GPR and superimposed on a topographic map of the site. This slice shows that there are several structures (white-gray colors) with large expanses of unbuilt space (earth = black) 25-50cm below the surface. Of note are the large stone structure along the terrace's eastern boundary (upper right) and a series of smaller structures along the terrace's central north-south axis.

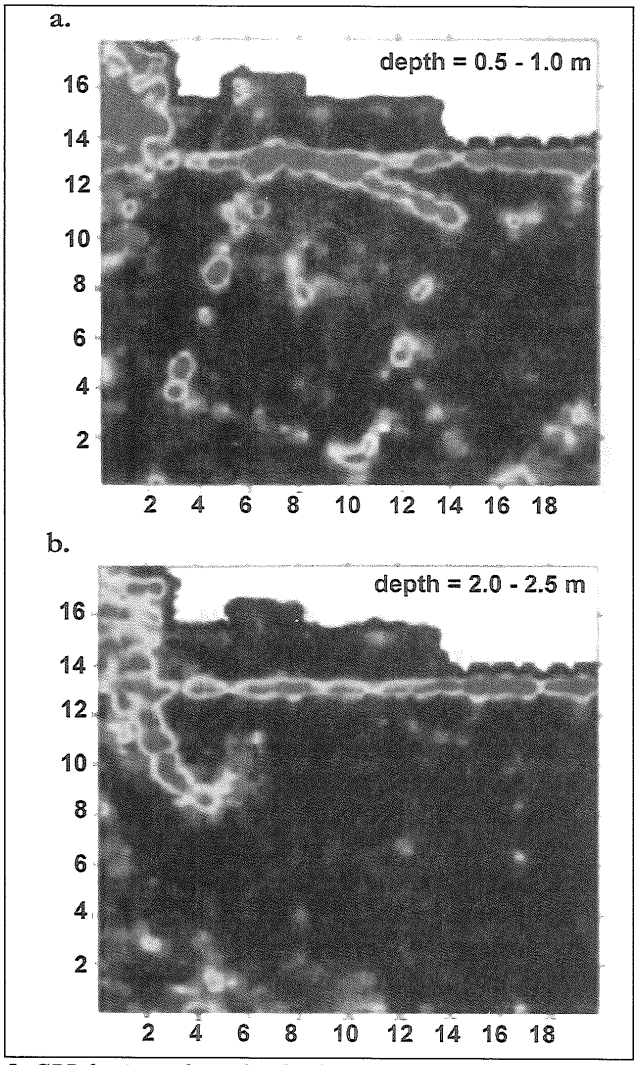
study. Excavation trenches were strategically placed to expose portions of three of the major stone structures whose presence had been revealed through GPR (**Fig. 4**). The first area chosen for excavation was located along the southern edge of the terrace, just three meters north of the pool. The GPR data showed what appeared to be a large and deeply founded stone structure (**Fig. 7**) directly north of the *castellum* (a water tank built into the pool's north wall) and stone conduits that compose a system of collection and distribution of water. Trench 5 was opened to test the GPR results and to expose a portion of this feature, which proved to be a solid stone platform packed with mortared sandstone rubble and faced with ashlars typical of Nabataean masonry. At least two phases of construction are distinguishable, with fragments of architectural elements, such as column drums and capitals, used in the rubble fill of the secondary construction phase (**Figs. 8, 9**). The stone conduits that emerge from the *castellum* lead directly underneath the stone platform in Trench 5, suggesting that the platform functioned as a hydraulic installation, perhaps a basin or fountain (**Fig. 10**).

The second area of interest was identified approximately 12m north of the southern platform (Trench 5), where GPR indicated the presence of another large stone-built feature at the center of the terrace. A small area of this feature was exposed on the surface and investigated during the 1998 field season. Trench 2 uncovered a second platform (3.67 x 3.85m), constructed of a core of mortared sandstone rubble faced with well-hewn sandstone ashlars (**Fig. 11**). A small limestone basin with a small drainage hole was found resting against the platform's southern face, just east of center.

The third feature investigated through excava-



4. View of the garden site, looking northwest, showing the location of the two GPR grids (outlined in gray) and excavation trenches of the 2001 season.

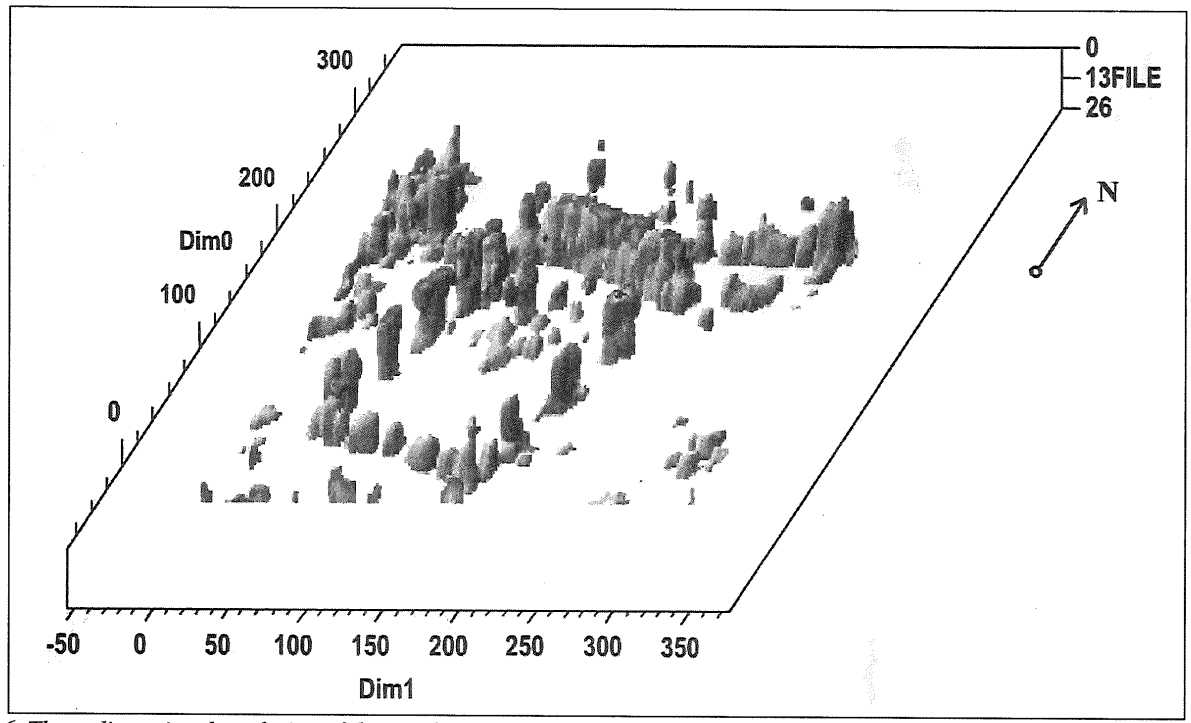


5. GPR horizontal amplitude slices of Grid 2 at two different depths. The outlines of the North Building are clearly visible less than 1m below the surface: (a). a solid structure, located to the west of the North Building, is founded more than 1.5m deeper and appears to be crescent-shaped at the bottom; (b). a distinct line runs southwest-northeast, underneath the northwest corner of the North Building.

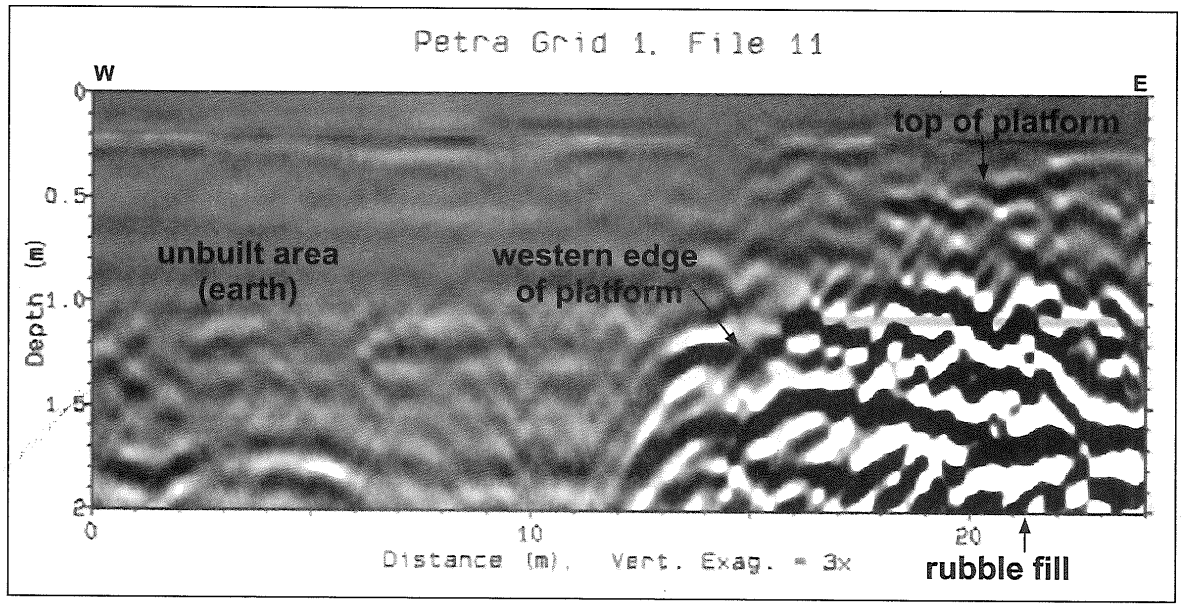
tion was the North Building, located 14m north of the central platform (Trench 2) and 5m south of the terrace's northern retaining wall. Two test trenches (6 and 8) exposed the southeastern and northwestern corners of the North Building, located immediately below the surface **(Fig. 12)**. The rough construction of the walls suggests that only the foundations (two courses high) are preserved. It is unclear from the limited exposure what the function of this building is, but its stratigraphic association suggests that it is post-Nabataean-Roman, possibly Byzantine. That the building is well aligned and centrally oriented with the site's other major architectural elements may suggest, however, some continuity in the use of the garden terrace in this later period. Below the level of the foundations an oval stone-line pit (1.5 x 1m) was uncovered **(Fig. 12)**. The discovery of the pit came as a complete surprise because its presence had not been detected in the GPR data. The pit is oriented perpendicular to the bold oblique line that the GPR data locates ten meters to the north **(Fig. 5a-b)**. Pottery sherds found within the pit are consistent with a first century BC date. The exact function of the pit is currently unclear, but the discovery of a feature that apparently belongs to the site's pre-garden phase offers promise for future clarification of the chronological development of the center of Petra.

Soil Studies

In addition to aiding in locating and excavating architectural elements, the application of GPR proved useful for the investigation of the garden soils. In addition to providing a map of the stone structures on the terrace, GPR indicated where there were no structures and thus where we might search for remnants of the garden soils which



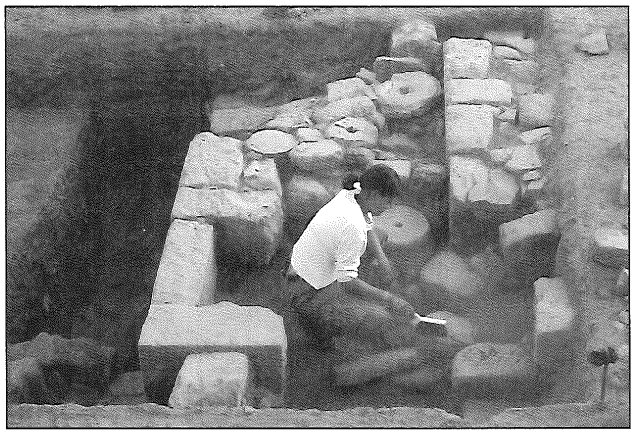
6. Three-dimensional rendering of the North Building in Grid 2, composed of GPR data from horizontal slices and vertical profiles for levels 25-95cm below the surface.



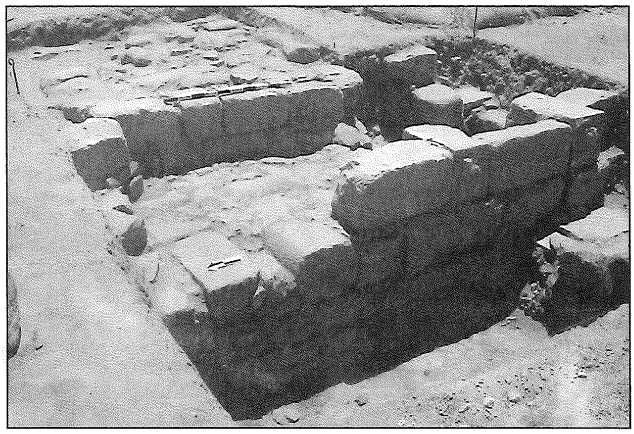
7. GPR profile of the southern platform (right) that was partially excavated in Trench 5. The unbuilt, earthen area immediately to the west of the platform may represent part of the garden's cultivated area.

might provide information on the nature of the garden itself. Vertical profiles of the subsurface provided by the GPR, showed what appeared to represent several laminated surfaces or stratigraphic layers to the east of the North Building. A total of 16 auger tests at various locations on the garden terrace provided a preview of the stratigraphic sequence that would be encountered in excavation (**Fig. 13**). Samples of the major soils at the site will be subjected to characterization analyses which will aid in establishing the morphology of soil units.[2] In Trench 6, three surfaces were detected to the east exterior of the North Building that have the characteristics consistent with cultivated soils — mottling and a high content of charcoal bits and pottery sherds. The uppermost cultivated soil is

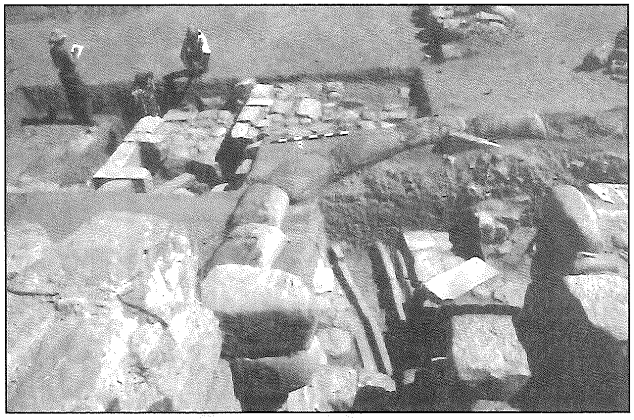
2. The analyses of soil samples were not completed by the time of publication of this preliminary report. The results will be included in future publications on the Petra Garden.



8. The southern platform (Trench 5), looking north. Kelly Cook sweeps off architectural elements used as fill between two construction phases.



9. The southern platform (Trench 5), looking southeast, after the removal of fill composed of architectural elements, exposing a rough surface of tightly packed rubble. Only the top preserved course of the exterior wall would have been exposed above the ancient ground level.



10. The southern platform (Trench 5), looking north. In the foreground is the castellum in the pool wall, with emerging stone conduits that lead directly toward the platform.



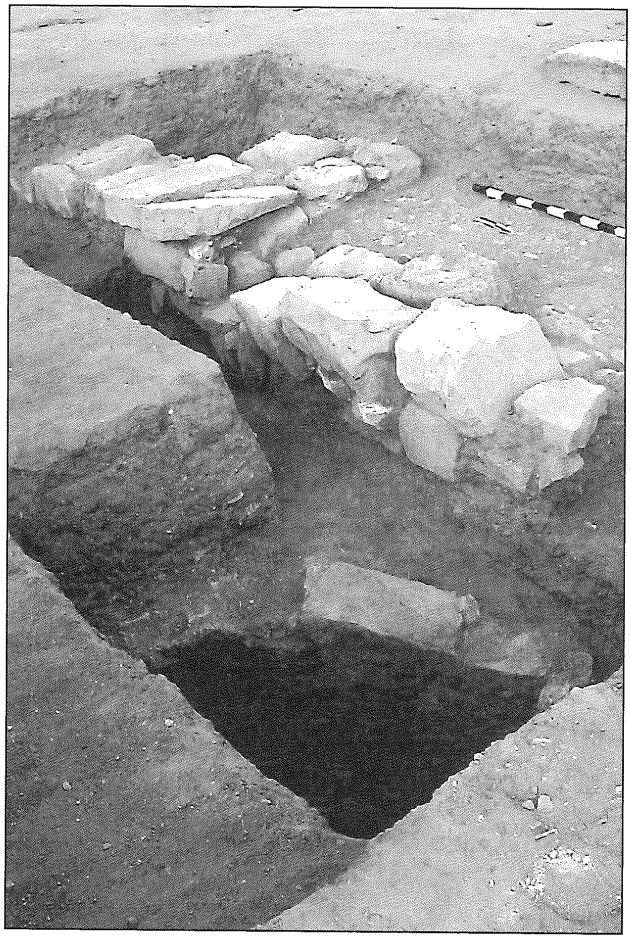
11. The central platform (Trench 2), looking northwest, with stone basin (lower left) found resting against the platform's southern face. The large hole in the northern part of the platform may represent ancient stone-robbing activity. The eastern face of the platform was preserved one course higher than the rest and was the only stone construction exposed on the surface of the garden terrace.

gray in color and represents the modern use of the terrace as an agricultural field by the modern Bedouin inhabitants of Petra. The two lower cultivated soil strata are each likely candidates for the garden surface of the classical period. A coin of Aretas IV was discovered at the bottom of the earliest soil layer, providing a *terminus post quem* for its cultivation **(Fig. 14)**. Future excavations will involve large horizontal exposure of each of these strata with the hope of identifying subtle features such as tree pits, root cavities, and earthen irrigation channels that cannot be easily detected in vertical soundings, and to determine their relative relationship to the architecture.

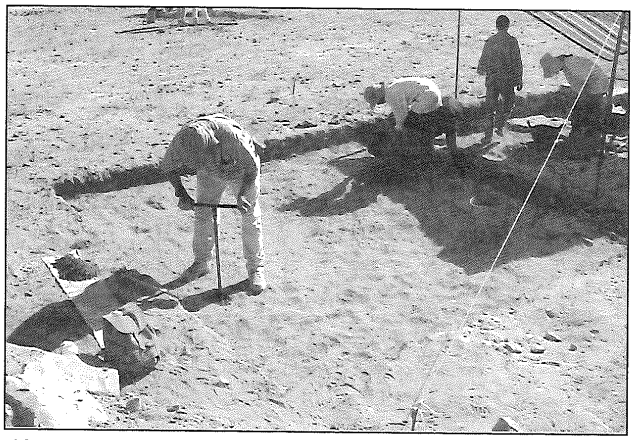
Summary

With one short feasibility study, valuable information has already been acquired about Petra's ancient garden through the combination of GPR, strategic placement of excavation trenches, and soil cores. After only three days of data collection, processing, and interpretation of the GPR data, it was possible to determine the locations for strategically placed test excavations. Using color images of horizontal GPR reflection amplitude slices, a map of the prominent archaeological features buried under the surface was created. The GPR-generated maps proved useful for placing excavation trenches in areas where the most valuable or desirable information could be obtained while avoiding areas that appear less promising for serving the goals and objectives of the feasibility study.

The combination of geophysical mapping and strategically placed archaeological tests prevented an unnecessary waste of time and expense on randomly placed trenches. Due to the nature of garden sites with their large expanses of unbuilt areas, randomly placed test trenches are unlikely to produce a significant amount of contextual information. By starting with a geophysical study, valuable maps of the terrace's subsurface were produced in only a

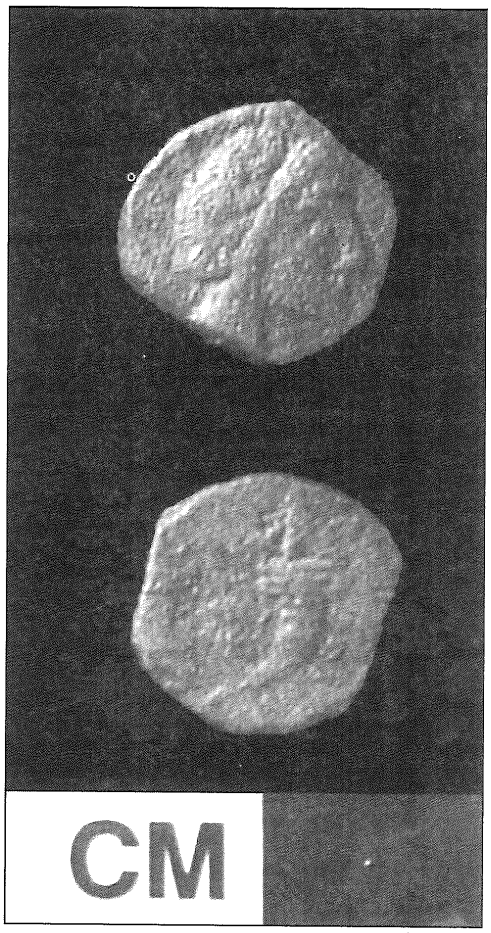


12. *The southeastern corner of the North Building foundations (Trench 6), looking southwest. In the foreground is a stone-lined pit that pre-dates the North Building, and possibly the garden terrace.*



13. *John Foss uses an auger to collect a soil sample from Trench 2.*

few days. Future excavations at the site will make use of the GPR maps produced from the feasibility study for more strategically placed excavation trenches. A combination of GPR and excavation results are integrated into an overall site map (**Fig. 15**) and cross-section (**Fig. 16**). Ultimately, a fusion of data from GPR, excavation, soil cores, and

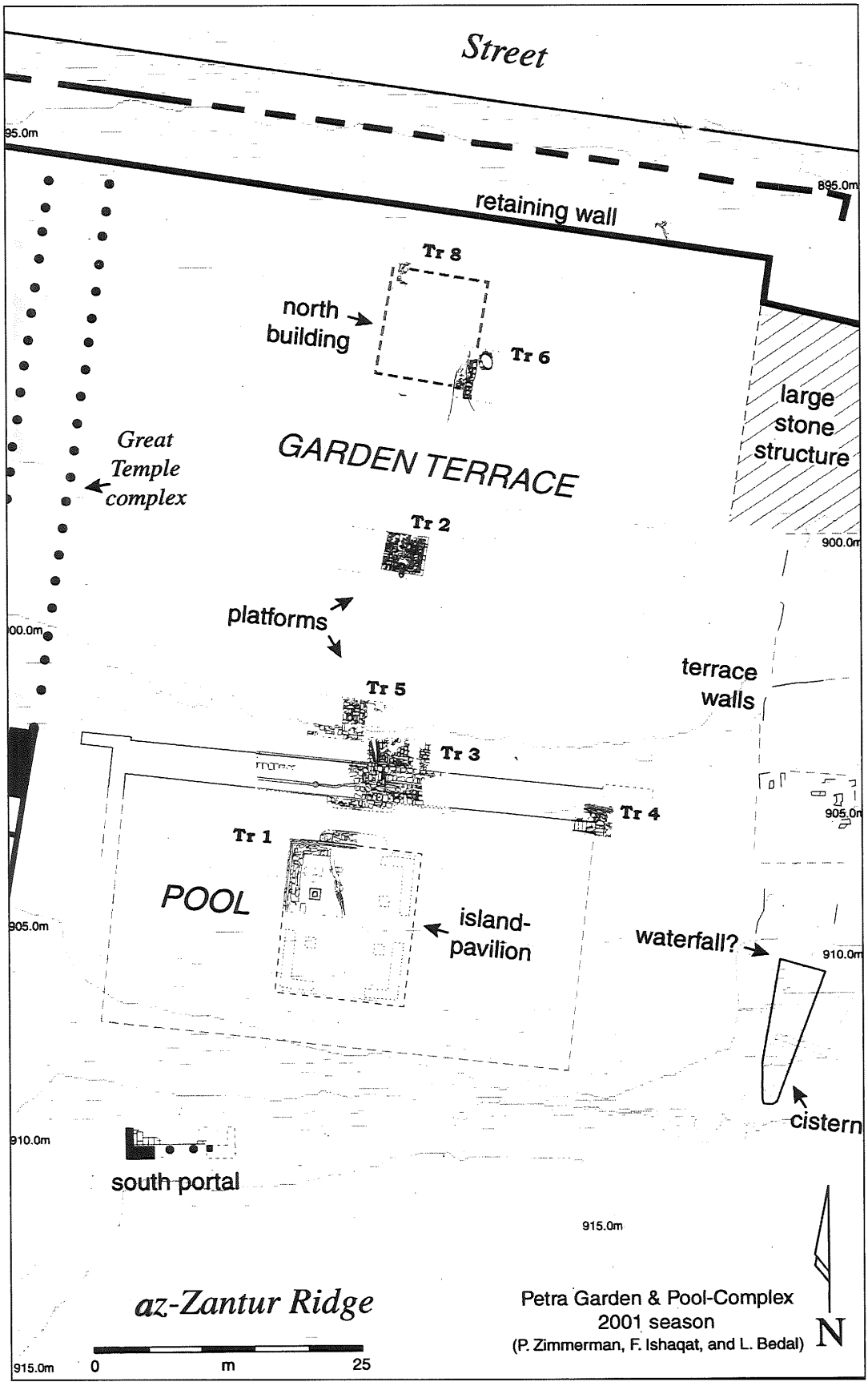


14. *A coin of the Nabataean king, Aretas IV (9 BC-40 AD) found in the lowest stratum of cultivated soil in Trench 6, above the stone-lined pit (#01-C-03). On the obverse is the bust of Aretas IV; on the reverse is a pair of crossed cornucopias (the one on the left is badly eroded).*

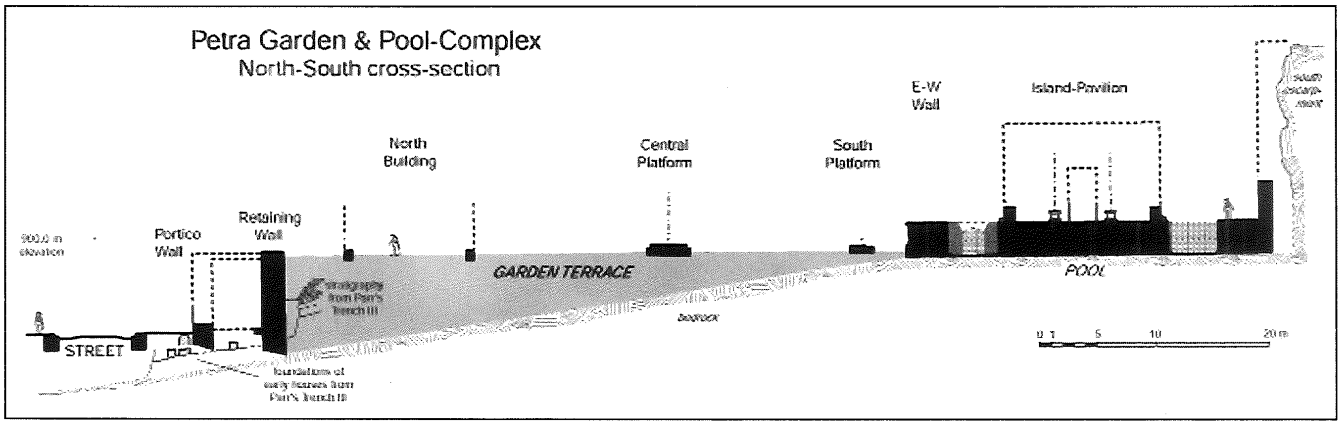
other methods of site analysis will yield a comprehensive three-dimensional reconstruction of the site that will enhance upon the usual information represented in two-dimensional site maps.

Acknowledgments

The Petra Garden Feasibility Study was made possible with the cooperation of the Department of Antiquities of Jordan. Funding was provided by a project grant from Dumbarton Oaks (Trustees of Harvard University) and field research funds from an ACOR CAORC Fellowship. We are especially grateful to Dr. Fawwaz al-Kharaysheh, the Director-General of Antiquities in Jordan, and Dr. Mohammed Najjar, the Director of Excavations in Jordan, for their enthusiastic support and encouragement. A collaborative effort with Talal Akasheh of Queen Rania's Institute of Tourism and Heritage, Hashemite University, Jordan, provided the project with surveying and mapping services. Valuable logistical and housing support was generously supplied by the family of Dakhilallah Qoblan



15. Map of the Petra Garden and Pool-Complex combining the results of the 1998 and 2001 field seasons.



16. Reconstructed cross-section of the Petra Garden and Pool-Complex facing east. The slope of the bedrock, which has yet to be determined, is presented here as an even grade between the level of the pool floor and under the street. Important information on the northern part of the terrace and the street was obtained from the section drawing for Trench III as presented in figure 1 of Parr 1970 [Drawing by C. Kanellopoulos; digitized by L.-A. Bedal].

in Umm Ṣayḥūn, Petra, and the staff of the American Center for Oriental Studies (ACOR) in ʻAmmān. Finally, acknowledgment must be made of all the team members who worked hard to attain the objectives of the 2001 feasibility study: Lawrence B. Conyers (geologist, Denver University), Kathryn L. Gleason (garden archaeologist/ landscape architect, Cornell University), John E. Foss (agronomist, University of Tennessee), Chrysanthos Kanellopoulos (architect), Fawwaz Ishaqat (surveyor, Hashemite University), Mustafa Asmar (surveyor's assistant, Hashemite University), Aicha Malek (garden archaeologist, Dumbarton Oaks), James Schryver (excavator, Cornell University), Kelly Cook (excavator/landscape design, SUNY Syracuse), and a fantastic group of men from Petra's Bdoul tribe.

All photographs were taken by the author unless otherwise indicated. The GPR-produced images were provided by Larry Conyers and Eileen Ernenwein.

L.-A. Bedal
Division of Humanities and Social Sciences
Pennsylvania State University, Erie
5091 Station Rd.
Erie, PA 16563-1501
USA

Bibliography

Bedal, L.-A.
1999 A *Paradeisos* in Petra: New Light on the 'Lower Market'. *ADAJ* 43: 227-239.
2000 *The Petra Pool-Complex: A Hellenistic Paradeisos in the Nabataean Capital (results from the Petra Lower Market survey and excavation, 1998)*. unpublished Ph.D. dissertation, University of Pennsylvania.
2001 A Pool-Complex in Petra's City Center. *BASOR* 324: 23-41.
Parr, P.J.
1970 A Sequence of Pottery from Petra. Pp. 348-381 in J.A. Sanders (ed.), *Near Eastern Archaeology in the Twentieth Century: Essays in Honor of Nelson Glueck*. Garden City, NY: Doubleday.

THE 2001 FINNISH JABAL HĀRŪN PROJECT: PRELIMINARY REPORT

Jaakko Frösén, Zbigniew T. Fiema, Katri Koistinen, Jacqueline Studer, Christina Danielli, Richard Holmgren, Yvonne Gerber, Nina Heiska and Antti Lahelma

The Finnish Jabal Hārūn Project (FJHP) carried out its fourth fieldwork season between September 1 and September 27, 2001. The fieldwork this year involved only the archaeological excavations. The project is directed by Prof. Jaakko Frösén, University of Helsinki. The archaeological fieldwork was supervised by Dr. Zbigniew T. Fiema, University of Helsinki. In total, one archaeologist, and six archaeology students from the University of Helsinki, and two professional cartographers from the Helsinki University of Technology, as well as one Swedish archaeologist actively participated in the fieldwork. Dr. Christina Danielli, a senior conservator from Italy and two graduates from the Department of Conservation, Espoo-Vantaa Institute of Technology also took part in the fieldwork. The DoA representative for the FJHP was Mr. Basem Mahameed. Up to 12 local laborers were employed in the excavations. The FJHP is sponsored by the University of Helsinki and by the Academy of Finland. The Project wishes to express thanks to the Director-General of Antiquities of Jordan and the Department of Antiquities office in Petra for their cooperation and support.

The FJHP focuses on Jabal an-Nabī Hārūn (جبل النبي هارون), located ca. 5kms to the southwest of Petra, which, according to Jewish, Christian and Muslim traditions, is the place of burial of Moses' brother Aaron. The peak of the mountain is occupied by a Muslim shrine which contains a cenotaph believed to contain Aaron's remains. At around 70m below and ca. 150m to the west of the peak there is an extensive, ruined architectural complex located on a wide plateau of the mountain, at ca. 1250m asl. This complex, considered to be a Byzantine monastery/pilgrimage center dedicated to St. Aaron, and preliminarily dated to the later fifth through the seventh/eighth centuries AD, is the focal point of the investigation. The main objectives, fieldwork methodology, and the results of the previous seasons have already been presented elsewhere (Frösén *et al.* 1998; 1999; 2000; 2001a; 2001b). The following is a summary of the excavation, the cartographic and conservation activities, and of the current research on the faunal remains from Jabal Hārūn.

CARTOGRAPHIC ACTIVITIES

(K. Koistinen and J. Latikka)

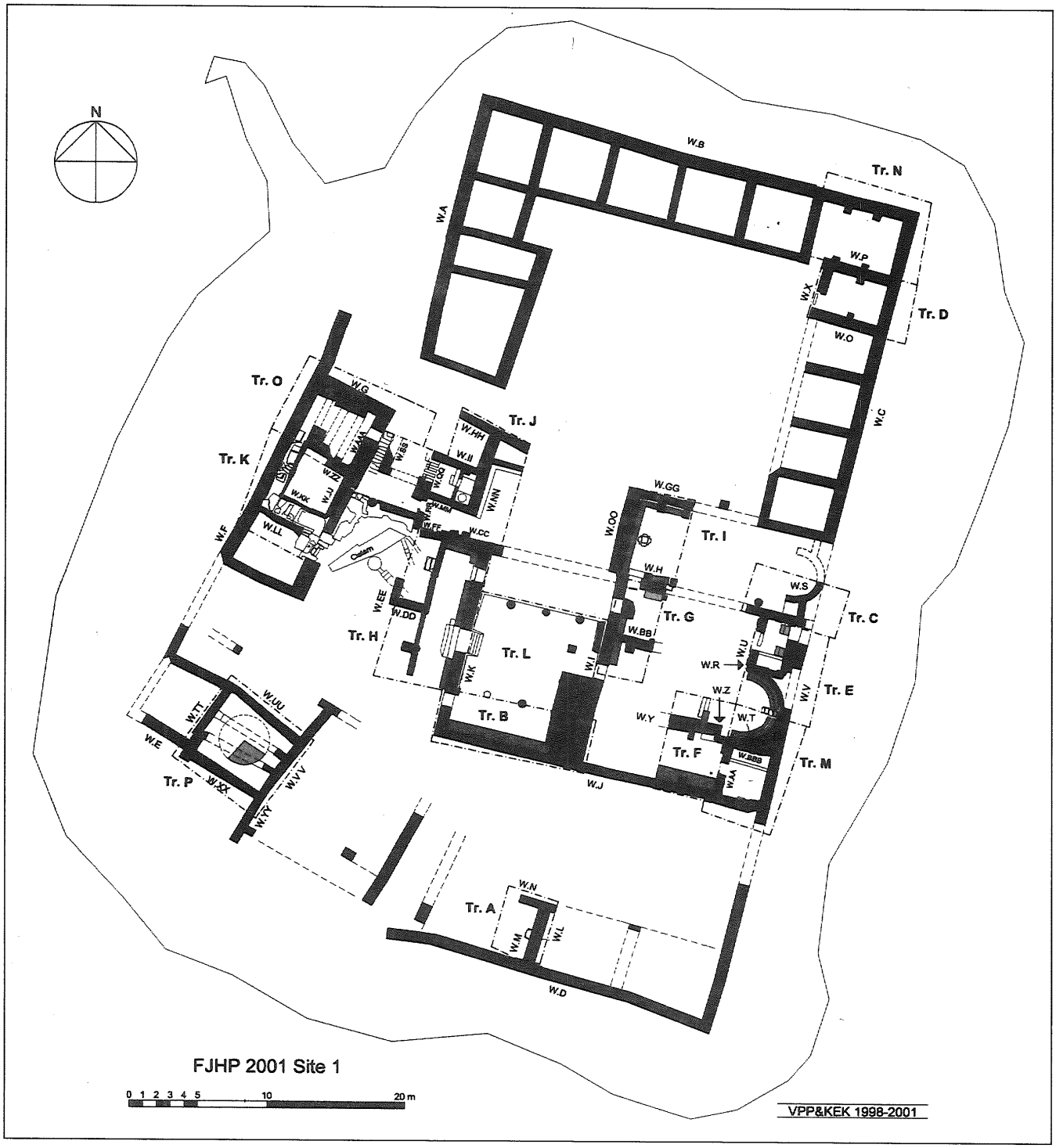
During the 2001 fieldwork, the members of the cartographic team continued to provide assistance in the recording of uncovered entities during the excavations. The recording system based on the use of a tachymeter, with three-dimensional readings downloaded every afternoon to the Project's database, was supplemented by digital imagery taken regularly in the excavation area. The digital images have also been utilized to record specific information related to the conservation work. For example, special attention was paid to the 3D documentation of the arches in Trench O, which required partial dismantling and considerable conservation effort. Furthermore, technical development work at the Helsinki University of Technology was continued, using the collected imagery to further improve the 3D model and to create various image products, such as photomaps (Koistinen *et al.* 2001). Although the 2001 fieldwork included only the excavations, the modeling of the ancient road recorded in 1999 was initiated using terrestrial panoramic images taken during 2000 season (Haggrén *et al.* 2001).

THE EXCAVATIONS

In 2001, the excavations concentrated in the area to the west of a large basilican church in order to continue uncovering the non-ecclesiastical remains at the site (**Fig. 1**). The fieldwork was conducted in two trenches (O and P) which were fully excavated down to the lowest stratum.

Trench O (Nina Heiska and Antti Lahelma)

Trench O is located on the high ridge that delineates the presumed western outer wall (W.F) of the complex. The room with three arches which was uncovered in Trench O appears to have been an integral part of a composite building which occupied the entire ridge. In the central part of this building there is a large room (referred to here as the southern room) uncovered in Trench K in 2000. As this room was found completely filled up with piled-up flat stones, it somewhat resembles a platform-like construction. The work in Trench O was already

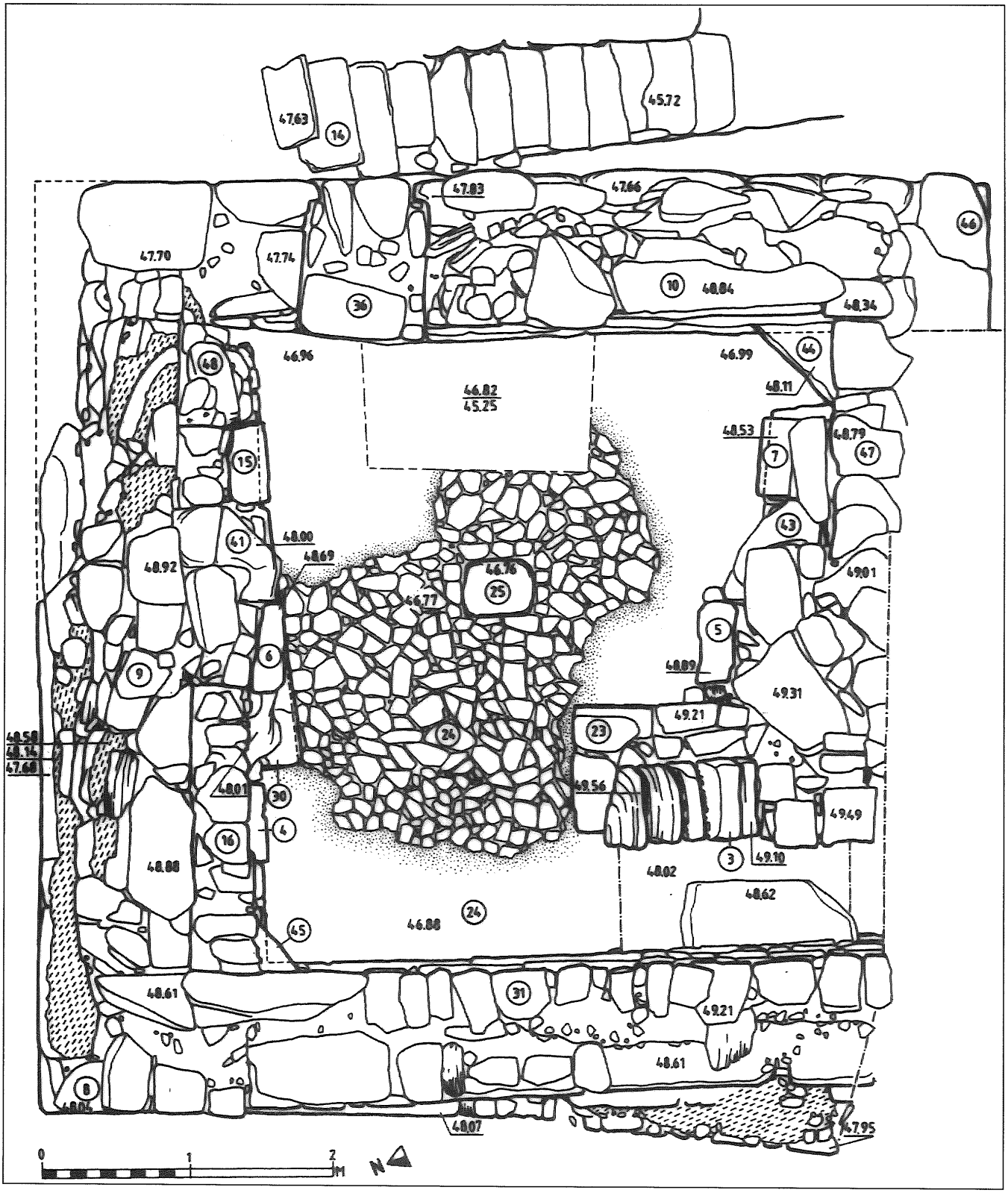


1. The plan of the monastic complex after the 2001 excavation season (by K. Koistinen and J. Latikka).

begun in the same year, partially exposing badly weathered arches already visible on the surface, and delineating the walls enclosing the room. During the 2001 season the trench was enlarged to the dimensions of 7.2m E-W x 6.1m N-S (**Fig. 2**). Additionally, the space adjacent to the NE corner of the trench was partially cleared, although a substantial stone tumble existing there postponed further investigations.

Although the room with three arches was fully excavated, its function within the entire building remains elusive. In spite of the fact that the arched room (Trench O) and the room filled with stones (Trench K) appear to form an entity, it is difficult to correlate the phases of these two structures. Some of the difficulty arises from the long and complex history of rebuilding in this part of the site: the function of the building is likely to have

changed during the course of time. The structures in Trenches K and O differ markedly from the rest of the monastic complex in terms of building techniques and architectural appearance. The entire building appears to have been in use already during the Nabataean period and its use continued (with breaks) into late antiquity, although its function must have changed over time.



2. Top plan of Trench O (by R. Holmgren). Wall designations: Wall F (locus 8), Wall G (locus 9), Wall AAA (locus 10), and Wall ZZ (locus 46).

Phase I: Construction and Initial Use

The initial construction included the four main walls: F (locus 8), G (locus 9), ZZ (locus 46), and AAA (locus 10), remarkably well-made of large, regular sandstone ashlars and a very hard, good-quality mortar. Considering this exceptional quality of building, it was somewhat unexpected to find that at least the eastern wall (AAA) appears to have been standing on soil (loci 38-40), as evidenced in a sounding. In addition to the Nabataean Fine Ware sherds (painted and plain) dated to the first-second centuries AD, these loci also contained ceramic material dated to the fourth-fifth centuries AD. Some parts of the walls may in turn lie directly on top of the bedrock, like Wall JJ in Trench K.

The original building probably had a ground floor and at least one upper floor, with N-S arches (probably three of them) supporting the upper floor. A large, flat slab (locus 41) protruding from the Wall G (locus 9) appears to be all that remains of the original upper floor. On roughly the same level, remains of the ceiling corner supports (loci 44 and 45) are still present in the SE and NW corners of the room (of these, the former shows marks of having been chiselled to fit a wooden roof beam). Furthermore, on approximately the same level as said structures, an offset ca. 0.1m wide is visible on the inner face of Wall F, and traces of a similar offset can be seen on Wall AAA. The presence of a upper floor in the original construction is also implied by the large number of huge ashlars found collapsed in the area just NE of the room (loci 1 and 13).

The pilasters (of which the lowest part of locus 7 is the only visible evidence) from which the ground floor arches sprung were set in a thick layer of mortar (locus 42H), which in turn was laid on a surface made of well-shaped sandstone slabs (locus 42I). The latter (only encountered in a sounding made in the SE corner of the room) also served as bedding for the ground level floor. No trace of the pavers of this floor was found in the soundings – presumably the floor was removed. The entrance to the ground level was located in the NE corner of the room, where a blocked doorway (locus 36) with doorjambs can still be seen. The possible place of a lintel may also be seen on the southern side of the doorway. It is unclear if the large room in Trench K was built in the same phase, but judging by the structure of its walls it should belong to roughly the same time period.

The first phase ended in destruction, doubtless caused by an earthquake: the walls suffered extensive damage, the arches collapsed, the upper storey floor was obliterated and presumably also the ground-level floor was damaged beyond repair. From this point on the building apparently never had more than a single floor.

Phase II: Wind-shelter

Following its destruction, the room lay in ruins but remained in intensive use as a wind-shelter. The stone tumble was cleared, but none of the structures were fully rebuilt. The remains of the original floor were removed, and only in the SE corner bedding was found. The surviving stone pavers were probably reused elsewhere. On the level of the original ground floor, a beaten earth floor (locus 35) was now made. The ceramics from this locus were uniformly dated to the fourth-fifth centuries AD. Where the bedding of the original floor was still present – as in the SE corner – this was used as a living surface. Fires were burned in the room which apparently no longer had a roof, and an ashy occupational layer containing bones, homogeneous pottery deposits, etc., accumulated inside the room (loci 34 and 42G). The ceramic material from locus 34 was slightly later in date than that from locus 35, and it contained the sherds datable to the fifth-early sixth centuries AD. The entrance during this phase was still in the NE corner. Whether or not the lintel was still in place is unknown, but the threshold was removed in this phase. As for the room in Trench K, no information is available except that apparently it was not yet filled up with stones.

Phase III: First Rebuilding and Use

This phase marks a renaissance in the use of the building, perhaps related to the emergence of the monastery on the high plateau. The three arches were rebuilt and presumably also the upper courses of the walls would have been rebuilt, although the only clear evidence of this can be seen in the inner courses of Wall ZZ (part of locus 47). Some supporting, pilaster-like installations (loci 16 and 43) were constructed inside the room, presumably to relieve the pressure placed on the walls by the reconstructed arches. A huge stone (part of locus 43) that was curiously wedged between the SE and southern/central pilasters could be a feature of this phase, and its position may possibly explain the lack of symmetry between these two pilasters.

A new, layered floor level was constructed on top of the occupation layer of Phase II. It consisted of a layer of large stones in the fill of smaller stones and fine soil (locus 33/42F), then a layer of smallish, thick slabs (locus 32/42E); and finally the floor itself, made of small, thin slabs set in mortar and covered by another layer of mortar (locus 29/

42D). Notably, locus 33 yielded ceramics dated to the second half of the fourth through the fifth centuries AD, and no earlier or later material. As the floor now lay ca. 0. 43m above the original (ground floor) level, the doorway in the SE corner became unusable and was blocked (locus 36). The most probable place for an entrance to the room in this phase would be the SW corner, where a corridor (partly excavated already in Trench K) now exists. As long as the southern room was still empty this would have been just a doorway connecting the two. A vertical crack in the masonry of the eastern wall of the corridor may mark the doorway that led to the room, now filled with the pile-up.

Phase III ended in some kind of destruction, for at least the easternmost and possibly also the central arch collapsed or was taken down. Wall ZZ also seems to have suffered damage. Curiously, in the two soundings, the mortar floor did not show any signs of damage. How this can be reconciled with the presumed destruction remains undetermined. Unlike the other two arches, the westernmost arch (loci 03 and 04) apparently remained untouched. The structures that still support its northern part belong to this phase; its voussoirs also have a different angle than those of the other arches.

Phase IV: Second Rebuilding and Use

In this phase, some structures of the room were rebuilt again. The phase can be further subdivided, with all but one of the new features belonging to the first sub-phase.

IVa - For unknown reasons, the floor of Phase III was abandoned and a new floor was built ca 0.5m higher up (**Fig. 3**). This floor features a layering almost identical to the old one: a layer of big stones brought from the plateau (loci 27, 28, 42C), then a layer of smallish thick slabs (locus 26 and 42B), and the surface of the floor, made of thin sandstone slabs set in mortar and covered by a second layer of mortar (locus 24). Locus 26 produced few sherds dated to the sixth century AD, and probably later. The floor slopes slightly towards a small pit (locus 25) in the center of the room. The opening of the pit is 0.47m by 0.43cm and it is ca. 0.42m deep, with gently curving walls covered with plaster, and a rounded bottom. The installation was found covered with a "lid" – a thin sandstone slab. Perhaps the sloping floor with a pit in the middle was reason enough for raising the floor level, but this may equally be associated with the substantial change occurring then in the southern room, i.e. its filling with piled-up stones.

The plastered pit could have been used as a small storage space for foodstuffs, valuables, etc. but this explanation does not account for the gradual sloping of the floor toward the pit. Elsewhere, similar installations have been interpreted as simple treading floors for producing wine or olive oil, with a collecting vat in the center (Frankel 1999: 52). The small size of the collecting vat should indicate the production of olive oil rather than wine, although such could also have been used in the production perfumes or spices from fruits and herbs (Frankel 1999: 54, 57). Frankel's examples



3. The upper (extant) floor inside the room with three arches in Trench O. The pit closed by the capstone is in the center (by J. Vihonen).

are all cut in solid rock, but treading floors could also have been plastered installations (Kingsley 2000: 49). The soft, crumbling sandstone bedrock of the plateau, which quickly absorbs liquids, would seem unsuitable for a rock-cut treading installation.

Also in this phase, the eastern and central arches (loci 05, 06, 07, 15) were rebuilt, although in a haphazard way. The easternmost pilaster (locus 07) on the southern wall was at this point apparently demolished down to the level of the new floor which was then laid out on top of it. Then the pilaster was rebuilt standing on the floor. A supporting installation (locus 30) was built between the floor and the remains of the upper floor of Phase I (locus 41), still protruding from the wall. The northern part of the central arch (locus 06) was rebuilt resting on top of this construction. It is possible that a part of the similar installation (locus 16) built in the previous phase, now hidden by locus 30, supports the same slab, but apparently this was regarded as an insufficient support for the new arch.

Following its probable destruction at the end of Phase III, Wall ZZ was not rebuilt. Instead, a huge pile-up (Trench K, locus 04) of sandstone slabs was deposited inside the southern room, filling up the entire space. The pile-up covers the remaining courses of Wall ZZ while its northern edge has been used to create a vertical, wall-like surface (locus 47) against which the pilasters in Trench O were rebuilt. The westernmost arch, however, would presumably still have been directly supported by the remains of Wall ZZ as it dates from the previous phase. In this phase, the corridor between rooms in Trenches K and O was formed, its eastern wall partly formed by the pile-up. Steps led from the arched room to a landing (in Trench K) from which the top of the pile-up could apparently be accessed.

IVb - During this sub-phase a massive supporting structure of locus 23 under the southern part of the westernmost arch was built. As opposed to most of other supporting installations which feature mortar of the floor (locus 24) lipping up against them, here even the topmost layer of mortar extends under the installation, i.e., the structure was built on top of the floor. Perhaps the arch or the wall behind it at some point became unstable and had to be reinforced.

Phase V: Decay

This phase marks a change in use of the room. The pit (locus 25) was no longer used; it was filled with sand and rubbish wiped from the floor, covered with a slab and never opened again. The fill loci (25 B-E) contained only few sherds but these were predominantly dated to Late Byzantine or the transitional Late Byzantine-Early Umayyad period, i.e., the late sixth-the first half of the seventh centuries AD. Windblown sand and occupational rubbish slowly accumulated on the floor, resulting in a layer (loci 20 and 21) containing quantities of pottery and bones, the latter including several vertebrae of the dorsal bone of a very large fish (possibly a sea bass), and other finds. Again, these loci have yielded pottery predominantly dated to the Late Byzantine-Early Umayyad transitional period. This phase also appears to have ended in destruction. The roof seems to have partially collapsed but the arches remained standing.

Phase VI: Last Occupation Period

The destruction filled the interior with a stone tumble which, however, was then removed from the main part of the room. A crudely built stone blocking (locus 18) was inserted under the westernmost arch. The collapsed stones in the interior were simply thrown behind the blocking which then formed a "platform" with its top ca 0.5m above the still occupied (eastern) part of the room. The corridor remained in use in spite of being half-filled with stone tumble. This is evidenced by a large slab resting horizontally ca. 1.5m above the mortar floor and by the crudely rebuilt uppermost courses (locus 31) of Wall F. The slab, which goes in between the original courses of this wall (locus 08) and the rebuilding, probably marks a level made of collapsed slabs and beaten soil, used for walking in the corridor.

Inside the room, an occupational layer (upper part of locus 20) continued to accumulate. Simple installations, loci 22 and 48, relate to activities of this phase; the former perhaps used to create a surface for storing something under the SE corner connection (locus 44), and the latter being perhaps a cluster of material pushed aside from the middle of the room. The entrance in this phase could have been from the corridor, although it would have required descending down from top of the platform (locus 18). Another possibility is the NE corner, which appears to have suffered severe damage. The blocking of the original door was still in place, but if the wall was preserved only to its current height, this would have been no obstacle. The steps (locus 14) leading up along Wall AAA would have made access convenient.

Phase VII: Abandonment and Natural Deposition

The Phase VI occupation ended at some point and the room gradually filled up with deposits of

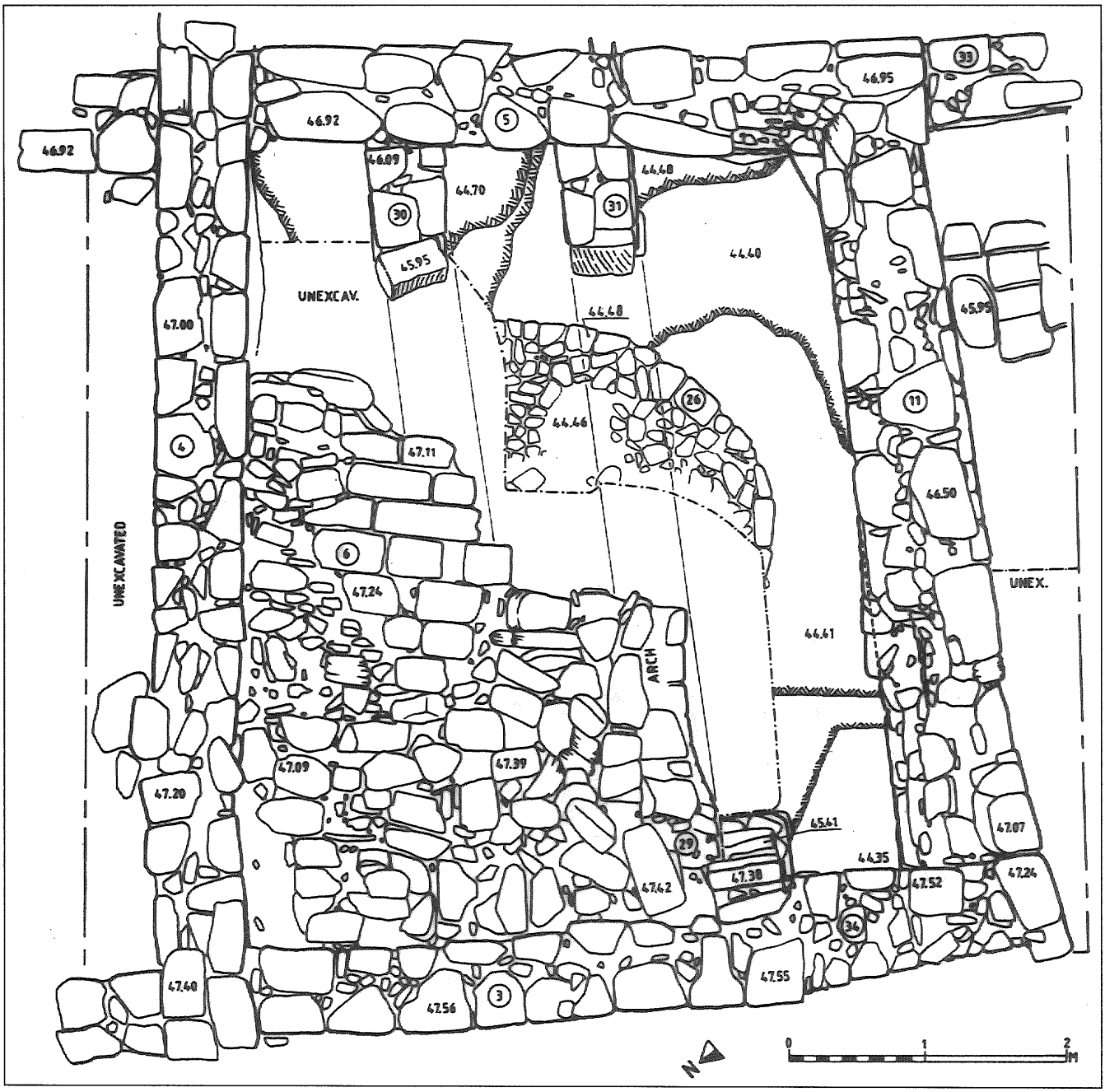
wind-blown sand and some tumbled stones, loci 01, 02, 11, 12, 17, 13. The first four loci contained quantities of Byzantine-Early Umayyad period ceramics. The arches were standing, apparently until recent times. The voussoirs were only slightly tipped but their very badly weathered condition required removal during the excavations.

Trench P (R. Holmgren, A. Rajala, T. Tenhunen and H. Kuisma)

This trench is located in the SW part of the complex, on a small rise which is the southern end of the main western ridge on the site (**Fig. 4**). Directly to the east of the trench area there is a depression which is thought to mark the southern entrance to the entire complex.

Phase I: An Unknown Structure/Enclosure

During this phase, the western and the northern walls (TT, locus 3, and UU, locus 4) were constructed. Wall TT has a bonding pilaster (locus 29) for an arch, which should have had a corresponding installation on the eastern side. It appears, however, that the extant eastern wall (VV, locus 5) was constructed only in the following phase. It is probable that there was a door in Wall UU. However,



4. Top plan of Trench P (by R. Holmgren). Wall designations: Wall TT (locus 3), Wall UU (locus 4), Wall VV (locus 5), Wall XX (locus 11), and Wall YY (locus 33).

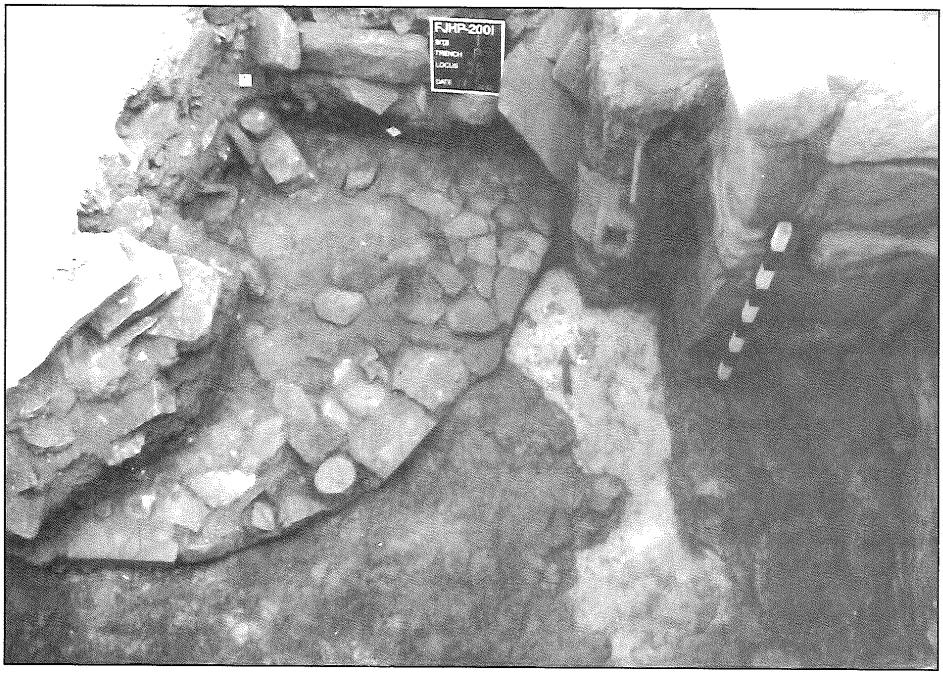
this proposition cannot be easily tested due to the presence of a large piled-up structure (loci 6, 17, 19, 22) built against the southern face of Wall UU in Phase IV. Somewhat later, a southern extension (locus 34) of Wall TT was erected, which continues beyond the southern limit of the trench.

Phase II: Room with Arches

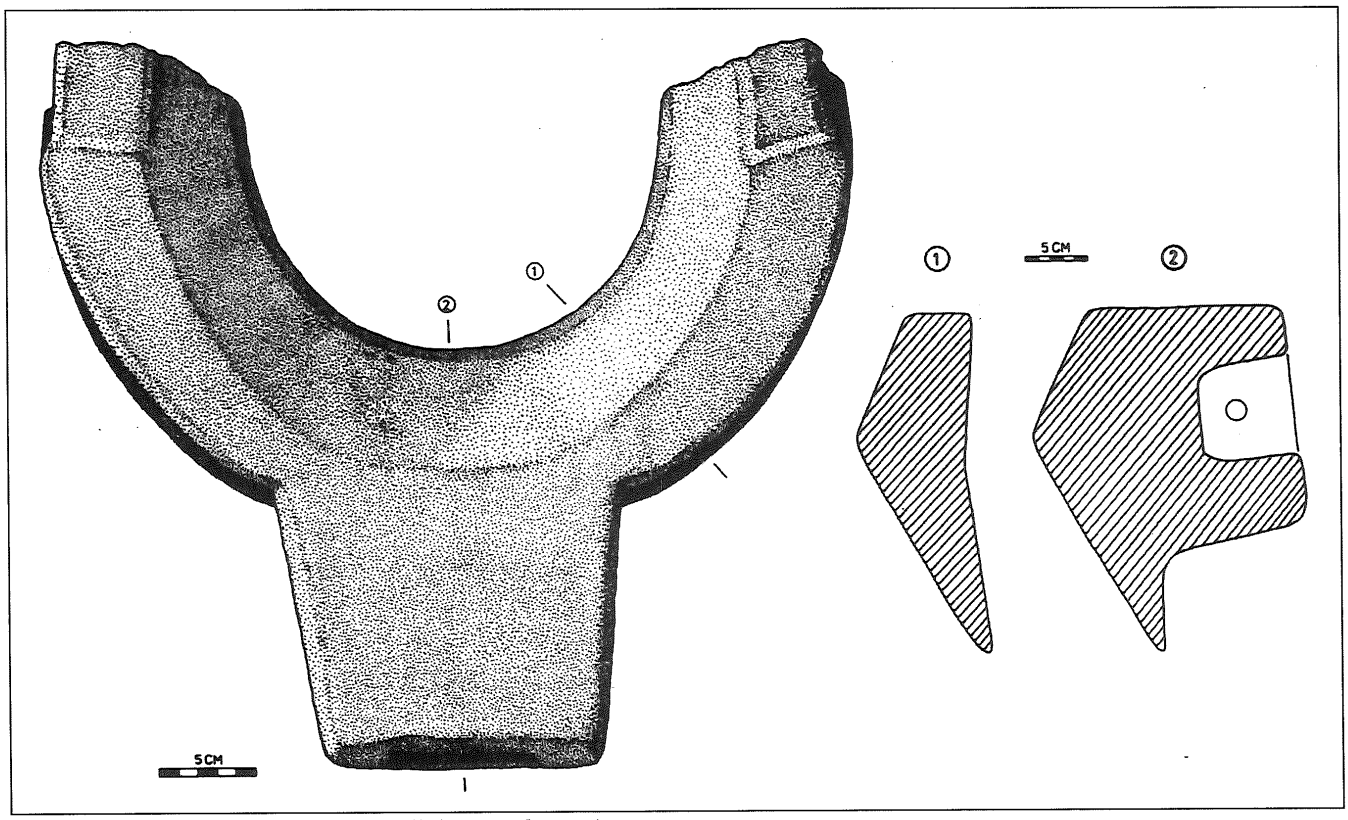
This phase witnessed the construction of a quadrangular room which used the existing Walls TT and UU and the new southern and eastern walls (XX, locus 11, and VV, locus 5). The only possible entrance to this room must have been the hypothetical door in Wall UU. Wall XX abuts the southern extension (locus 34) of Wall TT on the western end, and it bonds with Wall VV on the eastern end. The ceramics recovered from the collapse loci 8 and 13, dated to the second half of the fourth-first half of the fifth centuries AD, may partially belong to the fill of the interior of Wall XX. The line of Wall VV is continued farther south, as Wall YY, locus 33, which abuts Wall XX. It is unknown whether Wall YY was built then or later. The eastern wall had two pilasters serving as bases for two approximately NW-SE arches spanning the interior. Through rebuilding, the orientation of the corresponding, southern, pilaster in Wall TT was modified to respond to the line represented by the southern pilaster built against Wall VV. The corresponding northern pilaster associated with Wall TT is buried under the later structure (locus 6) built against Wall UU. There might have been a formal floor directly on top of the bedrock but no traces of it were found although the soil locus 27 seem to have been a floor buildup to even up the level of the bedrock. That locus contained ceramics primarily dated to the late fourth-fifth centuries AD.

The central part of the room was occupied by a round low platform (locus 26) built of irregular but flat stones (**Fig. 5**). One quarter of that platform was exposed. The purpose of this platform appears to have been as a space where grain was ground for flour. This is inferred from the presence of the upper part of a basalt rotating grain mill (Pompeian type), found lying beside the pilaster of the southern arch, in the fill of locus 32 (**Fig. 6**).

Directly south of Wall XX, and within the confines of the trench, a narrow space was excavated which yielded well-stratified remains of a midden. It consisted of loci 10, 18, 20 (concentration of ash) and 21 (only the top exposed). Generally, these loci included ashy soil, often containing the frequently burnt sherds of cooking pots. A preliminary analysis indicates the presence of large quantities of fish scales and bones (see below). The depth and extent of the midden deposit are unknown but apparently continuing beyond the southern balk of the trench. The midden could have come into existence as soon as Wall XX was constructed in Phase II. However, it is equally possible that the deposition of food remains, ceramic debris and ash began later. At any rate, all three loci (10, 18, and 20) contained ceramics mostly dated to the transitional Late Byzantine-Early Umayyad, and Early Umayyad periods (late sixth-seventh centuries AD). As the nature of occupation south of Trench P is unknown it was decided to continue the excavation of this area (including the remaining part of the midden) during the following season.



5. The stone platform in the center of Trench P. The upper part of the rotary grain mill is visible between the platform and the arch pilaster (by J. Vihonen).



6. The upper part of the rotary grain mill (by R. Holmgren).

Phase III: Disuse - Temporary Abandonment(?)

The entire space seems to have been partially abandoned at the end of Phase II. A thick ash deposit (locus 24), possibly the remains of a hearth, was deposited on top of the platform, locus 26. The wind-blown sandy deposits, exemplified by loci 23 and 25, accumulated throughout the interior of the room. These loci had ceramics mostly dated to the Late Byzantine through the transitional Late Byzantine-Early Umayyad periods.

Phase IV: Reoccupation of Undetermined Nature

At the beginning of Phase III, a large, rectangular, soil and piled-up stone, heavy buttress-like structure was built against the southern face of Wall UU and on top of the wind-blown deposits above the round platform. The structure extends from Wall UU south to the line marked by the southern arch. The structure is composite and it consists of the following strata (from the bottom up): hard-packed soil with stones (locus 22), a very compact, hardened layer of soil (locus 19), a layer of irregular, tightly packed stones (locus 17), and a layer of ashlars and flagstones laid on the top in rough rows (locus 6). These loci produced ceramic finds representing the dating range from the Byzantine through the transitional Late Byzantine-Early Umayyad periods. It is apparent that the room remained unroofed during this phase. The western part of the southern arch was still standing during the excavation, marking the southern extent of the structure. But the northern arch apparently collapsed or was taken down during the erection of the structure and its voussoirs were left inside the structure, still preserving the basic line of the arch. The top of Wall UU was seemingly levelled out, flush with the top of the structure. The function of this installation is unknown; it might have been a large defensive or supportive buttress, or a "plat form" for a special purpose.

With the construction of the buttress, the only possible entrance to the room (in Wall UU) would have been permanently blocked, but the standing walls would still provide a shelter. Certain strata provide relatively large quantities of broken ceramics, bones, eggshells, and ash deposits. To these belong loci 9, 12, and 14 in a relatively restricted space between the northern pilaster built against Wall VV, and Wall UU, and locus 16 south of that pilaster. These loci produced pottery dated from the fifth through the first half of the seventh centuries AD. As no well-defined occupational surfaces were detected there it is also possible that these deposits represent episodes of dumping debris from occupational areas located near the room.

Phase V: Destruction and Latest Deposition

Wind-blown sandy deposits, such as loci 13

(lower) and 15, accumulated elsewhere within the room. The collapse of the walls is represented by stone tumbles loci 7, 8, 13 (upper). These may reflect episodes of destruction but also the gradual deterioration of the walls' condition. Locus 2 seems to specifically represent the collapse of Wall TT. Locus 1 is the most recent natural deposition.

THE ARCHAEOZOOLOGICAL RESEARCH
(J. Studer)

During the 2001 excavations at Jabal Hārūn, very large quantities of fish scales were recovered from a midden located in the southern part of Trench P. Two distinct layers have been recognised (loci 10 and 18), essentially composed of fish scales in the matrix of sandy, occasionally ashy soil and small stones. Bones and ceramics have been found in these strata as well. A layer, locus 20, composed of fire residue (ash, charcoal), without any significant number of animal remains, separates the two layers. It is unknown at this point of time how large is the entire midden; apparently only a part was exposed in 2001. To achieve a maximum retrieval of all finds, especially the faunal remains, the sediments of the midden were sieved through a 3mm mesh. The assemblage comprises a total number of 3,188 bones, and the multitude of scales, filling three large buckets, which corresponds to ca. 90 litres.

The Fish Scales

The results of the archaeozoological research indicate that this large amount of scales represents fish processing and preparation before actual consumption. To obtain a general idea of the quantity and variety of the scales, ca. 170ml of the sieved midden sediment were sorted and the small residues examined under the microscope (6x). In this procedure, only the complete or almost complete scales were counted. Identification of scales is particularly difficult because of their great variability in shape as well as in form, and because they vary in different parts of the same fish. Until a more complete fish scale reference collection is created, only a preliminary evaluation of the material from Jabal Hārūn is possible.

A total of 524 complete scales were counted in 170ml of sieved sediment, roughly separated into three size-related categories: large, medium and small. The majority of the scales fall in the medium-size group, with an average width of 0.5 to 2cm. They seem to belong essentially to emperors and parrotfish, and only some of them, ca. 1cm wide, show the typical scale form of groupers. There are also fragments of very large scales of several forms which are as yet unidentified, and 181 small scales of 1 to 2.5mm, which correspond to *Scombridae*.

It seems that parrotfish scales are more fragile than scales of other taxa and tend to break more easily. The 2002 field season will include a careful excavation of the as yet untouched part of the midden in way to confirm this preliminary observation. If it is confirmed, then the final analysis will face difficulty in estimation of the relative frequencies between emperors and parrotfish, as the quantity of parrotfish scales will be biased by taphonomic factors. Not only the robustness of the scales is involved here, but also their number per fish and their size, depending on the species and the size of the fish.

The Fish Bones Recovered from the Midden

The majority of the 3,188 bone remains (identified and unidentified fragments) recovered from the midden represent fish (90% of the total). Mammals comprise 9% and birds only 1%. The quantity of fish increases to 95% if the number of identified bones is used for calculation of species frequencies.

The most common fish are parrotfish (*Scaridae*; 73% of the identified fish bones). At least 81 individuals have been recognized (**Table 1**), almost all of them of a standard length between 20 and 30cm. Though less common, three other fish families appear regularly: emperors (*Lethrinidae*, 13%), groupers (*Serranidae*, 8%) and tunas (*Scombridae*, 6%). Other fish such as snappers (*Lutjanidae*), wrasses (*Labridae*), mullets (*Mugilidae*) or seabreams (*Sparidae*) are rare (3%), and in terms of quantity they seemingly played a minor role in the diet. Small *Clupeidae* of less than 10cm length are also attested.

The great abundance of parrotfish could be due to the taphonomic factors. It is known that differences in robustness, size and shape of skeletal elements, within and between fish taxa, affect their abundance in archaeological deposits (Wheeler and Jones 1989: 61-78; Colley 1990: 212ff; Falabella *et al.* 1994). Pharyngeal teeth of parrotfish, which are coral crushers, are particularly resistant, strong and large skeletal elements. In Trench P, the most abundant element is the upper pharyngeal bone which gives a minimal number of individuals estimate (MNI) of 54 (locus 10) and 27 (locus 18) individuals for these layers of the midden (**Table 1**). The lower pharyngeal bone, a single bone, gives an MNI of 38 and 18 for loci 10 and 18 respectively. If only the skeletal elements are considered minus the teeth, then the hyomandibular is the most abun-

Table 1: The more common parrotfish bones identified at Jabal Hārūn. NISP = number of identified bone; MNI = minimum number of individual (by J. Studer).

Parrotfish (Scaridae)	TRENCH P						TRENCH D	
	locus 10		locus 18		TOTAL		TOTAL	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
premaxilla	17	10	18	16	35	16	72	(43)
dentary	18	11	12	9	30	20	40	(30)
hyomandibular	23	13	16	9	39	22	47	(21)
upper pharyngeal bone	90	54	40	27	130	81	39	(20)
lower pharyngeal bone	38	38	18	18	56	56	28	(25)
vertebra	114	10	82	12	196	22	357	(28)
other element	*89*	-	*48*	-	*137*	-	*178*	-
TOTAL	389	54	234	27	623	81	761	43

dant element and represents an MNI of 13 and 9. These data illustrate the differential preservation of skeletal elements within the same family of fish. However, the final interpretation of these data will have to await a more detailed study since human activities, such as the preparation of fish for transport or for consumption, could also affect the representation of the bones at the site.

To ascertain that parrotfish is indeed more abundant in the midden than emperors or groupers, a comparison of the same skeletal elements families (for example, the hyomandibular), considered to have the same potential of preservation between the three fish has been undertaken. The results confirm that parrotfish have been the major fish eaten in the monastery, and are about 3 to 6 times more common than emperors and at least 7 times more common than groupers.

The large quantity of parrotfish bones gives some indication of the body part frequency. Although the entire fish is represented in the remains, there is an abundance of upper pharyngeal teeth, as shown in **Table 1**. But there are also two anomalies worth mentioning. First, if upper pharyngeal teeth have a better preservation gradient than lower pharyngeal teeth, premaxilla or dentary (all of them robust elements), the same proportion should be found in other assemblages at Jabal Hārūn. This, however, is not the case. In the room excavated in Trench D, one of the 14 rooms around the North Court and preliminarily interpreted as a hostel room for pilgrims, the most abundant element of parrotfish is the premaxilla (twice more frequent than the upper pharyngeal bone). The second anomaly is the frequency of vertebrae. Usually, vertebrae represent the majority of fish remains, often more than half of the fish bones at a site. Compared to Trench D where vertebrae comprise 47% of the identified parrotfish bones, the vertebrae in the midden represent only 31% of all fish remains. These variations are probably influenced by natural taphonomic factors, but human activities could also have some role in affecting the relative proportion of these skeletal elements.

Sorting out a sample from the midden sediment under the microscope has yielded 12 tiny vertebrae of less than 1mm, including some *Clupeiformes*. These small remains resemble those found in a Late Roman pilgrim flask from az-Zanṭūr الزنطور (Petra), which contained the residue of the famous fish sauce – hallec – gastronomically much appreciated condiment during antiquity (Studer 1994). A Late Roman jar filled with tiny fish bones was also found at Aila-'Aqaba (Parker 2000: 379), and small Clupeidae used as condiment (similar to the fish sauce from Petra) have been found in a storeroom at Masada, and dated to 30-20 BC (Cotton *et al.* 1996). The evidence of preparation of small fish for sauce suggests the interpretation of the vertebrae from the midden at Jabal Hārūn as remains of culinary activities rather than the stomach contents of larger fish. Apparently, small fish were also consumed in the monastery. The tiny bones could be considered as a residue of a thick fish sauce (hallec) which was usually filtered to be specifically used as a juice. Therefore, these bones represent the refuse from the kitchen rather than the remains of a meal.

The Bones of Mammals and Birds

The presence of mammal (9%) and bird (1%) remains in the midden is insignificant. However, it is important to note that the only significant difference observed between loci 10 and 18 in the midden concern the mammal bones. In locus 10, mammal remains represent 2% (28 fragments) of the total number of bones found, as well as of the number of identified specimen (NISP: 18/888). In locus 18, they represent 15% (265) of the total number of bones, and the frequency decreases to 7 on the basis of NISP (30/403). Although the mammal bones are more frequent in the lower layer (locus 18) of

the midden, they are actually more fragmented than in the upper layer. The high degree of fragmentation may be due to the higher degree of pressure and compaction affecting the lower layer. But then it would be expected that compaction should also affect the preservation of the fish bones or scales, which does not appear to be the case so far. The observed differences in the frequency and fragmentation of mammal bones will have to be further confirmed by the analysis of material to be excavated in 2002.

The majority of the 48 identified mammal bones represent sheep and goat (88%). Cattle is also attested by 6 fragments found in locus 18. Chicken is the most common bird (85% of bird remains), and eggshell fragments of hen are regularly found mixed with the fish scales. Bones of wild birds like chukar partridge and water rail are also present.

There is practically no evidence for gnaw marks on the bones, either by dogs or rodents. In addition, rodent bones are missing from the midden sample checked under the microscope. Though the preceding archaeozoological study on another room of the monastery had shown that no bones were gnawed by dogs (Trench D; Studer in Frösén *et al.* 2001b), large quantities of birds' remains (and also some mammal bones) were gnawed by rodents. The presence of rodents' gnawing marks on the material from Trench D and their absence in Trench P has yet to be explained.

The Significance of the Midden

It is apparent that the part of the midden excavated during the 2001 campaign was filled up with kitchen refuse during the Byzantine period and probably later. The overwhelming abundance of scales is remarkable, and reflects *in situ* deposits that have been preserved till now, probably untouched.

The major characteristics of the midden, as compared to the culinary remains found in Trench D, can be summarized as following:
- an overwhelming predominance of scales;
- a high proportion of fish bones compared to mammals and birds (90% against 65% in Trench D);
- an absence of rodents and rodent gnawing on bones;
- parrotfish maintain the same proportion (73% and 78%), but the frequency of emperors and groupers is reversed: the emperors increase (13% against 8%) and the groupers decrease (6% against 14%).

There is no indication whether such density of fish remains could have been accumulated through intensive activity counted in weeks, months, or years. The quantity of fish scales obviously represent many more individuals than the minimum number estimate obtained from the fish bones, but a presence of the more substantial bone accumulation is still possible in another, yet unexcavated, part of the midden.

As shown by the ichtyofaunal analysis, the vertebrae can usually be connected forming assemblages of up to 6 joining elements. These connections can be recognized in the remains of the four major fish families. One set of vertebrae, of a skipjack tuna *(Watsuwonus pelamis)*, has a cut mark that can be observed along 4 vertebrae. All these anatomical connections restricted to some bones suggest that we have remains of a part of the body, and not the entire fish. Thus the vertebrae may represent kitchen refuse or culinary remains, but undoubtedly, the scales and the eggshells have to be considered in the context of the food preparation.

CONSERVATION ACTIVITIES
(C. Danielli)

During the past two seasons conservation work at Jabal Hārūn was mainly concerned with emergency repairs to stabilize the excavated architectural remains. As the excavation continues, larger areas of the site are gradually exposed, thus requiring more extensive preventive measures. During the 2001 season, the following issues were specifically addressed:
- a need for a more thorough analysis of the Byzantine building techniques used at the site;
- more substantial work on the stability of the architecture;
- the necessity of temporarily protecting the weakest structures with protective shelters;
- wall reinforcements and backfilling.

At the beginning of the season a survey of all previous conservation work was carried out to verify the condition of the structures and the repairs. Since the repairs applied during the previous seasons appeared to be effective and stable, the work was focused mostly on the consolidation of the recently exposed sandstone masonry. An extensive consolidation of the lime plaster covering the walls of a room in Trench J, which had suffered some losses during the winter, was also completed.

Masonry Repairs

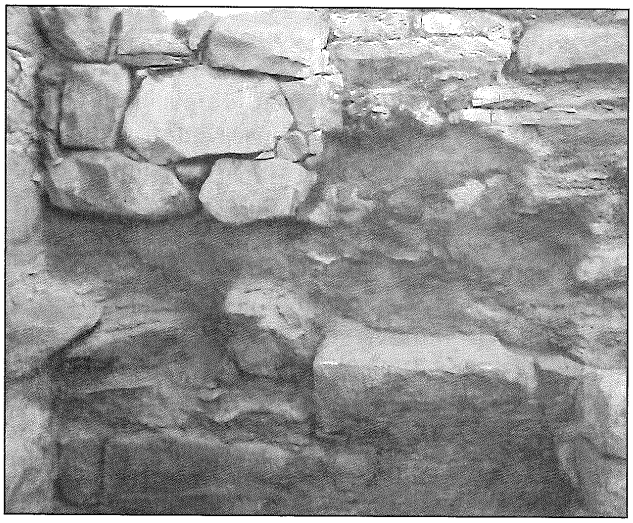
These were carried out principally in Trenches P, J, M and O. In Trench P an inner wall was reinforced with lime mortar in order to allow further excavation. As the walls of the site were generally constructed using sandstone blocks cemented with mud mortar which had disintegrated, a similar mud mortar was used as replacement, combined with a

small amount of hydraulic lime, to avoid altering the appearance of the original architecture (**Fig. 7**). In the areas where the disruptive effect of running water would compromise the integrity of the structure, lime mortar repairs and pointing were applied to avoid water infiltration and the displacement of detritus and small stones which were loosely encased in the masonry. These repairs were then brushed with wet soil to prolong the setting time as well as to give the repairs a more "natural" appearance.

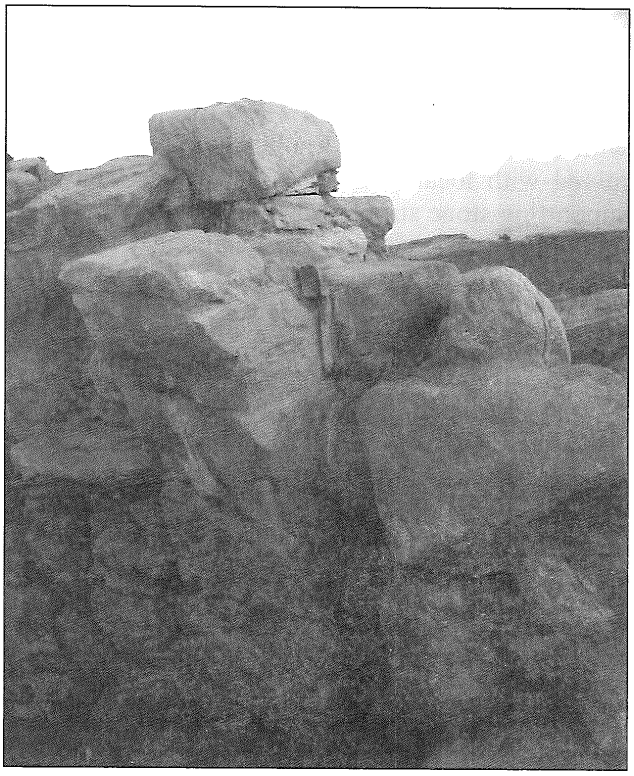
While the staircase leading up to the structure in Trench O was in good condition, the adjoining wall with its attached base of an arch was collapsing due to the laminating and exfoliation of the sandstone blocks and the erosion of the binding mortar. After eliminating the pulverized mortar and debris from deep inside the wall, lime mortar containing crushed pottery was pushed inside the large gaps, and leveled to fill the base of the wall. Once the mortar had set, the weak blocks were removed and replaced with limestone ones. This operation was extremely difficult due to the thickness of the wall and the constant threat of collapsing blocks. When the gaps were filled and the blocks set in place, the joints between the blocks were sealed with mud mortar.

A similar operation was performed on the northwestern wall (AA) and the eastern perimeter wall (V), both located in Trench M and composed of large blocks of sandstone. As in the previous case, the walls were freed from debris and filled with lime mortar containing crushed pottery. Loose fragments of wall plaster were consolidated and secured with injections of Syton X30 (20% diluted in water). After the setting of the mortar, the joints were sealed with mud mortar. The outer side of Wall V was partly buried. When the soil was removed, it revealed that the lower blocks were in very poor condition due to the presence of salts in the soil. As the surface soil is sandy, the salts penetrate below the surface, crystallizing where the damp, compacted soil joins the sand layer, causing some of the buried sandstone blocks to disintegrate. The upper blocks of the wall were removed and the weakened bottom blocks were replaced by limestone ones. The wall was rebuilt using lime mortar to bind the ashlars.

While excavating the structure in Trench O, particular care was taken in securing the bases of the uncovered arches (**Fig. 8**). The consolidation of the walls and the arches had to be carried out gradually throughout the excavation to avoid the drying out of the walls and the consequent risk of contraction. As in the previously described cases, the weaker stones were found at about one and half meters below the surface, due to salt crystallization. This created a problem for the support of the arches and the integrity of the walls themselves. It was impossible to remove any of the ashlars, since the walls were quite unstable and the damp soil, which kept them together, was rapidly drying into dust. Emergency stabilization of the soil was carried out using Syton X30 (20% diluted in water) injected directly into the mud mortar. This method was tested beforehand on other stronger walls of the site and it worked quite effectively in stabiliz-



7. Consolidated mud mortar of Wall G in Trench O after treatment (by J. Latikka).



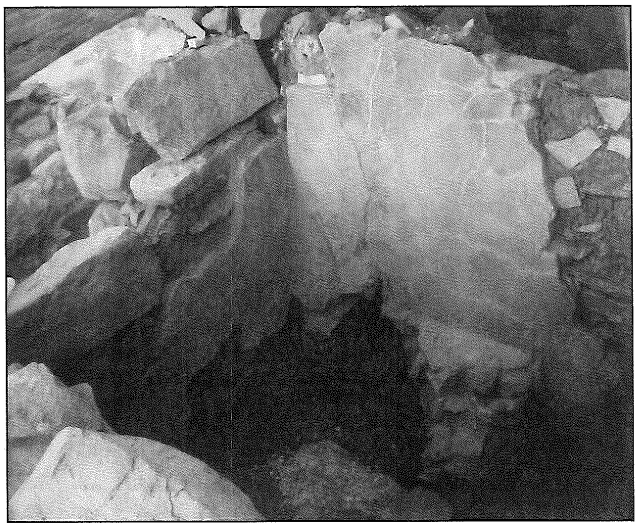
8. Arch pilaster and springer from Trench O after treatment (by J. Latikka).

ing the mud mortar, compacting it into a solid mass, which allowed the application of a final layer of lime mortar between the joints. For masonry repairs, the following mortars were used:
Mortar 1: 1:2.5 Hydrated lime with a small quantity of white cement : local sand + (for deep gaps) crushed pottery.
Mortar 4: 2:1 Local clay mixed with sand : hydrated lime.

Wall Plaster

The wall plaster uncovered in Trench J during the 2000 Season had survived poorly even under the temporary shelter. During the winter strong winds had damaged parts of the plastic sheeting of the shelter causing water infiltration, which damaged the upper parts of the wall plaster. The plaster was re-adhered to the wall with injections of liquid hydraulic mortar (Microlite) and kept in place with wooden props until the setting was complete. The cracks were sealed with lime mortar (**Fig. 9**). The exposed wall structure made of mud mortar and stone fragments was consolidated with injections of Syton X30 (20% in water). The same was done for the plaster surrounding the basin and the bench area and the floor, which was made of rough pebbles mixed into the lime. A new covering made of strong tent canvas was devised for the temporary shelter.

Two water channels leading to the cistern from the area in Trench J were also consolidated. They consisted of stone channels lined with a layer of hydraulic mortar, which became quite brittle and loose. The mortar was strengthened by injections of Syton X30 (20% in water). The edges were secured with a thin layer of hydraulic mortar (Serpo 148) mixed with local sand. In some places where the supporting stone structure was missing, a reinforcement of lime mortar with crushed pottery was used.



9. Wall plaster in Trench J after treatment (by J. Latikka).

The following mortars were used for plaster repairs:
Wall plaster: 1:2 Hydrated lime with a small quantity of white cement : local sand.
Water channels: 1:2 Hydraulic lime (Serpo 148) : local sand. Syton X30 was used for the consolidation of the original hydraulic mortar.

As the mortar repairs carried out during the previous seasons have held out very well in the arid climate, proportions were kept the same and the same type of lime was used. Further testing has been carried out on Syton X30, changing the dilution and using it as a consolidant for the constituent mud mortar of the original walls. As the use of ethyl silicate proved quite difficult because of the rapid evaporation rate of the solvent, Syton was preferred because it can be diluted in water and is easier to apply. It has been very successful in consolidating loose material such as mud mortar mixed with sand and brittle, eroded plaster fragments. All operations have been carried out considering factors of the reversibility of treatments and the historical authenticity of the site. Because interventions during this season concerned the original structure of the monastery, the close collaboration of all the members of the FJHP was extremely helpful in establishing the significance and function of the uncovered architectural elements, as well as in identifying traditional Byzantine building techniques.

Small Finds (S. Pouta and A. Karakoski)

During the 2001 field season all new finds were cleaned of soil and packed for transportation. Fragile ceramic objects were consolidated to avoid further damage during transportation. Metal objects were packed with silica gel to protect them from moisture and corrosion. Small finds included metals, most of them small coins, decorated marble fragments, a lamp mould, ceramic pots and a small carved mother-of-pearl cross. Registered objects were taken to Finland for conservation and further study. All objects were properly cleaned in the conservation lab. Metals were treated with BTA and incralack to stop further corrosion. Where salt encrustations were suspected in ceramic objects, the pieces were soaked in several baths of deionized water to remove soluble salts. After cleaning, the broken objects were conserved.

PRELIMINARY ASSESSMENT

(Z.T. Fiema and R. Holmgren)

Contrary to previously held opinion, it is now apparent that while the rooms in Trenches O and K should be dated to the Nabataean period, the inten-

tional filling up of the room in Trench K must have happened during the later phases of occupation at the site, most probably during the Byzantine period. Both rooms, judging from their layout, architecture and masonry, were the components of a larger, Nabataean/Roman period structure. Whether or not the structure had a sacral function then, cannot be fully verified at this point of the fieldwork. At any rate, the excavations of the room with three arches (Trench O) have provided useful chronological indicators, perhaps applicable to the entire structure. The ceramics from the lowermost strata below the lower floor (Phase III) are either Nabataean or fourth-fifth century in date. Taking into consideration the removal of the original (Phase I) floor and the remains of the casual occupation (Phase II), it is possible that the original Nabataean-Roman structure was seriously damaged sometime in the fourth century, perhaps as a result of the AD 363 earthquake. Causal occupation continued for some time until the monastic center was constructed in the fifth century, and the structure incorporated into its precinct. The occupation in Phase III (lower floor) and Phase IV (upper, extant floor) would have continued throughout the sixth century and probably later. The gradual disuse of the place (Phase V) may be dated to the transitional Late Byzantine-Early Umayyad period, i.e., the later sixth-the first half of the seventh century and probably later.

The function of the structure once it was incorporated into the monastic complex is more problematic. Besides the most common function – habitation – there are few indications of any specialized use. The centrally located pit in the room in Trench O provides the only indication of a secondary use of that room during Phase IV. As stated above, the interpretation of the room in Trench O during that period – as a place where olive oil was pressed, filtered or stored – is so far the most plausible although not fully satisfactory. If the room's floor was used then as a treading surface, the pit could have served as a collection vat in the initial processing. Remains of olive pressing installations were found even in small isolated monasteries of the Sinai (Dahari 2000: 161), and the olive oil production in the Petra-Wādī Mūsā area during the Nabataean through the Early Islamic times is also supported by extant remains of the installations (e.g., 'Amr *et al.* 2000: 233-234, 239, 244).

The 2001 excavations also provided significant information about the economic aspects of the occupation in the monastic/pilgrimage complex, specifically in terms of the evidence of the diet of the site inhabitants and their visitors. Bones, seeds and plant remains were already collected during past campaigns, but the quantities of fish remains (bones and scales) recovered in the midden in Trench P are indeed substantial. Furthermore, it appears that the midden continued to be used, possibly even beyond the latest occupation of the room in Trench P. At any rate, a fish diet in the monastic context is not surprising. For example, it is known that small salted fish made into a thick soup was quite popular among monks (Dembinska 1985: 441). Also, fish occurs commonly in monastic/ pilgrimage contexts, e.g., *Scaridae* at Dayr al-Qaṭṭār al-Byzanṭī on the Lisān (Holmgren and Kaliff 1997: 324; Politis 1992: 284). Hopefully, future analysis will be able to detect the specific patterns and variations in dietary practices at the site.

In this context it is worth mentioning two Nessana letters (P. Nessana 47, before AD 605?) which deal with the shipment of fish (Kraemer 1958: 139-141). The exchange is between the abbot Patrick from Nessana and the deacon Stephan from an unidentified locality. Apparently, the Stephan's original request of 90 pounds of fish was not fully accomplished because Patrick sent "80 pounds of fish and 20 large heads," of which 70 pounds actually arrived. Notably, the text mentions *skaros* in Greek which probably means that parrotfish is specifically involved here. Nessana in the Negeb is located more than 150km away from the Red Sea, the natural habitat of parrotfish (Colt 1962: 66). The excavations at Nessana ('Auja al-Ḥafīr) yielded bones of parrotfish in considerable quantities (Colt 1962: 66-67; Jackson 1962: 67-68).

It is apparent that the midden discovered at Jabal Hārūn in 2001 largely represents the remains coming from food processing and preparation. The actual consumption activities may have taken place nearby. In a monastic context, segments including the refectory, kitchen, granary storerooms, flour production area and a bread oven were usually located in one area, as at the Khirbat ad-Dayr monastery in the Wādī al-Ghār of the Judaean Desert (Hirschfeld 1996: 140). The room uncovered in Trench P appears to have belonged to the kitchen complex, at least during Phase II. A large domed, bread oven with a circular stone baking platform was discovered at the monastery at Khirbat ad-Dayr (Hirschfeld 1996: 148-149) in a setting similar to that of the room in Trench P. However, the low circular platform at Jabal Hārūn is better associated with flour-producing activities, which is further indicated by the discovery of the rotary grain mill fragment there. A similar basalt biconic mill was found in the monastery of Khirbat Siyar al-Ghanam near Bethlehem (Corbo 1955: 9). As the

midden at Jabal Hārūn contains large quantities of ash, this may indicate the presence of an oven nearby. Bread was the basic staple of the diet of monks living in communal monasteries, and bread loaves were stamped with a cross (Dembinska 1985: 438; Hirschfeld 1996: 144, 149). A small limestone stamp with a lightly engraved cross was found during the 1999 fieldwork at Jabal Hārūn (FJHP Reg. No. 78). It should be noted, though, that some of the stamps with cross engravings are not necessarily found in the place of their original use. They were also traditionally preserved as valuable holy objects (Galavaris 1970: 20-21).

The recent discoveries indicate that the Monastery of St. Aaron had its own food production and subsistence strategy, and was not just dependent on the gifts and donations from the pilgrims and the population living nearby. This again supports the idea that the St. Aaron Monastery was of a *coenobium*-type, a proposition already put forward two years ago.

J. Frösén
Z.T. Fiema
Institutum Classicum
PL 4, Vuorikatu 3 A
FIN-00014-University of Helsinki
Finland

K. Koistinen
Institute of Photogrammetry and
Remote Sensing
Helsinki University of Technology
P.O. Box 1200
FIN-02015 HUT, Espoo
Finland

J. Studer
Département d'archéozoologie
Muséum d'histoire naturelle
CP 6434, CH-1211 Genève 6
Suisse

C. Danielli
Conservazione Beni Artistici
Via Agrigento 3
00161 Rome
Italy

R. Holmgren
ARCDOC, Archaeological Documentation
Wollmar Yxkullsgatan 15B
SE-118 50 Stockholm
Sweden

Y. Gerber
Department of Archaeology
University of Basel
Schoenbeinstrasse 20
CH-4056 Basel
Switzerland

N. Heiska
A. Lahelma
Institute for Cultural Research
Department of Archaeology
P.O. Box 59
Unioninkatu 38 F
FIN-00014 University of Helsinki
Finland

References

'Amr, K. *et al.*
2000 Summary Results of the Archaeological Project at Khirbat an-Nawafla/Wadi Musa. *ADAJ* 44: 231-256.

Colley, S.M.
1990 The Analysis and Interpretation of Archaeological Fish Remains. Pp. 207-53 in M. B. Schiffer (ed.), *Archaeological Method and Theory, 2.* Tuscon.

Colt, H. Dunscombe
1962 Biological Remains. Pp. 66-67 in H. Dunscombe Colt (ed.), *Excavations at Nessana (Auja Hafir, Palestine).* Volume 1. London: British School of Archaeology in Jerusalem.

Corbo, P.V.
1955 *Gli scavi di Kh. Siyar el-Ghanam (Campo dei pastori) e i monasteri dei dintorni.* Jerusalem.

Cotton, H., Lernau, O. and Goren, Y.
1996 Fish Sauce from Herodian Masada. *JRA* 9: 223-238.

Dahari, U.
2000 *Monastic Settlements in South Sinai in the Byzantine Period.* Jerusalem.

Dembinska, M.
1985 Diet: A Comparison of Food Consumption between some Eastern and Western Monasteries in the Fourth-12th Centuries. *Byzantion* 55: 430-462.

Falabella, F., Vargas, M.L. and Melendezet, R.
1994 Differential Preservation and Recovery of Fish Remains in Central Chile. Pp. 25-35 in W. van Neer (ed.), *Fish Exploitation in the Past.* Proceedings of the 7th Meeting of the ICAZ Fish Remains Working Group. Annales du Musée Royal de l'Afrique Centrale, Sciences Zoologiques, No 274. Tervuren.

Frankel, R.
1999 *Wine and Oil Production in Antiquity in Israel and Other Mediterranean Countries.* JSOT/ASOR Monograph Series 10. Sheffield.

Frösén, J., Fiema, Z., Haggrén, H., Koistinen, K., La-

vento, M. and Peterman, G.M.
1998 The Finnish Jabal Haroun Project Report on the 1997 Season. *ADAJ* 42: 483-502
Frösén, J., Fiema, Z.T., Lavento, M., Koistinen, K. and Holmgren, R.
1999 The 1998 Finnish Jabal Hārūn Project. A Preliminary Report. *ADAJ* 43: 369-410.
Frösén, J., Fiema, Z.T., Lavento, M., Koistinen, K., Holmgren, R. and Gerber, Y.
2000 The 1999 Finnish Jabal Hārūn Project: A Preliminary Report. *ADAJ* 44: 395-424.
Frösén, J., Fiema, Z.T., Koistinen, K., Lavento, M., Holmgren, R., Gerber, Y., Mikkola, E., Ylönen-Peltonen, R., Heiska, N. and Lahelma, A.
2001a The 2000 Finnish Jabal Hārūn Project: Preliminary Report. *ADAJ* 45: 359-376.
Frösén, J., Fiema, Z.T., Danielli, C., Studer, J., Gerber, Y., Keller, D., Jansson, H., Lindblom, J., Tenhunen, T. and Hertell, E.
2001b The 1998-2000 Finnish Jabal Hārūn Project: Specialized Reports. ADAJ 45: 377-392.
Galavaris, G.
1970 *Bread and the Liturgy*. London.
Haggrén, H., Nuikka, M., Junnilainen, H. and Järvinen, J.
2001 Photogrammetric Approach for Archaeological Documentation of an Ancient Road. CIPA 2001 International Symposium, Surveying and Documentation of Historic Buildings - Monuments - Sites, Traditional and Modern Methods, Potsdam University, 18.-21.9.2001. (Manuscript to be published in *International Archives of Photogrammetry).*
Hirschfeld, Y.
1996 The Importance of Bread in the Diet of Monks in the Judean Desert. *Byzantion* 66, fasc 1: 143-155.
Holmgren, R. and Kaliff, A.
1997 The 1995-1996 Excavation of Dayr al-Qattar al-Byzanti: Preliminary Report. *ADAJ* 41: 321-340.
Jackson, J.W.
1962 Report on the Animal Remains found at Auja. Pp. 67-69 in H. Dunscombe Colt (ed.), *Excavations at Nessana (Auja Hafir, Palestine*). Volume 1. London: British School of Archaeology in Jerusalem.
Kingsley, S.
2000 The Economic Impact of the Palestinian Wine Trade in Late Antiquity. Pp. 44-68 in S. Kingsley and M. Decker (eds.), *Economy and Exchange in East Mediterranean during Late Antiquity*. Oxford.
Koistinen, K., Latikka, J. and Pöntinen, P.
2001 The Cumulative 3D Collection and Management during an Archaeological Project. CIPA 2001 International Symposium, Surveying and Documentation of Historic Buildings - Monuments - Sites, Traditional and Modern Methods, Potsdam University, 18.-21.9.2001 (Manuscript to be published in *International Archives of Photogrammetry*).
Kraemer, C.J.
1958 *Excavations at Nessana.* Volume 3. Non-literary Papyri. Princeton: Princeton University Press.
Parker S.T.
2000 The Roman 'Aqaba Project: the 1997 and 1998 Campaigns. *ADAJ* 44: 373-394.
Politis, K.D.
1992 Excavations at Deir 'Ain 'Abata 1991. *ADAJ* 36: 281-290.
Studer, J.
1994 Roman Fish Sauce in Petra. Pp. 191-196 in W. van Neer (ed.), *Fish Exploitation in the Past.* Proceedings of the 7th Meeting of the ICAZ Fish Remains Working Group. Annales du Musée Royal de l'Afrique Centrale, Sciences Zoologiques, No 274. Tervuren.
Wheeler A., and Jones, A.K.G.
1989 *Fishes*. Cambridge: Cambridge University Press.

THE ROMAN 'AQABA PROJECT: THE 2000 CAMPAIGN

S. Thomas Parker

Introduction

This preliminary report summarizes results from the project's fifth season of excavation in 2000 (from May 24 to July 9, 2000), conducted under a permit from the Department of Antiquities.

The team in 2000 included 15 senior staff, 37 students, and 70 local workers. Sawsan Fakhiry, again ably served as representative of the Department of Antiquities. Other senior field staff in the field included Kim Cavanagh as photographer, David Clark as consultant for the church, Christina Kahrl as conservator, Joann McDaniel as small finds specialist, Nasser Mansour as assistant geologist, S. Thomas Parker as director, stratigrapher, and ceramicist, Megan Perry as human osteologist, John Rucker as camp manager, and Wayne Sawtell as architect and surveyor. Area supervisors were Susan Gelb (Areas O and P), Mary-Louise Mussell (Area J- east), Megan Perry (Area A), Alexandra Retzleff (Area M), Joseph Stumpf (Area K), and James Terry (Area J- west and Area T). Sarah Morgan Harvey served as assistant area supervisor for Area J- east. Senior staff not in the field in 2000 included John Betlyon as numismatist, Vincent Clark as Semitic epigrapher, William Grantham as faunal analyst, Christopher Gregg as small finds specialist, Janet Jones as glass specialist, Eric Lapp as ceramic lamp specialist and metallurgy specialist, Mary Mattocks as draftsperson, Tina M. Niemi as geologist, David Reece as shell specialist, Andrew M. Smith II as director of the survey, Michelle Stevens as lithics specialist, and Peter Warnock as archaeobotanist.

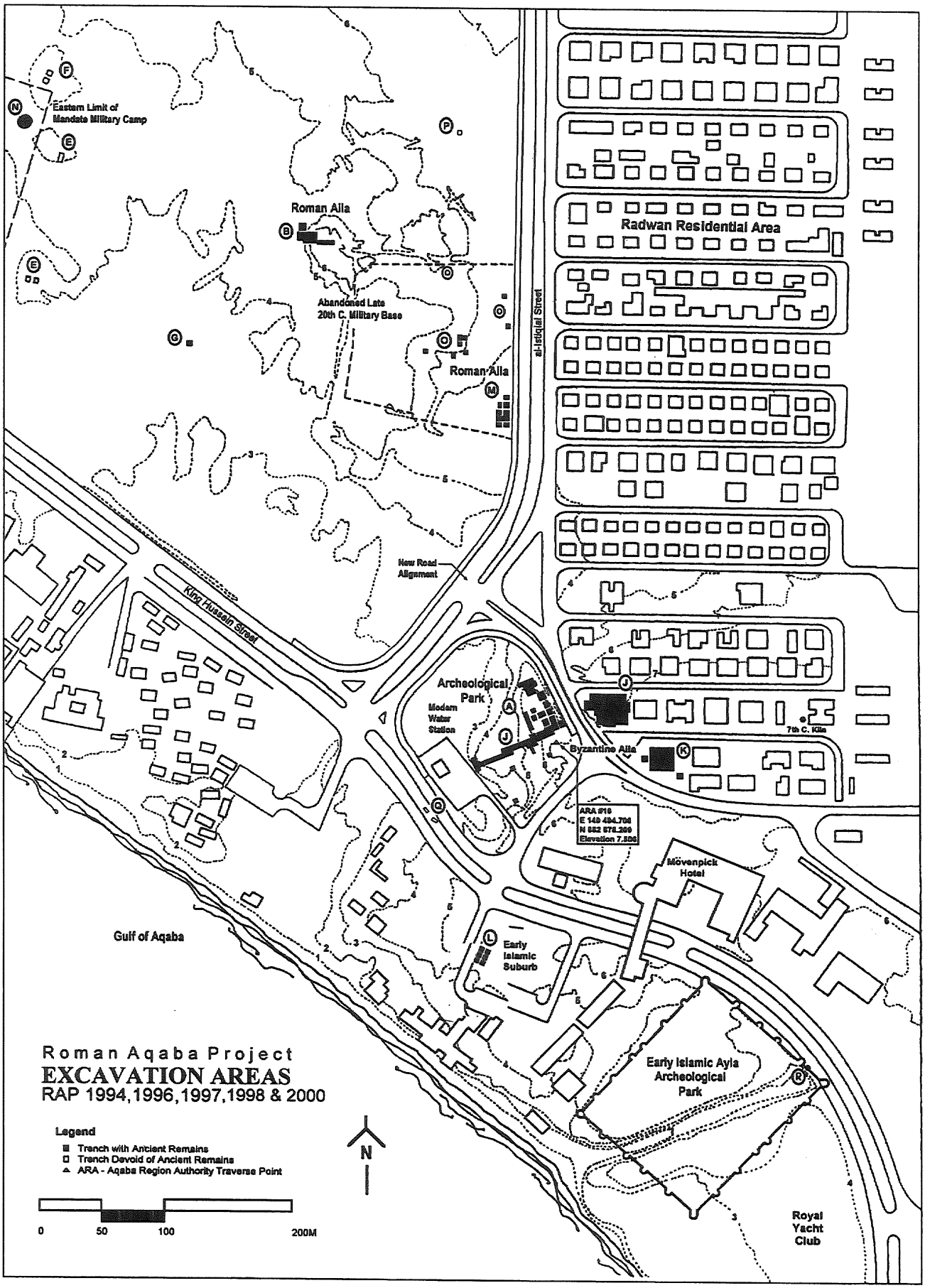
Student staff serving as trench supervisors in 2000 included Jennifer Armstong, Stephanie Bowers, Matthew Breznai, Meredith Campbell, Sarah Campbell, Jennifer Cunningham, Collier de Butts, Elena Dodge, Benjamin Dolinka, Catherine Goodman, Diane Grubisha, Tony Hartley, Rebecca Hunter, Thomas Johnson, Christina Kahrl, Alison Kooistra, Eric Lamb, Kris Larson, Amanda Lawes, Carl Martel, Tim Miles, Robert Patterson, Kenyon Reed, Marie Sanka, Jordan Somers, Jennifer Swimmer, James Sutton Nancy Teeple, Suzanne Tiefenbeck, Genevieve Trottier, Amanda Vellia, Jessica Watkins, Walter Ward, Heather Whitman, Cheri Williams and Bonnie Wright. Tom Bonhomme and Tracy McKenney were assistant architect/ surveyors. Susan Gelb was pottery registrar and Sarah Campbell was assistant pottery registrar. Tony Hartley supervised field processing of faunal remains, including shell. Elena Dodge and Joseph Stumpf supervised field processing of glass.

The project is examining the evolution of the economy of Aila from the first century BC to the early seventh century AD. The project's research design includes a regional archaeological and environmental survey of the environs of Aila (completed in 1998) and excavation of Aila. Earlier reports may be consulted about the regional environment, historical sources, previous research, and the project's goals, research design, and results (Parker 1996: 232-240; 1997a: 19-26; 1997b; 1998; 1999; 2000; Smith, Niemi and Stevens 1997; Niemi and Smith 1999). The purpose of this report is merely to summarize some salient results from the 2000 season.

Excavation of Aila

Excavation in 2000 continued mostly in existing areas that had already proved productive (**Fig. 1**). These excavation areas extended from the eastern 'Circular Area' southwards to the northern edge of Early Islamic Ayla. The one new area opened (Area R) was a sounding of the northern curtain wall of Early Islamic Ayla. The following discussion of results from each of these areas will proceed from north to south, which also corresponds roughly with the chronological order of the remains.

Area O. This area was opened in 1998 a short distance west of al-Istiqlāl Street atop a low mound within an abandoned military base. Its purpose was to locate the northern edge of the antiquities in the so-called 'Circular Area' and to test the assumption that structures of Nabataean/Roman Aila extended throughout the area between Areas M and B (cf. **Fig. 1**). These goals were accomplished in 1998 by five soundings (Trenches O.1-O.5) of varied dimensions scattered over a wide area period (Parker 2000: 377-378). The soundings exposed portions

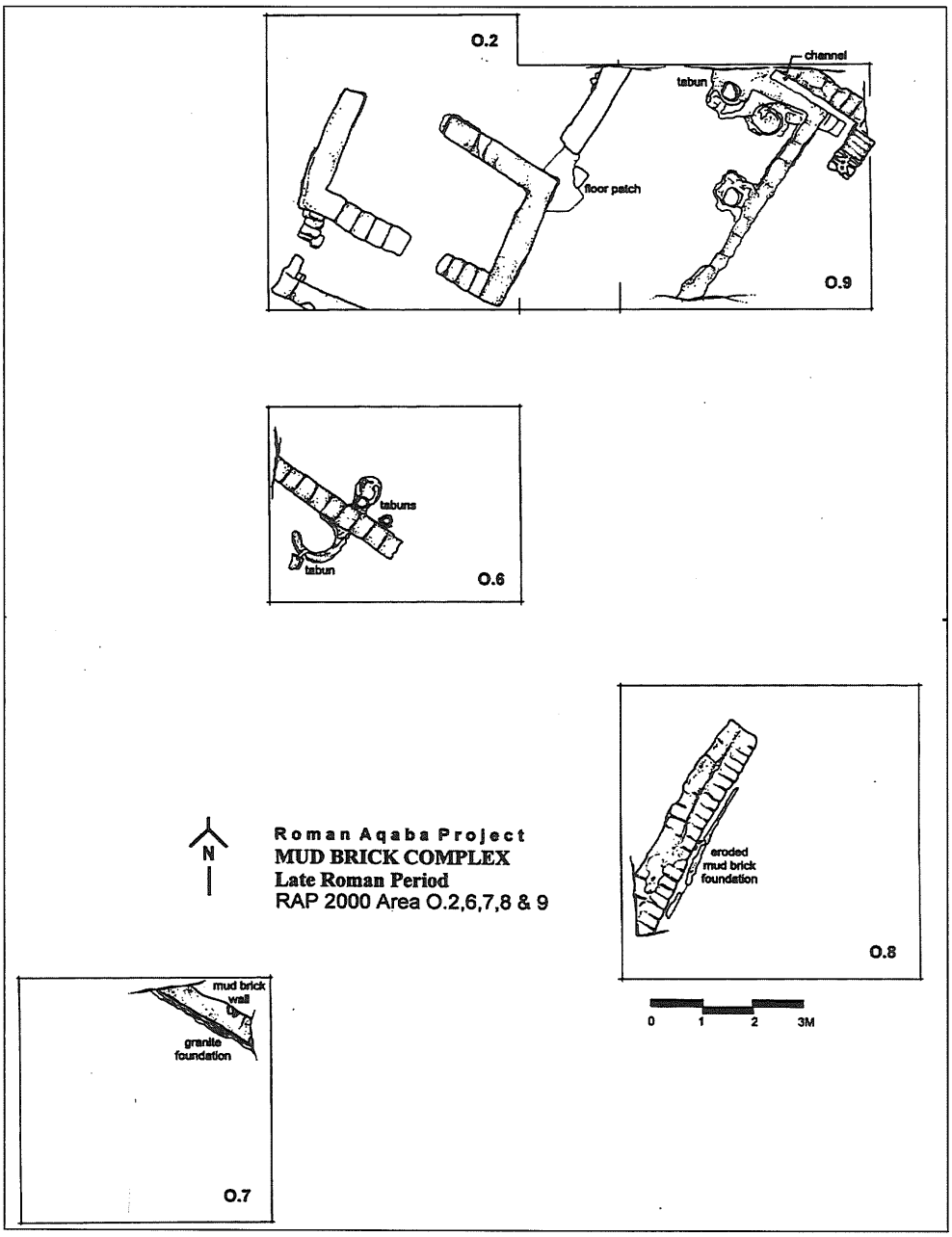


1. Excavation Areas of the Roman 'Aqaba Project, 1994-2000.

of a complex of Early Roman/Nabataean mud brick structures, apparently domestic in nature, as well as a dump of ceramic production debris. There was limited evidence from one trench (O.2) of reoccupation in the Late Roman period. The goals in 2000 were to complete a vertical section of the complex atop the mound, expose a larger horizontal sector of this complex, and determine the relationship between the Early Roman/Nabataean and Late Roman phases.

Excavation continued in Trench O.2 and four new trenches were opened (Trenches O.6-9), all located on the mound. The stratigraphic profile suggested that occupation began in the late first century BC directly atop the natural alluvial fan, with little evidence of structures. After a period of abandonment, a second phase of Early Roman/ Nabataean domestic occupation began in the first century AD. Mud brick structures were erected and beaten earth floors were laid.

The second phase of Early Roman/Nabataean occupation was followed by a period of abandonment, without evidence of destruction, around the turn of the second century, then reoccupation later in the same century. The Late Roman occupation began with the reuse of some of the earlier Nabataean architecture as well as construction of new walls (**Fig. 2**). The orientation of these domestic mud brick structures closely follows those in Area M. The Late Roman occupation in Area O may be divided into up to three distinct phases, all apparently domestic in nature, as evidenced by a number



2. Plan of the mud brick structures in Area O.

of clay-lined ovens within several structures. The complex seems to have been finally abandoned by the early third century. The results suggest that this area lay near the northern edge of Roman Aila.

Area M. This area lies southwest of Area O and west of al-Istiqlāl Street on the eastern edge of the Circular Area (**Fig. 1**). Excavation of seven trenches (M.1-7) in 1994-98 produced stratified evidence of Early Roman/Nabataean and Late Roman occupation in mud brick and stone structures with rich cultural remains. After the abandonment of this complex the area was used as a cemetery in the Early Byzantine period. Thus in 2000 excavation continued in five existing trenches (M.3-7) to expose more of the Early Roman/Nabataean phases and in two new trenches (M.8-9) to uncover more of the Late Roman phases.

Occupation began in the early first century AD. There was limited evidence from the first phase of occupation (ER1), mostly surfaces with flat-lying sherds and without structures. This was followed by a short period of abandonment when windblown sand accumulated over these surfaces.

In the mid-first century AD there was a major period of construction (ER2) marked by erection of mud brick houses and courtyards (**Fig. 3**). The walls in the southern trenches (M.5, M.9, M.6, M.7 and possibly M.4) appear to belong to the same structure, with a courtyard in M.6 leading off to the corners of two other structures to the south and southwest. Trenches M.1 and M.2 were part of a large courtyard with cooking and storage facilities. To the north is evidence for portions of two other structures. The associated installations and artifacts from this period suggest a domestic function for these buildings.

Sometime in the first half of the second century AD the ER2 mud brick houses were abandoned, although there is no sign of disaster, earthquake, or burning. The rooms were largely cleared out prior to abandonment. The southern sector of the area remained abandoned in the ensuing Late Roman 1 (LR1) period, with windblown sand accumulating in the rooms and the mudbrick walls decaying (**Fig. 4**). A make-shift water channel system employing reused jars was set up over the houses in M.5 and M.6. There was no new construction in M.1 or M.2, which appear to have remained as exterior spaces with natural soil accumulation. In M.4 and M.7, the ER2 structures were completely razed but were immediately built over with a new mud brick and stone house, apparently in the late second century.

In the third century (LR2), there was renewed domestic construction across Area M. The LR1 structure in M.7 and M.4 continued to be used, and some of the ER2 walls that had been abandoned in the southern sector were put back into service as the foundation levels of LR2 combined stone and mud brick walls (**Fig. 5**). The courtyard area in M.3, M.2 and M.1 was built over with a series of narrow mud brick walls dividing cooking areas. A household terracotta industry was possibly set up in a room extending from M.4 to M.7, but otherwise the complex seems to have been domestic in nature. There is more *in situ* material from installations in this phase and some indication that the period might have come to a violent end, perhaps in an earthquake.

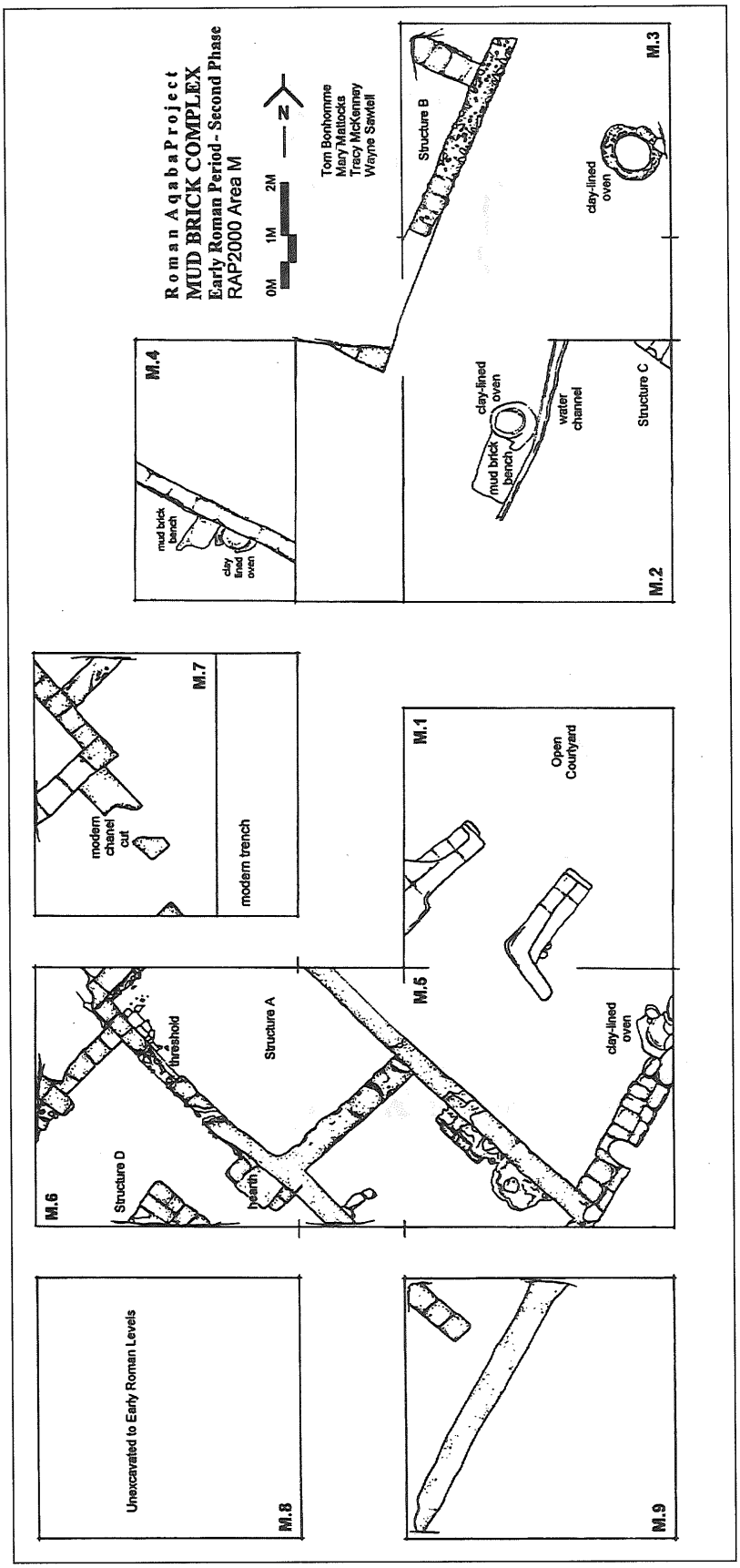
The area was nonetheless rebuilt to some degree. The end of habitation here is not well understood because the latest level of occupation (LR3), dated to the late third or early fourth century, is very poorly preserved. The stone walls and installations that survive suggest a continued domestic function for the area.

Quantities of natural clay, 359 fragments of ceramic slag, 905 kiln wasters recovered from both Areas O and M strongly suggest a local pottery industry somewhere in the vicinity in both the Early Roman/Nabataean and Late Roman periods.

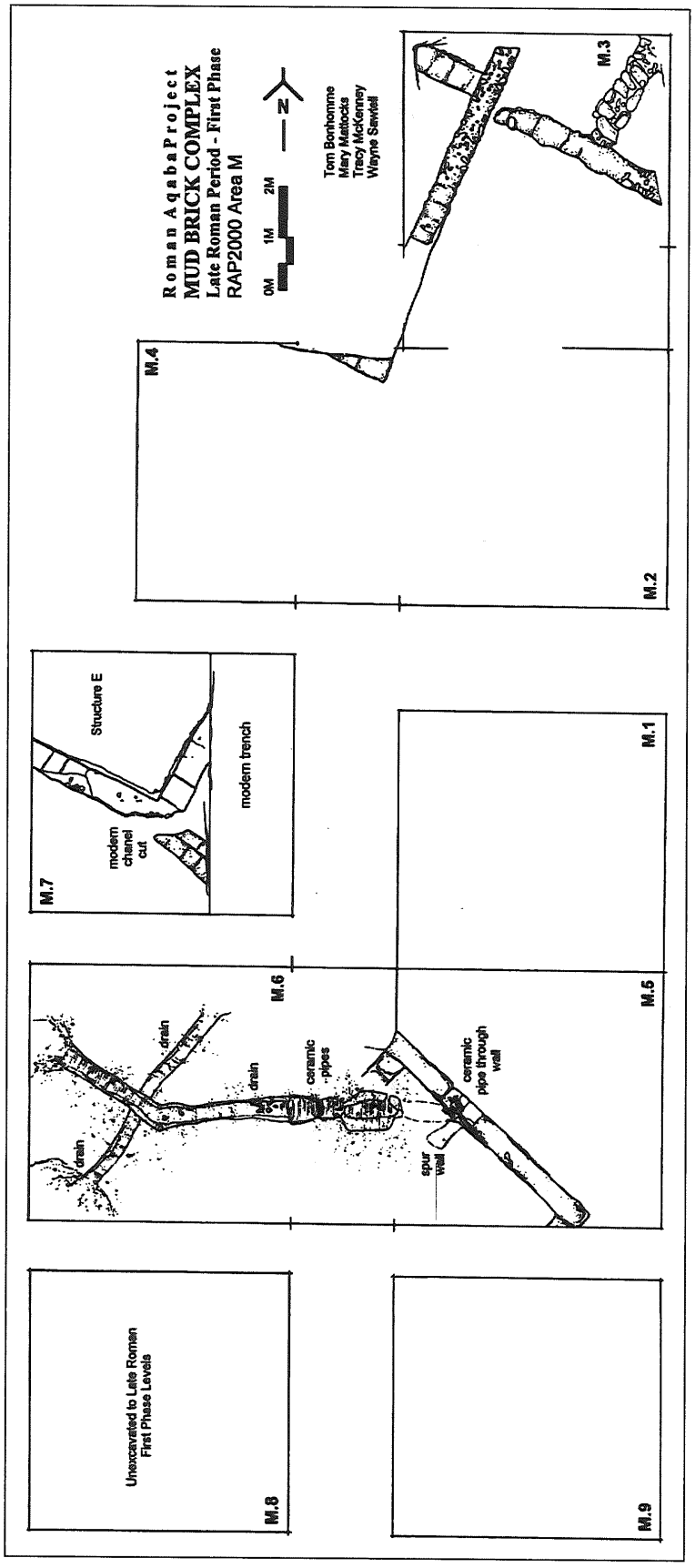
The area was apparently abandoned in the late third or early fourth century, after which it served as a cemetery. At least thirteen human burials were laid into simple pits cut into windblown sand among the abandoned mud brick structures (**Fig. 6**). Nearly all the individuals were oriented east-west, with the head towards the west and facing south. They constituted a mixed population of males and females of varying ages. The graves were almost completely devoid of grave goods but associated pottery suggests a fourth century date for the cemetery. The full extent of the cemetery is not known, but it clearly does not extend as far west or north as Area O. These simple pit burials, unaccompanied by grave goods, presumably represent less affluent inhabitants of Aila who could not afford the constructed mud brick tombs such as in the Area A cemetery closer to the city.

Area A. This area lies ca. 300 meters south of Area M and also just west of al-Istiqlāl Street. Excavation in fourteen trenches (A.1-14) in 1994-98 revealed several phases of occupation extending from Early Roman/Nabataean to Early Islamic. Excavation in 2000 continued in two existing trenches (A. 2, 9) and in three new trenches (A.15-17) to further elucidate these remains.

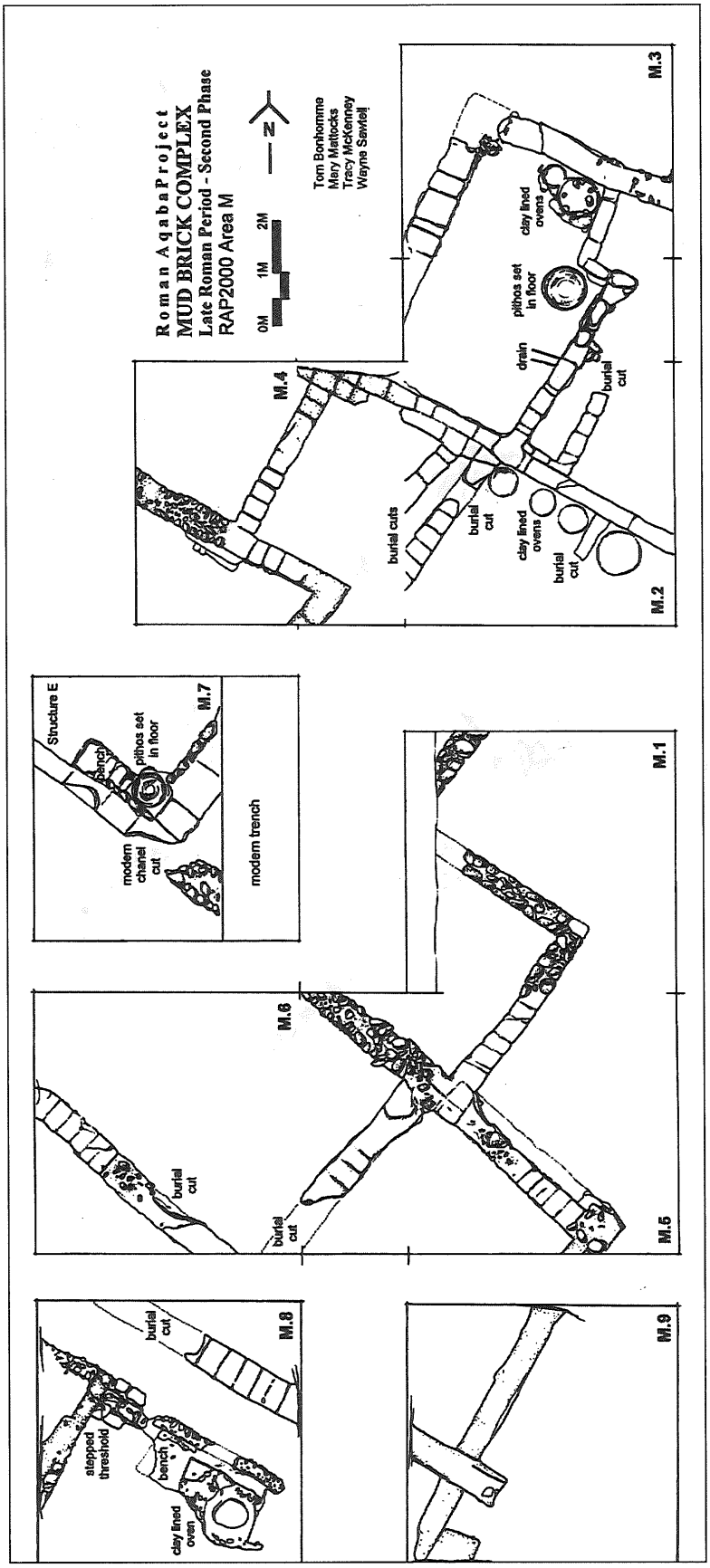
The earliest occupation encountered in Area A in 2000 was in Trench A.9, which yielded more



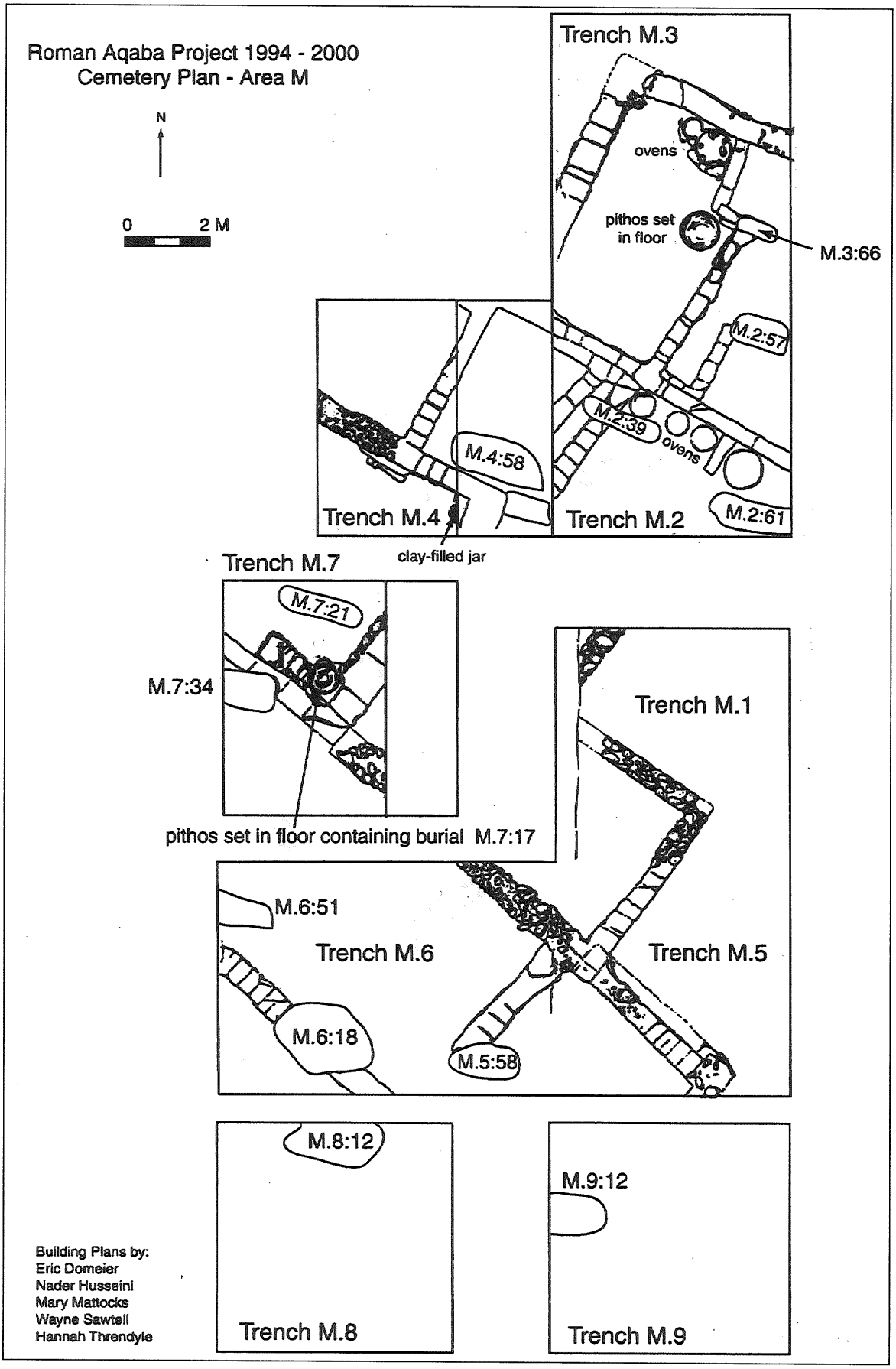
3. Plan of Area M in the Early Roman 2 phase.



4. Plan of Area M in the Late Roman 1 phase.



5. Plan of Area M in the Late Roman 2 phase.



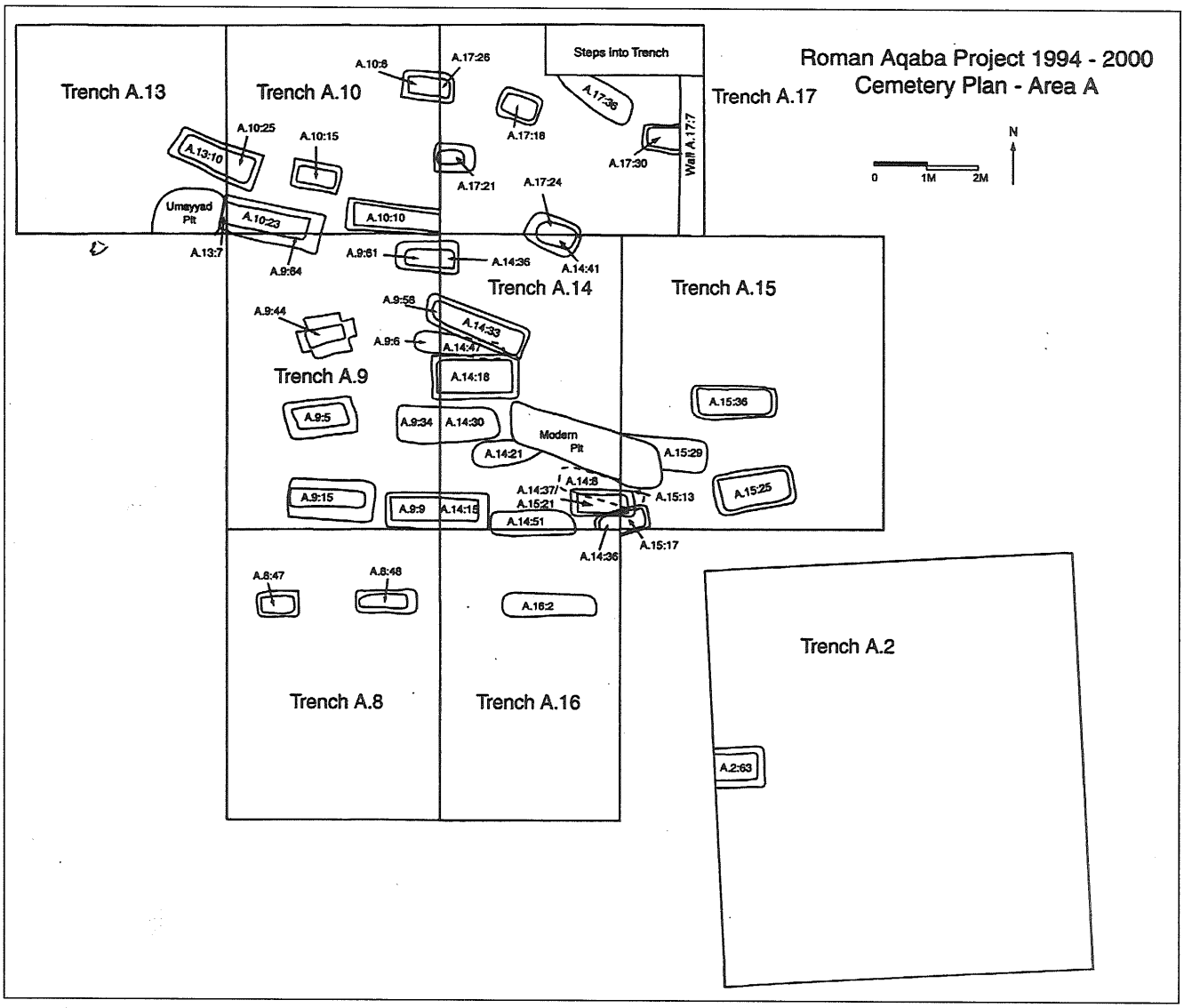
6. Plan of Area M in the Early Byzantine phase, showing location of burials (by locus number, e.g. "M.8:12") intrusive through Late Roman 2 phase structures.

stratified evidence from the transition from the Late Roman to the Early Byzantine periods (late third/early fourth centuries). Modest mud brick and stone structures and associated installations suggested domestic occupation. A large *pithos* installed within the structure was used for dumping broken ceramic vessels and other debris after its probable use as a storage container.

Trench A.2, immediately adjacent to al-Istiqlāl Street, was reopened to penetrate through a previously exposed Early Islamic domestic complex (excavated in 1994) to reach the underlying Byzantine cemetery. Excavation revealed a massive mud brick structure that appeared generally aligned with the monumental mud brick structure (the putative church) across the modern street. Although occupation levels were not reached within this structure, pottery from soil layers around its walls suggested that it might be contemporary in date, i.e., fourth century.

Excavation in Trench A.2 also revealed a complete Byzantine tomb in section. This consisted of a mud brick surface marker, a vertical shaft ca. 0.70m in depth, and rectangular mud brick tomb-structure. The tomb was built of coursed mud brick walls. The deceased was interred within the walls and covered by a mud brick cap. The shaft was then back-filled.

In Trenches A.15-17 just to the northwest was more evidence of the Early Byzantine cemetery (**Fig. 7**). *In toto*, some 32 mud brick tombs have now been excavated in Area A. Most tombs were like that described in Trench A.2 above and contained a single articulated skeleton. The population consisted of both males and females of varying ages. There was a concentration of infant and child burials in Trench A.17. As in the Area M cemetery to the north, nearly all the tombs were oriented E-



7. Plan of the Early Byzantine cemetery in Area A.

W with the head to the west and the face to the south. It was previously suggested that this cemetery in Area A might be associated with the monumental mud brick structure just to the east in Area J. But it now seems clear that the cemetery slightly postdates the primary destruction of this building in the late fourth century. The tombs were largely devoid of grave goods, but associated pottery sherds, coins, and stratigraphic evidence suggest a date in the late fourth and early fifth centuries for the use of the cemetery.

The abandonment of the cemetery, presumably in the fifth century, was followed by deposition of thick layers of wind-blown sand. Then, during the Late Byzantine period (sixth or early seventh century), the area south of the cemetery was reoccupied by construction of a stone and mud brick domestic complex, discovered and elucidated in 1994-98. This Late Byzantine domestic complex was apparently abandoned for about a century and then reoccupied in the late Umayyad or early Abbasid period (mid-eighth century). No further excavation was conducted within this complex in 2000.

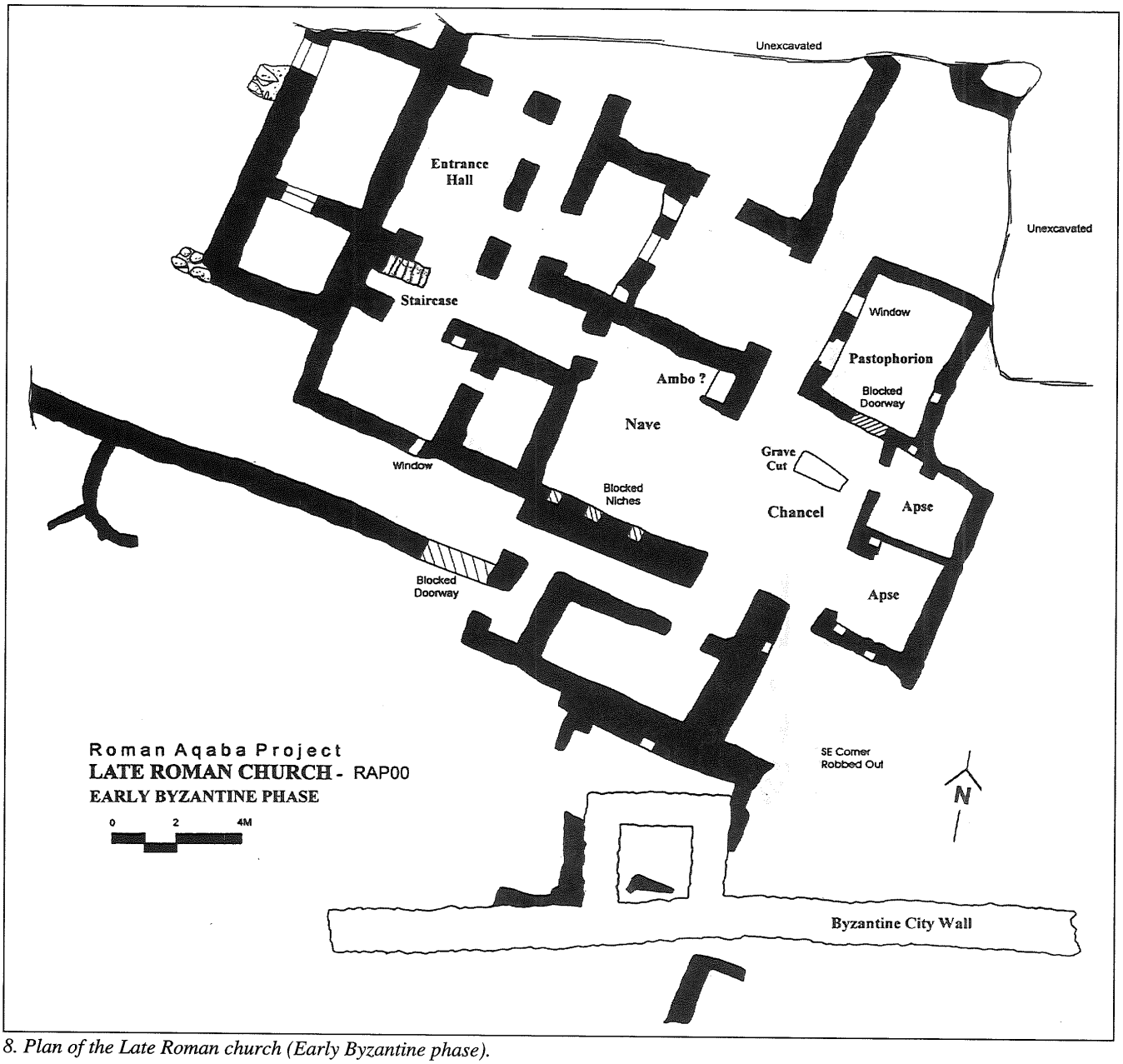
Area J. This area lies along both sides of al-Istiqlāl Street (**Fig. 1**). The western sector of Area J is situated immediately south of Area A; the eastern sector is east of al-Istiqlāl Street. Excavation in both sectors since 1994 has revealed two major structures. The northern range of trenches east of al-Istiqlāl Street (J.1-3, 11, 19-22, 29) revealed a monumental mud brick structure. This structure clearly extended to the south, where it was cut into and partly built over by a stone curtain wall and projecting tower, part of the city wall of Byzantine Aila, in the late fourth or early fifth century, as exposed in Trenches J.4-7, 9-10, 12-18, 23-26. Deep probes against major walls of the mud brick structure in 1998 provided evidence for the date of construction at the end of the third or beginning of the fourth century.

Excavation in 2000 revealed more of the overall plan and internal architectural details of the mud brick structure (**Fig. 8**). The central core of the building measures ca. 26m E-W by ca. 16m N-S and is oriented ESE-WNW. But there is increasing evidence of a surrounding complex of structures in all directions but the east. Most walls consist of lower courses of stone supporting upper courses of mud brick. Some walls supported arched doorways and vaults within the structure. A stone-built staircase probably was intended for access to the roof rather than a second story. The building continued to yield rich artifactual remains, including much Early Byzantine pottery (including imported African Red Slip ware), glass (including many fragments of glass oil lamps, probably once suspended from chandeliers), several metal objects, and hundreds of coins. A major find this season was a complete rectangular alabaster plate recovered from the foundations of the structure. At least some walls were decorated with painted plaster in several colors, but fragmentary preservation as yet prohibits discernment of any images. The structure was erected about the turn of the fourth century and underwent three phases of use before its destruction, apparently in the earthquake of 363. Portions of the partially ruined structure then experienced limited domestic reuse and dumping of refuse in the late fourth and early fifth centuries, perhaps associated with construction of the adjacent city wall.

The eastward orientation of the structure, the overall plan, and some artifactual evidence (such as many fragments of glass oil lamps) all suggest that the building was designed as a Christian church. A rectangular ancient trench discovered in the putative chancel area suggests the prior burial of an important personage, presumably later removed after the building went out of use. A Christian bishop of Aila is in fact attested in documentary sources in 325. This structure, if in fact a church, seems to be the earliest known church in Jordan and possibly the oldest purpose-built church in the world.

The Byzantine city wall just south of the church also continued to be explored this season. A segment of the city wall east of al-Istiqlāl Street was uncovered in 1994. In 1996 and 1998 excavation west of al-Istiqlāl Street in Trenches J.9-18 and J.25-26 traced the city wall farther west to the modern pumping station on King Hussein Street. *In toto*, counting the segment now buried under al-Istiqlāl Street, ca. 120 meters of the Byzantine city wall of Aila have now been exposed. Excavation in Trench J.24, in the middle of the western sector of the city wall, reached its foundations, revealing that the wall here still stands over four meters high and averages 1.10 to 1.40m in width.

An interesting feature on this segment of the city wall is a large structure built against the inner (south) face. This was further elucidated in 2000 (**Fig. 9**). It consists of two elliptical mud brick towers connected by a mud brick wall, all erected on stone foundations set nearly as deep as the city wall itself. The elliptical towers abut the city wall. The connecting wall between the towers runs parallel to and ca. one meter south of the city wall. The space between the mud brick wall and the city wall was immediately back-filled with sand, presumably to create a rampart to defend the wall.

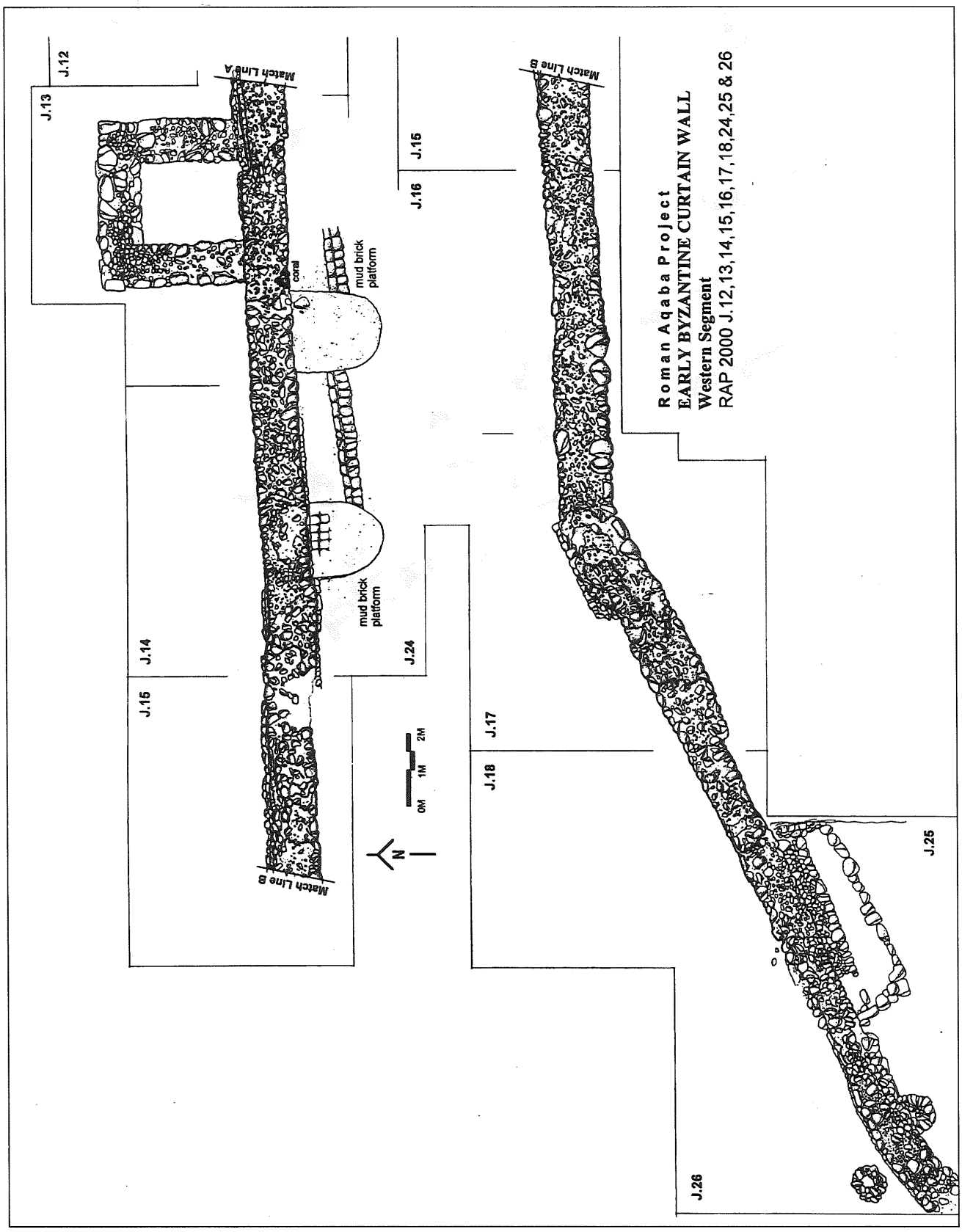


8. Plan of the Late Roman church (Early Byzantine phase).

Pottery from the foundations of this structure abutting the city wall suggests it was secondary, constructed in the late sixth century. Late in the 2000 season another similar mud brick wall was discovered extending east from the more easterly of the elliptical towers, suggesting that this interior system continued farther east.

On the northern face of the city wall in this sector in Trench J.13 is a rectangular interval tower, projecting from the north face of the wall, discovered in 1998. It is similar in size and plan to that exposed in 1994 on the eastern segment of the city wall east of al-Istiqlāl Street. Both towers were bonded to the curtain wall, lacked any entrance through the city wall, and seem to have been backfilled with sand immediately after construction, presumably to create an elevated fighting platform. The tower in J.13 seems to have experienced some later domestic use in the Umayyad period. A doorway was cut through its eastern wall and the interior was partially cleaned out. Farther east along the city wall, just west of al-Istiqlāl Street in Trench J.23, what appears to be another projecting rectangular interval tower was discovered this season. It is spaced nearly equidistant between the two other towers. Although similar in size to the other interval towers, this newly discovered tower is exceptional by its doorway through the city wall at the ground floor level. This doorway, about one meter wide, was later blocked up with mud brick in the Umayyad period.

The Early Byzantine city wall went out of use



9. Plan of the Early Byzantine city wall (western segment) with the Late Byzantine rampart.

by the end of the Late Byzantine period (early seventh century), when mud brick and stone structures in J.9-10 were built against the north face of the city wall, obviously rendering it useless for defensive purposes. The city wall was extensively robbed in the Umayyad period, presumably for stones to build the Early Islamic Ayla.

Three new trenches were also opened in Area J south of the city wall to search for ancient occupation within the Byzantine fortifications. Excavation within two of these trenches (J.28 and J.30) revealed thick layers of fluvial and aeolian sand up to three meters in depth with no structures and minimal artifactual remains. The third of these trenches (J.27) also encountered thick sand deposition up to three meters in depth. Under the sand were remains of a stone-lined water channel and associated walls that seemed to form one edge of a well. Associated artifacts suggested that these installations date to the Abbasid period. All this suggests that the ancient remains in the area south of the Byzantine city wall and west of al-Istiqlāl Street are covered by sand accumulations several meters thick. The uppermost ancient remains that do exist in this sector seem to lie at or just below the modern water table and apparently date to the Early Islamic period.

Area K. This area lies ca. 50m southeast of Area J in a vacant lot east of al-Istiqlāl Street (**Fig. 1**). Eight trenches (K.1-8) were opened in 1994-98 to recover evidence of the city inside the Byzantine curtain wall. Excavation revealed significant remains of the Umayyad and Abbasid periods (late seventh to tenth centuries), including stone and mud brick structures underlying thick layers of Abbasid dump. Removal of the Abbasid domestic structures revealed substantial stone and mud brick structures of the Umayyad period. These Umayyad structures were laid out along both sides of a street that extended from northeast to southwest through Area K. The Early Islamic street continued to follow the plan of the earlier Byzantine city. By the end of the 1998 season, fifth century Byzantine levels had been reached only in small probes at deep levels in this area.

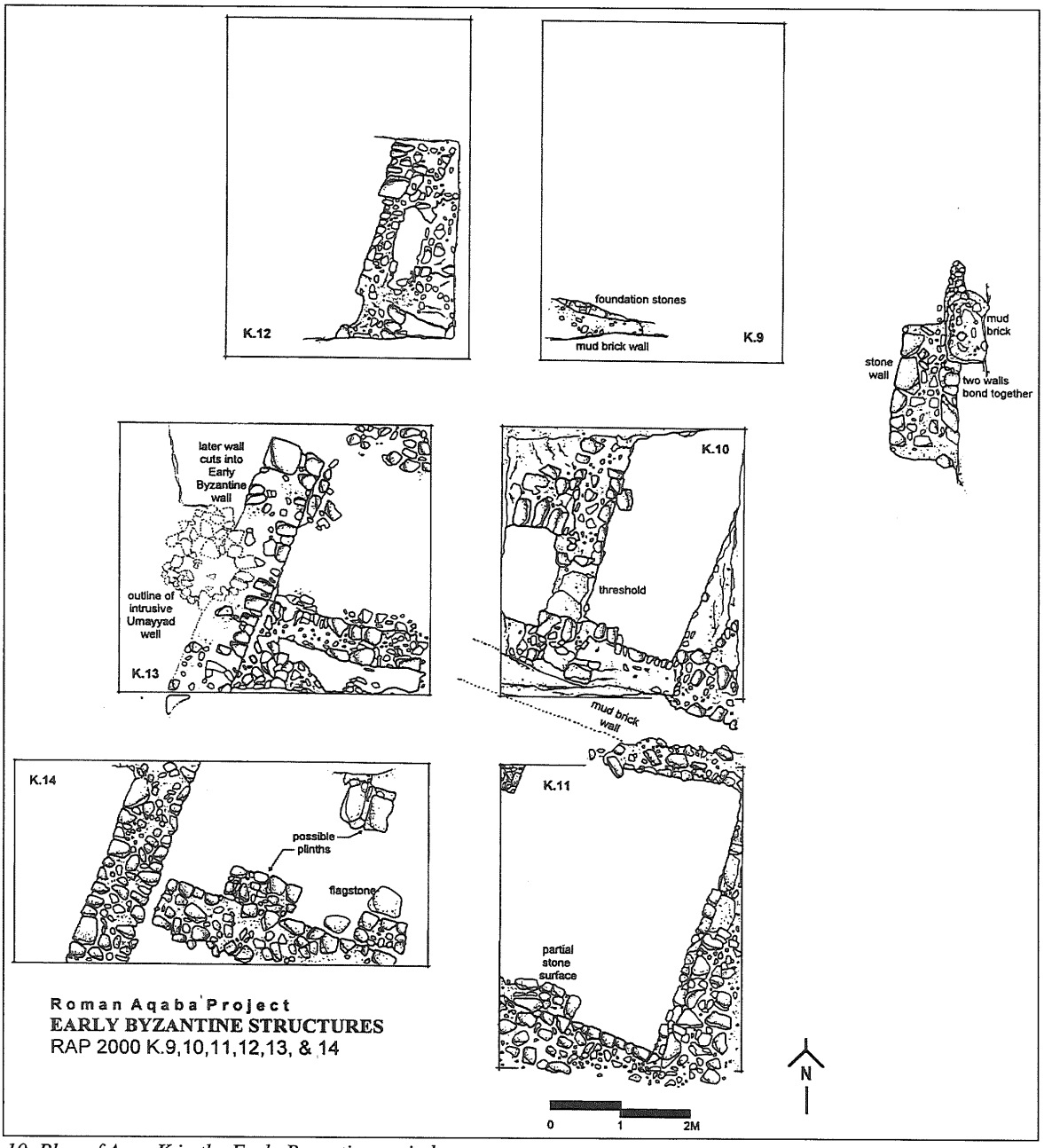
The archaeological remains in this area were faced with imminent destruction by development planned after the season. Because this is the last remaining sector of the site within the Byzantine city wall where remains of this period are easily accessible, the destruction of this area by modern development will be a major loss to the history of this important site. Therefore we removed the remaining overlying Umayyad structures (now fully documented) with mechanical equipment in order to expose a large horizontal area of pre-Islamic Aila. Six trenches (K.9-14) were laid out in a grid over the newly exposed area covering some 15.5 x 10.5m. Excavation revealed stone and mud brick structures dating to the fourth and fifth centuries (Early Byzantine) built along the east side of a street (**Fig. 10**). Rich artifactual remains, including a variety of imported fine wares, amphorae, and numerous coins, suggest the vibrancy of Aila's economy in this period. Deep probes in several trenches reached Late Roman (second to third century) strata before season's end. Area K has thus produced a complete stratigraphic profile of Aila's history from the second through the tenth centuries.

Area R. One new area was opened this season to address the ongoing scholarly debate about the date of the city wall of Early Islamic Ayla, southeast of the current project's excavation areas. The excavator of this site, Donald Whitcomb, suggested a mid-seventh century date for the foundation of Early Islamic Ayla. But he never reached the actual foundations of the city wall, being prevented by the water table. Colin Brooker and Axel Knauf, pointing to architectural parallels in several Late Roman legionary fortresses, suggested that the foundation of the fortifications of Early Islamic Ayla might actually date to the Late Roman period (ca. 300) when *legio X Fretensis* is attested at the site. In an attempt to settle this important historical question, and with the support of Dr. Whitcomb, a trench (R.1) was opened on the northern segment of the Early Islamic city wall to recover datable material from its foundations (**Fig. 1**). Once the wall was articulated and the water table reached, a pump was employed to permit excavation below the water table. The foundations of the city wall were exposed. Pottery from soil layers against the north face of the masonry foundations and from a soil layer extending under the foundations dated to the seventh century, confirming Whitcomb's date for the foundation of Early Islamic Ayla.

Analysis of Artifacts and Organic Remains

A summary of some categories of evidence was presented in a previous report (Parker 1998: 387-389). This section presents an update on various types of evidence, especially based on subsequent research.

Archaeobotanical Evidence. The picture here is little changed from previous reports. Despite processing of more than 1,000 soil samples by froth flotation and recovery by both sieving and manual retrieval, the quantity of botanical remains is still fairly meager. Local soil conditions are simply not conducive to preservation of botanical remains.



10. Plan of Area K in the Early Byzantine period.

The evidence recovered to date, however, is suggestive. The relative scarcity of wood (apart from palm) and the abundance of dung suggest that timber was not readily available in the local region. Palm wood and palm fronds were used for construction and fuel. Most of the remaining wood derived from shrubs still attested locally. In short the botanical evidence suggests that the local environment in the Roman and Byzantine periods was not significantly different from contemporary conditions.

Excavation of an ancient dump (Trench O.4) near the northern edge of Aila revealed rich deposits of charred pottery, ceramic slag, kiln wasters, charcoal, and other materials, reflecting ceramic production in Early Roman/Nabataean period. The vast majority of the wood charcoal derived from palm and tamarisk, both locally available (Parker 2000: 378). Although some wild species, such as chenopods, were also exploited for fuel, dung was the principal fuel for most purposes.

Most dietary plants recovered were grains, especially barley, with some wheat attested. Other domesticates including grape, date, olive, almond, and various legumes. Assuming an environment similar to contemporary conditions, the attested grains and most of the fruits (except dates) were probably not grown locally in any significant quantity and must have been imported.

Faunal Evidence from Area B. This mound on the

eastern edge of the Circular Area (**Fig. 1**) was excavated between 1994 and 1998 (Parker 1996: 241-243; 1997a: 28-30; 1998: 378-379; 2000: 375-377). Excavation reached the alluvial fan, the natural surface that existed before human occupation, providing a complete stratigraphic profile of the mound. It was originally occupied in the Early Roman/ Nabataean period, by a complex of mud brick domestic structures. These structures were abandoned in the late first or early second century AD, then filled with wind-blown sand. The mound was soon reoccupied, by new mud brick domestic structures in the Late Roman period (mid- to late second century AD). This occupation extended through three phases into the fourth century AD, or beginning of the Early Byzantine period, after which the mound was abandoned.

Recent analysis of nearly 2,000 faunal remains from this area is suggestive. Not surprisingly for a coastal site, 24.1% of the sample were fish. Excluding a mere handful of bones from other wild species (including gazelle, bird, and small mammals) and unidentified bones (15.3% of the total sample), the remaining sample consisted of 1156 bones of various domesticated animals. Of these, sheep and goat comprised about 90% of the domestic consumable animal bones, with goat outnumbering sheep by a ratio of about 5:1. Cattle comprised 14.1% of the domestic animal bones. However, it is notable that all the cattle derived from the Early Roman/Nabataean period; none derived from Late Roman or Early Byzantine contexts. Only a handful of bones derived from other domesticated animals, including camel, pig, chicken, and dog.

Given the obvious importance of sheep and goats, some further observations may be noted. First, all parts of the animal were recovered in essentially the same frequencies throughout the occupation of Area B. This suggests that whole animals were being brought to these households, rather than pre-cut portions of meat imported from elsewhere. Second, harvest profiles (i.e., age at slaughter) revealed that most animals were slaughtered at two years of age and nearly all the remainder by three years. This suggests that the main goal was meat production, not dairy or wool production, which yield different mortality curves. Third, the numeric predominance of goat over sheep, which is consistent throughout the occupational history of the area, may reflect the greater ability of goats to withstand the high temperatures and ability to forage more successfully in the arid landscape *viz.* sheep (Grantham 2000).

It must be stressed that these interpretations are preliminary and based on analysis of material from only one major excavation area. An important question for future consideration is the source of these animals. It seems clear that hunting made virtually no contribution to the local diet but that both fish and marine invertebrates were important food sources throughout the history of the site.

Coins. Some 1,269 coins have been recovered thus far by the project. Nearly all were found in an extremely corroded condition and required extensive cleaning before analysis. Although a significant minority (32%) cannot be identified due to their poor state of preservation, most can be identified within at least broad limits. A minority can be identified precisely. The coins range in date from Nabataean issues of the first century BC to the Abbasid period (10th century AD). The coins thus constitute crucial evidence for reconstructing the economy of Aila in this period.

The complete absence of Hellenistic coins from so large a corpus suggests that the site was not established until the first century BC. Some 184 coins date to the Nabataean period, ranging from the early first century BC to the annexation of Nabataea in AD 106. There is a relative paucity of imperial Roman issues from the second and third centuries, but sufficient to suggest continued occupation of the site. The largest number of coins by far (n=551) date to the fourth century, particularly issues of the House of Constantine. Few coins date to the fifth century, none from the late fifth century. But there are some Late Byzantine coins (n=32) from the sixth and early seventh centuries. The distribution of coinage is in general accord with that from other contemporary sites in the region.

The excavations have thus far yielded only a few Umayyad and Abbasid coins and none of the later Islamic periods.

Pottery. Over 556,000 potsherds have been recovered thus far by the project. The vast majority are locally made coarse wares. The stratigraphic contexts associated with some 1461 fragments of ceramic slag and 1423 kiln wasters in a variety of forms suggests local ceramic production throughout from the Roman the Byzantine and into the Early Islamic periods. There is also evidence for mining natural clay in the Early Roman/Nabataean period in Area N, northwest of Aila (Parker 1998: 378). The discovery of two seventh century kilns proves the existence of local pottery production in this period (Melkawi, 'Amr and Whitcomb 1994).

Quantities of imported pottery suggest Aila's role as a nexus of commercial exchange. Aila has thus far yielded over 1700 sherds of terra sigillata

dating primarily from the first century BC to the early second century AD. The vast majority is Eastern Sigillata A, although a few sherds of Eastern Sigillata B and Cypriote Sigillata are attested. It is notable that no Western Sigillata (including Arretine) has yet been identified at 'Aqaba, since western fine ware is common at Egyptian Red Sea ports, such as al-Quṣayr (Myos Hormos) and Berenike. Quantities of Nabataean painted and unpainted fine ware, plus a small amount of Nabataean Sigillata, also appeared in similar stratigraphic contexts. This fine ware seems to derive from Petra.

Later imported fine wares consist mainly of over 2000 sherds of Late Roman Red Wares from the third to the early seventh centuries. The vast majority of these are African Red Slip (ARS) wares, which begin appearing in quantity in the mid-third century and include both table wares and lamps. The ARS sherds comprise about 60% of the Late Roman Red Wares from the site. A distant second among the Late Roman Red Ware is Egyptian Red Slip (ERS), which appears at 'Aqaba in the fourth century, seemingly imitating ARS forms. Both types of ERS wares are attested: Egyptian Red Slip A (from the region around Aswān in Upper Egypt), including painted plates, and Egyptian Red Slip B (from various production centers along the Nile Valley). Small quantities of Phocaean (Late Roman C) and Cypriote Red Slip (CRS) begin appearing in the fifth century. By the late fifth century it appears that the quantity of ARS had declined dramatically. So-called Byzantine Fine Ware is also attested in some quantity.

Finally, a few dozen sherds from hand-made vessels have been identified as Axumite wares from Ethiopia. These begin appearing at 'Aqaba in fourth century contexts and include red burnished bowls and jars, some also decorated with incising. A few other hand-made sherds are tentatively identified as imports from South Arabia. Fragments of a single vessel from Area K from derive from India.

The other major category of imported pottery recovered is transport jars (amphorae). Over 3,000 fragments of imported amphorae have been recovered to date at Aila. Most can be at least broadly assigned to the typology of Peacock and Williams (1986), although a minority remains to be identified.

The most abundant type of imported amphora during the Roman period at Aila is the so-called "proto-Gaza", so named because they appear to be of identical fabric to the better known Gaza amphorae of the Byzantine period. These appear in the earliest deposits at 'Aqaba in the late first century BC. Much less common among the imported Roman amphorae thus far identified at Aila are the Dressel 2-4 amphorae. These were most often wine containers that originated in the Aegean (so-called Koan) and then were widely imitated in the western Mediterranean in the first centuries BC/AD (so-called "Pseudo-Koan", Class 10 in Peacock and Williams 1986: 105-106). Only a few dozen sherds of this type have been identified from the site and identification of their source is difficult. Most Dressel 2-4 amphorae at 'Aqaba seemingly derive from the eastern Mediterranean (including Koan, Rhodian, and Laodicean), but some appear to be Italian or western. A previously published example (Parker 1996: 244, fig. 8), originally identified as Pseudo-Koan from Italy, now more likely seems to be Koan.

Also attested but extremely rare at 'Aqaba are examples of the Peacock and Williams Class 33 amphora (originating from Tunisia and generally thought to carry fish products), Class 34 amphora (from North Africa) and Class 25 (a Spanish olive oil container; Peacock and Williams 1986: 136-140, 153-157).

Somewhat more abundant is the Class 47 ("hollow foot") amphora of the third and fourth centuries AD and possibly an Aegean wine container (Peacock and Williams 1986: 193-195).

The fourth century witnessed a dramatic increase in the number of imported amphorae at Aila. These include the Class 44 amphora, possibly an olive oil container from northern Syria, the Class 45 amphora, possibly from Asia Minor, and the Class 46 amphora ("Palestinian bag jar"; Peacock and Williams 1986: 185-192).

However, by far the two most common imported amphorae attested at Aila are the Gazan amphorae (Classes 48-49) and Egyptian amphorae (Classes 52-53). Among the nearly 500 sherds of the Gaza variety identified thus far are both the holemouth (Class 48) and short-necked (Class 49) varieties. Many carried wine, but others transported olive oil or sesame oil (Peacock and Williams 1986: 196-199). The most abundant amphorae by far at Aila are Egyptian. A few sherds of Egyptian amphorae appear at Aila in Roman contexts, but they only begin appearing in quantity in the fourth century. The approximately 1,600 Egyptian amphora sherds recovered to date represent just over half of all imported amphorae sherds from the excavations. These include several examples of Classes 52 and 53, both used as wine containers (Peacock and Williams 1986: 204-207). Importation of Egyptian amphorae continued into the seventh century. A small amount of Egyptian coarse ware has also been recovered at 'Aqaba.

In addition to the imported amphorae, Aila was

itself a major producer of transport jars, the so-called "Ayla-Axum amphora", in the Byzantine and Early Islamic periods. This type appears at Aila in the late fourth or early fifth century and is common through the seventh century (Melkawi, 'Amr and Whitcomb 1994). The current project has recovered thousands of fragments of these amphorae, which are attested throughout the Red Sea littoral, including Egypt, Yemen, Eritrea, and Ethiopia (Wilding 1989: 314; Hayes 1996: 159-161). Recent stratified examples from the Egyptian Red Sea port of Berenike date to the early fifth century. These jars possibly carried Palestinian agricultural products (Melkawi, 'Amr and Whitcomb 1994: 463-464).

Glass. Although there is as yet no evidence of glass production at Aila, thousands of glass fragments have been recovered. Some seems to be of Egyptian manufacture (Parker 1996: 252), but it now appears that the bulk of the glass is of Syro-Palestinian origin. There is also some evidence of luxury imports (Jones 2000).

Stone. Varieties of imported stone also reached Aila in the Roman and Byzantine periods, including basalt, marble, alabaster, steatite, limestone, and sandstone. Basalt was imported for mortars, mills, and grinders. Over 50 fragments of marble have been recovered, none from Early Roman/ Nabataean contexts and nearly all from Byzantine contexts. This is in keeping with a recent study concluding that importation of marble into the southern Levant began only in the second century after the annexation the regional client states. Most of the marble at 'Aqaba appears to be architectural elements. One group of marble architectural fragments from Aila, paralleled in ecclesiastical decoration in churches at both Petra and Mount Nebo, suggests a yet to be discovered monumental church somewhere in Aila.

Some 609 pieces of steatite (schist) representing about 462 vessels have been recovered thus far by the project. Steatite vessels first appear at Aila in the early fourth century (Parker 1998: 389; 1997: 32), possibly the earliest evidence for these vessels in Jordan. The quantity of steatite, also called "soft stone" or "soapstone", increases in frequency through time and is most prevalent in the Early Islamic period, when it was also used for lamps and other types of vessels. Possible sources for the steatite artifacts include the western Arabian Peninsula and the eastern Egyptian Desert. There are quarries in Western Saudi Arabia, dating primarily to the Early Islamic Period (Al-Rashid 1986: 77; Hallett 1990: 4-10; Kisnawi *et al.* 1983: 78-79; Zarins *et al.* 1980: 27-28). There are also recently discovered steatite quarries in the eastern Egyptian Desert utilized in the Early Islamic Period and possibly earlier (Harrell and Brown 2000: 39-40). Petrologic analysis of twenty-one steatite vessels from Aila as well as nine samples from the Egyptian quarries may identify the source of the artifacts. X-ray diffraction analysis of the steatite artifacts from Aila shows them to be primarily composed of varying mixtures of talc and chlorite, with most containing other minerals such as dolomite and calcite. The same items are also undergoing Inductively Coupled Plasma Mass Spectrometry analysis to determine trace element contents of the material. Together these analyses may yield important information about the composition of the steatite material and may determine which quarries were the sources of these items. Future testing of quarry samples from Western Saudi Arabia would provide additional valuable information (Grubisha 2001).

The preliminary analysis shows the steatite assemblage consists largely of charred cooking pots, about 56% of the total assemblage. Decoratively incised bowls (ca. 18% of the assemblage) may have been used as serving dishes; most lack evidence of charring. Undecorated vessels without clear evidence for charring account for approximately 21%. In addition, fragments of six lamps and three incense burners have been recovered (Grubisha 2001). Steatite is particularly useful for these types of utilitarian purposes. It withstands and conducts heat well during cooking and also maintains heat for serving food and illumination (Grubisha 2001; cf. Hallett 1990: 12; Harrell and Brown 2000: 39-40; Whitcomb 1994: 27).

Conclusions

Obviously much analysis of the evidence recovered in the 2000 remains, but the following summary highlights some points of historical interest.

Although Aila clearly was a center of trade and industry under the Nabataeans, the relative economic importance of trade in the city's economy is unclear. There are relatively few amphorae to suggest the export of wine, oil, or other liquid commodities in this period. The significant quantities of Eastern Sigillata and Nabataean fine ware and glass was at least partly for local consumption but perhaps represents vessels broken in transit. The evidence from Nabataean Aila has thus far revealed only domestic complexes. But these lie near what was probably the northern edge of Nabataean Aila. There is increasing evidence that substantial portions of the Nabataean city may lie closer to the coast. But these now lie buried under the Late Ro-

man, Byzantine, and Early Islamic strata, specifically in Areas A, J, and perhaps K. Literary sources of this period stress the importance of Leuke Kome, now widely identified with 'Aynuna near the outlet of the Gulf of Aqaba. Ships from southern Arabia transferred their cargoes at Leuke Kome to camel caravans en route for Petra via Aila. Such cargoes, largely frankincense, myrrh, and other aromatics, might have left little trace in the archaeological record at Aila. Clearly the city already hosted several industries in this period, including pottery production, copper-working, and perhaps bone-carving.

There was more evidence of discontinuity or occupation around the turn of the second century in all three northern areas (Areas B, M, and O), when these three domestic complexes were abandoned. It remains unclear whether this widespread abandonment, without evidence of destruction, should be associated with the Roman annexation of Nabataea in 106.

Whatever the cause for the abandonment, it was seemingly brief. All the northern areas (B, M, and O) were soon reoccupied in the early second century. This again appears largely domestic in nature, although there is evidence of continued ceramic production and perhaps other industries in the vicinity. The beginning of this century also witnessed the completion of the *via nova Traiana* between 111 and 114 and the reopening of the Nile-Red Sea canal, both ordered by Trajan. The Nile-Red Sea canal enabled traffic to move from the Mediterranean, Alexandria, and Egypt to the Red Sea entirely by water. The *via nova Traiana*, with its metalled surface, bridges, road stations, and Roman military garrisons, probably enhanced both the efficiency and security of commerce between Syria and Aila. Thus the second century might have begun a revival in Aila's economic fortunes. It is perhaps notable that Leuke Kome is no longer mentioned in literary sources after the first century AD.

The focus of occupation at Aila clearly shifted south in the beginning of the fourth century, when the domestic complexes in the northern areas were abandoned. Again, there is no evidence of destruction. The Area M complex was reused as a cemetery later in the fourth century.

The evidence suggests that the fourth century was a period of significant economic prosperity and development. This century began with the arrival of *legio X Fretensis* from Jerusalem. Although this unit probably no longer consisted of 5,000 or so troops typical of legions of the Principate, it still probably numbered at least 1,000 men. These troops, along with their families and other dependents, represented both a predictable influx of cash into the local economy and a market for a variety of products. The legion also required a steady supply of food and other materials, most necessarily imported to Aila. The huge increase in Egyptian and Gazan amphorae and the quantities of African Red Slip and Egyptian Red Slip table wares at Aila in this period may in part be explained by the legionary presence, which continued for at least a century and probably longer.

Construction of the putative church in Area J ca. AD 300 also has economic implications for this period. Although there is still no proof that the mud brick structure is in fact a church, its eastern orientation, overall plan, and associated artifactual evidence still suggest that this is the most plausible interpretation. If so, it was probably erected shortly before the church building program launched by Constantine in Palestine in 325 and thus represents an entirely private initiative. It implies the existence of a local Christian community with surplus economic resources sufficient to erect this monumental structure.

In the late fourth century, the church was severely damaged, perhaps by the earthquake of 363, and then abandoned. Soon after, construction of the stone curtain wall began. The line of the new fortifications partially extended over the church, which otherwise lay outside the new city wall, perhaps explaining why the ruined church was not rebuilt. The new city wall clearly demarcated the northern urban limit of Byzantine Aila. Construction of the city wall, with its projecting interval towers, also suggests the availability of surplus economic resources (whether local, imperial, or both) and some perceived threat to the city's security in this period.

Just outside the wall a cemetery of mud brick tombs was established (in Area A) that remained in use until perhaps the early fifth century. The two Early Byzantine cemeteries in Areas A and M have now produced a total of about 45 individual skeletons. This evidence promises some insights into the demography of Aila in this period. Inside the wall, excavation in Area K revealed a sequence of occupation extending from the Late Roman period through the Early Byzantine period, when a complex of stone and mud brick structures lined a street.

Aila's prosperity in the Byzantine period was undoubtedly fueled by several factors. The legionary presence, as noted above, continued at least into the early fifth century, if not later. The city became a station for pilgrims visiting Mount Sinai as well as an episcopal see. The abandonment of the more southerly Egyptian ports — Myos Hormos by the early third century and Berenike by the early

sixth century — gave greater significance to the northern Red Sea ports, specifically Clysma (modern Suez) and Aila. Both literary and archaeological evidence suggests that Red Sea commerce was flourishing in this period. Of special significance is the enormous quantity of amphorae produced at Aila itself and found throughout the Red Sea littoral including as far south as Axum in modern Ethiopia. Production seemingly began in the late fourth or early fifth century and continued into the Early Islamic period. Although the quantity of these jars is impressive (thousands of fragments have been recovered at Aila), their contents remain unclear. This evidence is now complemented by the Axumite pottery recovered at Aila and the eye-witness testimony of Cosmas Indicopleustes. This early sixth century Egyptian merchant visited Adulis, the port of the Axumite kingdom, and reports that the port was "much frequented by traders from Alexandria and the Gulf of Aelana" (i.e. Aila, cf. Miller 1969: 166-168).

It has been suggested that the city wall went out of use sometime in the Late Byzantine period (sixth/early seventh centuries). The most recent evidence suggests that this occurred relatively late in this period. Secure dating of construction of the mud brick rampart and elliptical towers to the late sixth century surely implies that the city wall remained in use in this period. It was perhaps not until the early seventh century that the city wall fell out of use for defensive purposes, as its exterior (north) face could be incorporated into a domestic complex in Trenches J.9-10. The city wall was then robbed more systematically for stone to build the adjacent Early Islamic Ayla later in the seventh century.

Important new evidence about the Early Islamic period was also obtained this season. The Area R sounding of Early Islamic Ayla suggests that its curtain wall was erected in the seventh century and not, as some have argued, in the Late Roman period. The deep deposits of over four meters of Abbasid and Umayyad strata in Area K clearly suggest that the Byzantine city continued to experience intensive occupation until late Abbasid times, when the sector was abandoned and used as a dump. In contrast, the project has recovered no evidence of Fatimid occupation, in line with Whitcomb's view that the Fatimid period at Ayla was one of economic decline and population contraction.

Acknowledgments

Roman Aqaba Project is sponsored by North Carolina State University and is affiliated with the American Schools of Oriental Research and the American Center of Oriental Research (ACOR). Funding for the 2000 season was provided by the National Geographic Society, Joukowsky Family Foundation, Samuel H. Kress Foundation, North Carolina State University, Foundation for Biblical Archaeology, and private donors. Walter Ward was a Jennifer C. Groot Fellow in the Archaeology of Jordan, awarded by ACOR. Assistance was provided by Dr. Fawwaz Al-Khrayseh, Director-General of the Department of Antiquities, and Dr. Pierre Bikai, Director of ACOR. The author is grateful to all these agencies and individuals for their support.

S.T. Parker
Department of History
North Carolina State University
Raleigh, North Carolina 27695
USA

Bibliography

Al-Rashid, S.A.
1986 *Al-Rabadhah: A Portrait of Early Islamic Civilization in Saudi Arabia*. Essex: Longman.

Grantham, B.
2000 Aqaba Area B Faunal Remains. Unpublished paper presented at the Annual Meeting of the American Schools of Oriental Research.

Grubisha, D.
2001 *An Analysis of the Steatite Artifacts from the Archaeological Site of Aila, Jordan*. Unpublished M.A. thesis. University of Wisconsin-Milwaukee.

Hallet, J.
1990 *The Early Islamic Soft-Stone Industry*. Unpublished M.A thesis. Oxford University.

Harrell, J.A. and Brown, V.M.
2000 Discovery of a Steatite Baram Industry of the Medieval Islamic period in Egypt's Eastern Desert. Presentation at the Annual Meeting of the American Research Center in Egypt, Berkeley, CA. Abstract in *Program and Abstracts*: 39-40.

Hayes, J.W.
1996 The Pottery. Pp. 147-178 in S.E. Sidebotham and W. Wendrich (eds.), *Berenike '95. Preliminary Report of the Excavations at Berenike (Egyptian Red Sea Coast) and Survey of the Eastern Desert*. Leiden: School of Asian, African and Amerindian Studies.

Jones, J.D.
2000 Roman Export Glass at Aila (Aqaba). Pp. 147-150 in *Annales du 14e Congrès de l'Association International pour l'Histoire du Verre*. Lochem: Association International pour l'Histoire du Verre.

Kisnawi, A., de Jesus, P.S. and Rihani, B.
1983 Preliminary report on the Mining Survey, Northwest Hijaz, 1982. *Atlal: The Journal of Saudi Arabian Archaeology* 7: 76-83.

Melkawi, A., 'Amr, K. and Whitcomb, D.S.

1994 The Excavation of Two Seventh Century Pottery Kilns at Aqaba. *ADAJ* 38: 447-468.

Miller, J. Innes

1969 *The Spice Trade of the Roman Empire. 29 B.C. to A.D. 641*. Oxford: Oxford University.

Niemi, T. and Smith, A.M. II

1999 Initial Results from the Southeastern Wadi Araba, Jordan Geoarchaeological Study: Implications for Shifts in Late Quartenary Aridity. *Geoarchaeology* 14 (8): 791-820.

Parker, S.T.

1996 The Roman 'Aqaba Project: The 1994 Campaign. *ADAJ* 40: 231-57.

1997a Preliminary Report on the 1994 Season of the Roman 'Aqaba Project. *BASOR* 305: 19-44.

1997b Human Settlement at the Northern Head of the Gulf of 'Aqaba: Evidence of Site Migration. Pp. 189-193 in *SHAJ* 6. Amman: Department of Antiquities.

1998 The Roman Aqaba Project: The 1996 Campaign. *ADAJ* 42: 375-394.

1999 Brief Notice on a Possible Fourth Century Church at 'Aqaba, Jordan. *JRA* 12: 372-376.

2000 The Roman 'Aqaba Project: The 1997 and 1998 Campaigns. *ADAJ* 44: 373-394.

Peacock, D.P.S. and Williams, D.F.

1986 *Amphorae and the Roman Economy: An Introductory Guide*. New York: Longman.

Smith, A.M. II, Stevens, M. and Niemi, T.M.

1997 The Southeast Araba Archaeological Survey: A Preliminary Report on the 1994 Season. *BASOR* 305: 45-71.

Whitcomb, D.S.

1994 *Ayla: Art and Industry in the Islamic Port of 'Aqaba*. Chicago: Oriental Institute of the University of Chicago.

Wilding, R.F.

1989 The Pottery. Pp. 235-316 in S.C. Munro-Hay (ed.), *Excavations at Aksum: an account of research at the ancient Ethiopian capital directed in 1972-4 by the late Dr. Neville Chittick.* London: British Institute in Eastern Africa.

Zarins, J., Whalen, N., Ibrahim, M., Mursi, A.J. and Khan, M.

1980 Comprehensive Archaeological Survey Program: Preliminary Report on the Central and Southwestern Provinces Survey: 1979. *Atlal: The Journal of Saudi Arabian Archaeology* 4: 9-36.

THE RUJM ṬĀBA ARCHAEOLOGICAL PROJECT (RTAP): PRELIMINARY REPORT ON THE 2001 FIELD SEASON

Benjamin J. Dolinka

With contributions by R. James Cook, Sean C. Fraser, Daniel Keller and Khalil Hamdan

Introduction

The Rujm Ṭāba Archaeological Project (RTAP) conducted a preliminary survey and reconnaissance of Rujm Ṭāba (رجم طابه) in August 2001. The project was inspired by previous research and fieldwork in and around the site undertaken between 1993-2000 by the Southeast 'Araba Archaeological Survey (SAAS), directed by Andrew M. Smith II. Three main archaeological components of the site were identified: a large building (Structure A001) identified by previous researchers as either a caravanserai or fortlet; a village consisting of 22 features (C001-016, D001-006), many of which represent separate structures; and a large necropolis containing numerous tombs. The purported caravanserai and village date from the Nabataean/Early Roman period and have the potential to provide excellent stratified deposits unspoiled by later occupation, but both areas are in immediate danger from natural and human destruction. RTAP intends to conduct further investigation of the site in the future.

Site Location and Regional Environment

The Nabataean site of Rujm Ṭāba is located in the heart of the Wādī 'Arabah (وادي عربه) valley of southern Jordan, ca. 41.5km northeast of al-'Aqaba (العقبه) and 4km south of the village of Raḥma (قرية رحمه) (**Fig. 1**). The remains straddle the modern Dead Sea Highway, ca. 1km north of the Ṭāba mudflats (Ar. *sabkhat Ṭāba* سبخة طابه) and to the southeast of a large sand-dune field. The well-known landmark and important regional water source known as 'Ayn Ṭāba (عين طابه) lies along the road ca. 3.5km to the south. In antiquity, the site likely served as a way station along the major Nabataean and Roman route that ran northward along the eastern escarpment of Wādī 'Arabah from Aila[1] (modern al-'Aqaba) to the southeast coast of the Dead Sea.

Geologically, the Ṭāba region is part of the Pre-Cambrian "Aqaba Granite Complex", a hard and jagged component of the Great Rift Valley (Bender 1974: 25), which extends along the entire length of Wādī 'Arabah and, due to subsurface discharge, gives rise to some springs on the eastern side of the valley, such as 'Ayn Ṭāba (Burdon 1959: 23, 58). More specifically, the site falls within the "Rahma Foliated Suite" (McCourt *et al.* 1990: 26-27), of which the "Taba Monzogranite Unit" makes up the largest portion (Rabba *et al.* 1988: 19-20; Ibrahim 1991: 31-32).

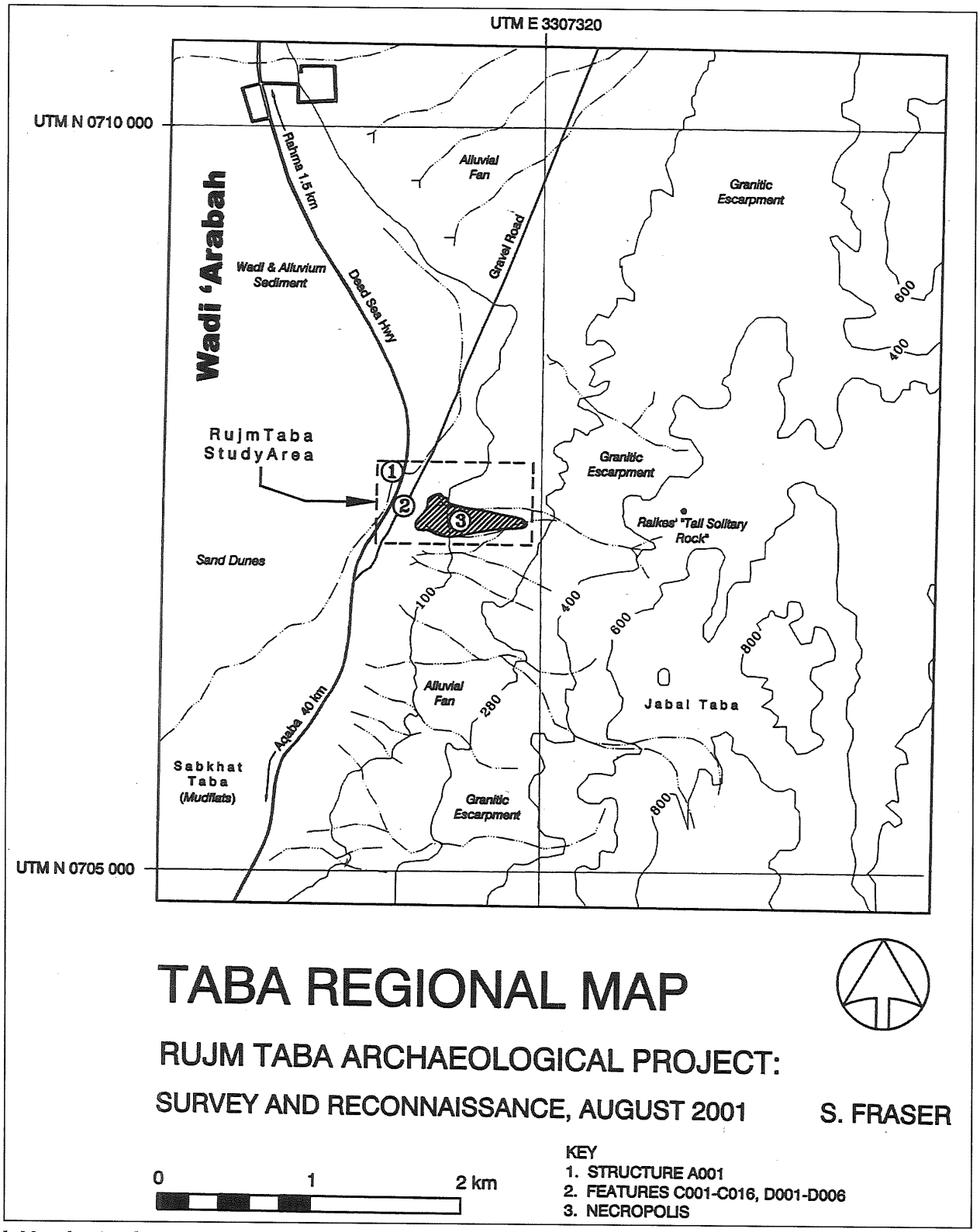
The climate is arid and hot in the area around Ṭāba. During the summer, the mean maximum temperature is 39°C, although it can often get as hot as 47°C; during the winter, the mean minimum temperature is 11°C, but the desert night can often be as low as 2°C (al-Eisawi 1996: 117; Rashdan 1988: 4; Ibrahim 1991: 3-4, table 1). Rainfall is mostly limited to the winter months and averages between 50 and 100mm *per annum*; however, the region is so arid that evaporation measurements of up to 5000mm can occur annually (Rosenthal *et al.* 1990: 340). In recent years, there has been little or no rainfall in the southern Wādī 'Arabah.

There are three types of soil present at Rujm Ṭāba: mudflats, *ḥammāda's,* and sandy soils. A mudflat (Ar. *sabkha*) is a place in the desert where water accumulates and the soil is made up of very fine sedimentary particles — mainly clay and silt; when the water evaporates, the result is a crusted surface that retains some of its water (al-Eisawi 1996: 101). Local inhabitants continue to dig shallow pits and wells at the edge of the alluvial fans along the eastern boundary of the Ṭāba mudflats, where the ground water is easily accessible.

Ḥammāda soils, often referred to as the Grey Desert Soils, cover some 50% of the region; they are gravely, consisting for the most part of flint, basalt and limestone (Burdon 1959: 20). At Rujm Ṭāba, *ḥammāda* soils are generally found to the west of the modern highway between the mudflats and the dunes.

Sandy soils make up nearly a quarter of the 'Arabah valley, and the movement of sand dunes can often cover and hide archaeological remains in

1. Parker 1997: 21. By agreement of the two archaeologists working in al-'Aqaba, the Nabataean/Roman/Byzantine site is referred to as Aila, and the Islamic fort and surrounding areas is known as Ayla.



1. Map showing the RTAP 2001 survey area and the regional environment surrounding Rujm Ṭāba (by S.C. Fraser).

the region (Smith 1995: 28). A large dune field is gradually encroaching in Rujm Ṭāba from the northwest. Although it has not yet engulfed any of the structures mentioned by previous visitors, some ancient architectural remains may already have been subsumed in the sand. As none of the aforementioned soil types are conducive to extensive plant life, the vegetation in the area is made up of only some 50 different species of desert shrubs, low bushes and acacia trees (al-Eisawi 1996: 96-121).

In addition to the soil types mentioned above,

the steep sides of the 'Arabah are studded with rocky alluvial fans (Ibrahim 1991: 85-86). Created by the swift-flowing flash floods of the winter season, they are composed of boulders and cobbles carried down from the heights. The archaeological site at Rujm Ṭāba is located along the base of a rounded alluvial fan radiating from the eastern escarpment of Wādī 'Arabah. Most of the village is located on the slightly higher and more stable ground between two major streambeds on the slope of the fan. While the setting may seem treacherous, the ancient inhabitants presumably took measures to safeguard the settlement from sudden flooding. In addition to the plentiful supply of water near the site, the granitic field of the fan provided a large quantity of relatively uniform, and easily accessible, building stone.

Previous Research

Rujm Ṭāba completely escaped the notice of the ancient Greek and Latin authors, who fail to mention it either directly or indirectly. The site remained essentially *terra incognita* until it was visited by an expedition of the Palestine Exploration Fund in 1883, which camped there temporarily (Kitchener 1884: 210). The expedition provided useful information about the flora and fauna found in the immediate environs of Ṭāba (Hart 1885: 252-254; 1891: 30-32); many of the animal species present in the region at that time have since been hunted out of existence.

In September of 1902, the great Czech scholar Alois Musil visited the area of Rujm Ṭāba. He described the spring of 'Ayn Ṭāba (Musil 1907: 1.17, 20, 253, 256; 2.190-191, figs. 138-139), but failed to mention any of the archaeological remains at the site.

Fritz Frank, who surveyed Wādī 'Arabah between 1932 and 1934, compiled the first detailed catalogue of archaeological sites in the region. This survey included a compendium for each site of all extant architectural features, inscriptions and pottery. During his visit to Rujm Ṭāba, Frank (1934: 238) provided the first detailed description of the site:

> "Am Ostrand der *'araba* angekommen wandten wir uns nach Süden und erreichten un 10 Uhr die Ruinen von *'en taba,* etwa 6 km von *wadi darba* entfernt. Die Ruinen liegen unmittelbar am Fuß des Gebirges auf einer Geröllhalde, bedecken eine Fläche von 200 zu 100 m und bestehen aus rohen Granitblöcken; südöstlich von ihnen ein Friedhof, 300 m nördlich noch ein Ruinenhügel. Alles ist sehr zerfallen; ich sah feine alte Keramik..."

Frank was therefore the first to identify the archaeological components at Rujm Ṭāba: the caravanserai, village and necropolis. The fineware pottery that he referred to was most likely the Nabataean painted and unpainted fine wares that he noticed frequently throughout his travels in the 'Arabah valley.

After the visit of Frank, however, Rujm Ṭāba once again faded into obscurity and was not even visited by Nelson Glueck during his extensive surveys of the region. Thomas Raikes reported the remains of a "Nabataean Fort and Village" at Rujm Ṭāba (Raikes n.d.: 14-15; 1985: 100), just 4km south of the petrol station at Raḥma (Khouri 1988: 129), during his surveys associated with road construction in Wādī 'Arabah during the years 1967-69 and 1975-79. He also noted the presence of thin Nabataean pottery there, confirming the previous work of Frank.

The most important and comprehensive investigation of the archaeological remains at Rujm Ṭāba has recently been provided by the "Southeast Araba Archaeological Survey" (SAAS), a component of the "Roman Aqaba Project" under the direction of Andrew M. Smith II, which began as the "Southeast Araba Archaeological Reconnaissance" (SAAR) in 1993. The archaeological remains at Rujm Ṭāba correspond with SAAR sites 17-19 and SAAS sites 135-136 (Smith and Niemi 1994: 478-479; Smith 1995: 45-47, 117, pl. 2; Smith *et al.* 1997: 57-58). Although the focus of his research was broader, with a more regional emphasis, Smith described the extant architectural remains and pottery found there and also stressed the endangered nature of the site, due to bulldozing activities associated with highway construction and local vandalism (Smith and Niemi 1994: 478-479).

Objectives of the RTAP 2001 Field Season

The specific objectives of the first season of archaeological reconnaissance at Rujm Ṭāba were: 1) to locate and describe the site in greater detail than had been possible for survey projects with a broader, regional emphasis; 2) to ascertain the physical extent of the site as well as to delineate its major features; 3) to conduct intensive surface collection in order to obtain a large body of representative, datable cultural material; 4) to assess the impact of human activity and natural processes on the integrity of the site; and 5) to ascertain the feasibility of further archaeological research at Rujm Ṭāba.

Methodology

Master Site Grid

As a preliminary measure to facilitate future work at the site, the team established a permanent

site datum (**Fig. 2**) along the western side of the highway (UTMN 0705502, UTME 3307308, elevation 75m ASL ±3m). The datum formed the origin for an infinitely expanding grid aligned on Universal Transverse Mercator grid North and corrected for magnetic declination.[2] The four quadrants of the grid were labelled: A, northwest of the datum; B, northeast of the datum; C, southeast of the datum; and D, southwest of the datum. The main grid was further subdivided into 5 x 5m squares. Each may be labelled according to its quadrant and its E-W and N-S distance from the datum (Field, x-coordinate/y-coordinate). Thus square C006/045 occupies an area 25-30m east and 225-230m south of the datum. The 5 x 5m square size was chosen to conform to any future excavation, which would be conducted on that module.

Surface Collection

It is well established that the results of surface artefact collection may not reflect accurately all periods and types of human occupation at a site, but they remain the most useful assessment of a site without excavation. During this preliminary reconnaissance and survey, two blocks of thirty-six 5 x 5m squares were selected for intensive surface collection. The first encompassed the entire purported caravanserai, Structure A001 (**Fig. 2**); the other was an area selected within the apparent central portion of the village (**Fig. 3**). The goal of intensive collection in these two areas was to obtain a body of datable material, which would be sufficiently large enough to better understand the occupational history of the site. In addition, the choice of two areas from different parts of the site permitted comparisons between them in terms of quantity and type of artefacts in the hopes of assessing the probable function of each area.

The artefacts were collected and labelled by individual 5 x 5m squares. Only diagnostic artefacts were collected. For the purposes of the survey, diagnostics were defined as: all rims, bases and handles; all painted and unpainted fine wares; all imported wares; all metal and glass; and any non-local stone. Bone and shell were not collected from the surface. The results of the surface collection are discussed below.

General Site Delineation

Structure A001

The various components of the site were delineated by walking the landscape. The Nabataean caravanserai (Structure A001) is located 55m west of the modern highway in a broad, flat area of *ḥammāda* soil, between a small but dynamic wadi and the dune field. Located some 150m to the southeast is a major local water source. According to an informant, the structure is known locally as Bīr Ḥilwān (بير حلوان). The probable extent of the structure was determined by examining its remaining architecture and the irregular topography, and by estimating the size of its surface scatter.

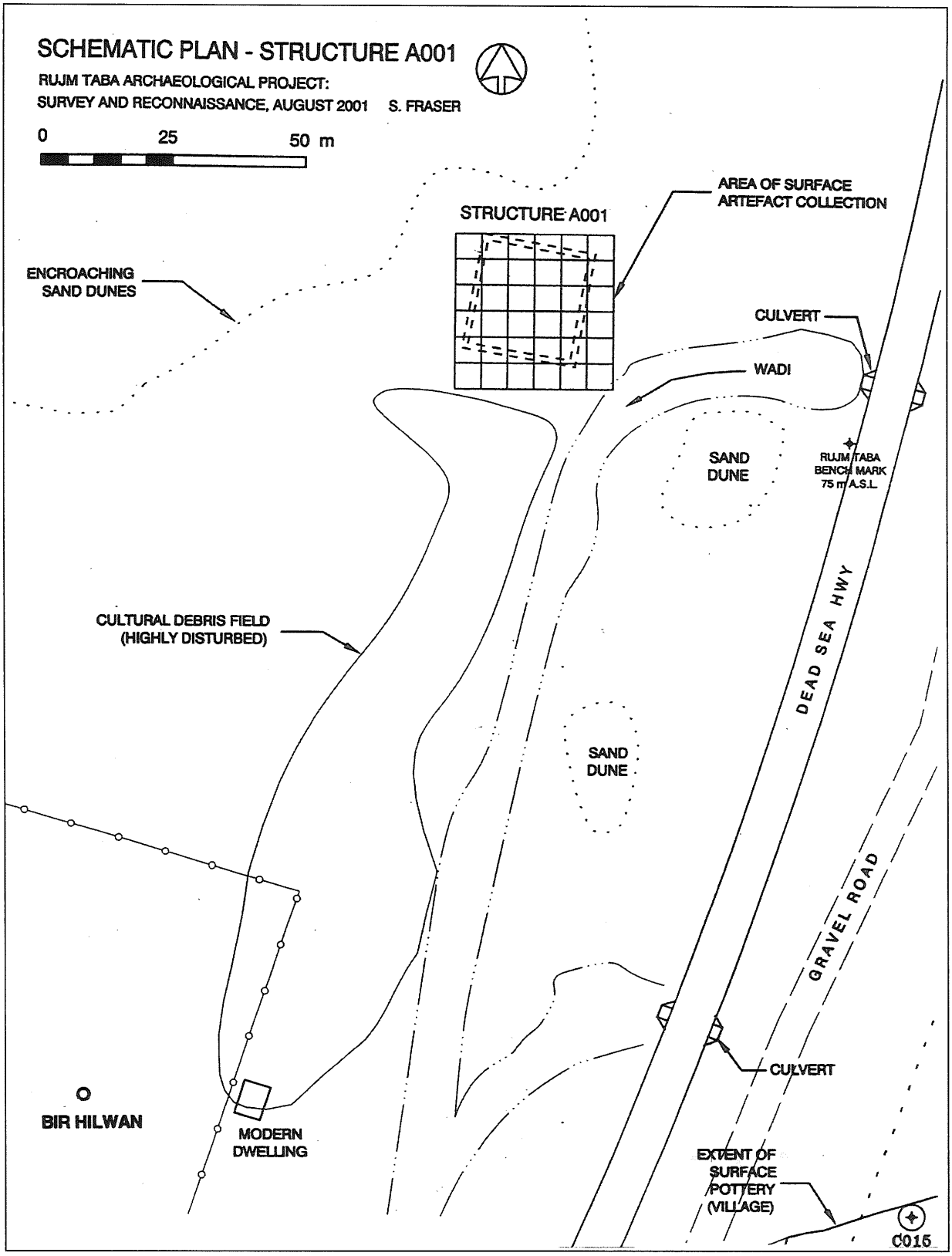
Structure A001 (**Fig. 4**) is roughly square, measuring ca. 20 x 20m, and has at least four internal rooms. The entire building seems to have been constructed of the pink, grey and white granite, which is plentiful in the nearby alluvial fan. It is preserved to an average height of at least 1.25m above the desert floor, but in some places — e.g. the northwest corner — the extant architectural remains rise to ca. 2m. Crude wall lines (**Fig. 5**) and the remains of an internal corner were visible in the southwest portion of the structure, but attempts to clean the tops of the walls and establish precise wall lengths and widths were frustrated by the decomposition of the top course of masonry, which had become highly friable from weathering. Where a second course of stone was visible, it seemed to be much better preserved (**Fig. 6**).

The architectural plan of Structure A001 exhibits all of the elements typical of a Nabataean caravanserai, with clear parallels coming from elsewhere in the Wādī 'Arabah valley and in the an-Naqab (Negeb) desert. The Nabataeans seem to have a preferred caravanserais that were either square (or nearly square) that consisted of a large, central courtyard surrounded by a series of rooms measuring between ca. 3 and 5m^2 situated along the interior of the outer walls (**Fig. 7**). Many of these structures had staircase-towers, a common feature in Nabataean architecture.[3] It has been suggested that "debris pushed forward by [a] bulldozer gives the false impression of a northwest corner tower" (Smith 1995: 46) on Structure A001, but our examination of the extant architectural remains of that corner (**Fig. 8**) suggests that it may actually be a Nabataean staircase-tower. The closest parallel to Structure A001 is the Nabataean caravanserai at Horvat Dafit (Cohen 1984c), situated only 14km to the southwest of Rujm Ṭāba.

Nabataean caravanserais generally measure

2. According to the 1997 Arabic version of the *Wadi Rahma (3049.IV) Topographical Map* produced by the Royal Geographic Centre, magnetic declination was approximately 4° 0' 8" East in 1997, and has moved 3' 2" East each year since then.

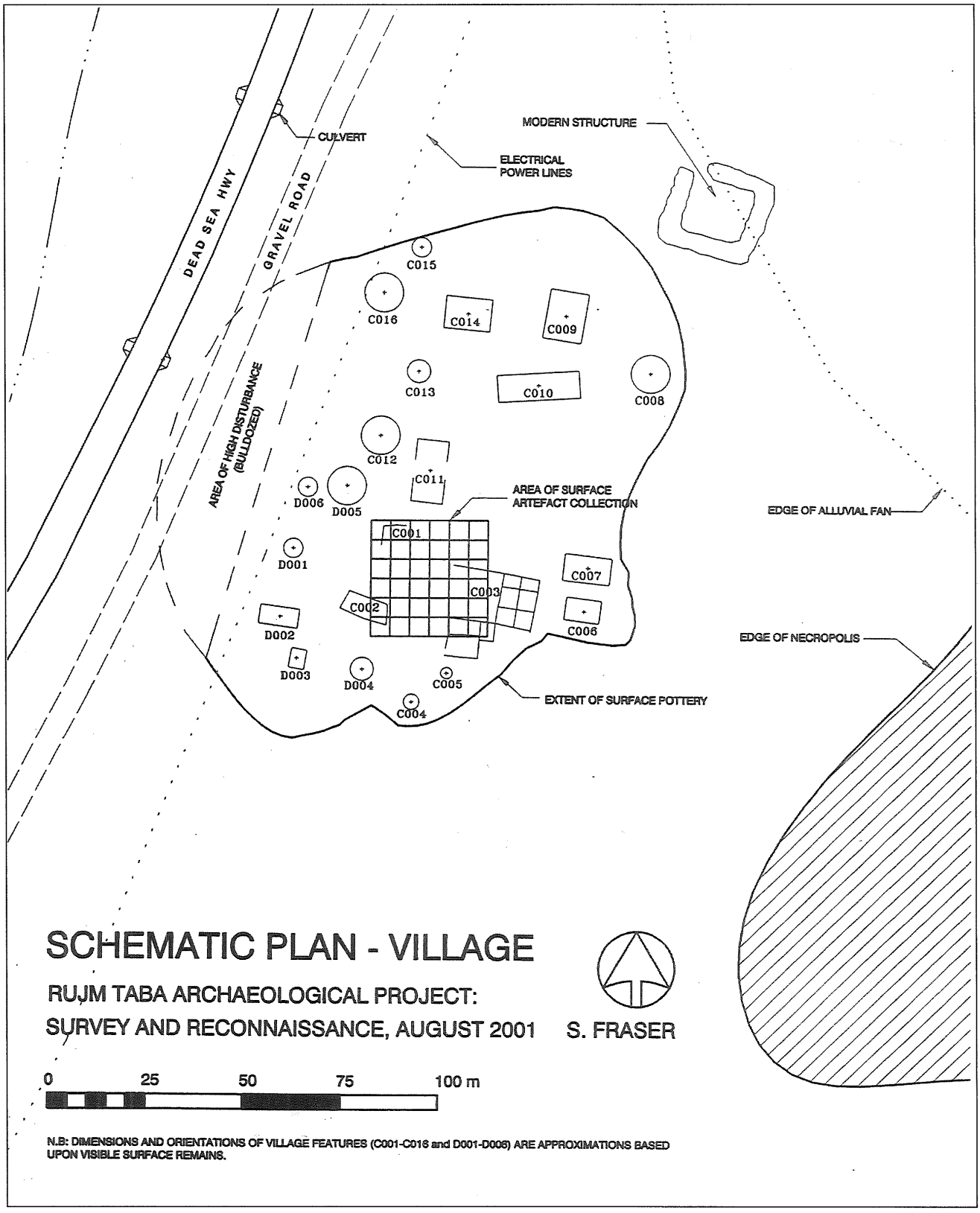
3. See Negev 1973 for Nabataean staircase-towers at Kurnub/Mampsis and 'Abda/Oboda. They are also present at the caravanserais of al-Maḥalla/Sha'ar Ramon and Muyat 'Awād/Mo'a, and at the Nabataean fort of Horvat Ma'agora in the central-western 'Arabah (T. Erickson-Gini: pers. comm.).



2. Plan showing the RTAP permanent site datum on the western side of the Dead Sea Highway and Structure A001, the Nabataean caravanserai (by S.C. Fraser).

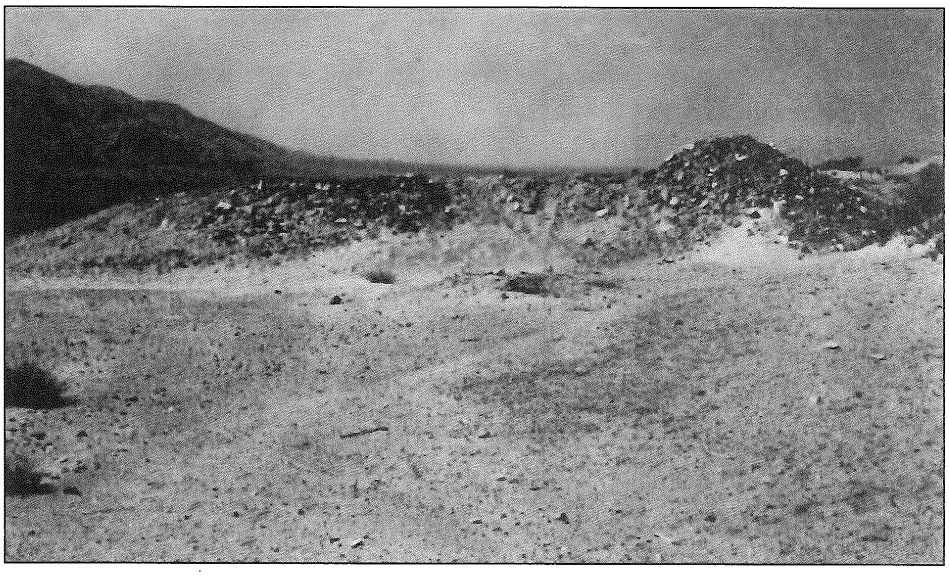
from ca. 16 to 42m^2 and are almost always located on level ground.[4] They often offered such ameni-

4. For Nabataean caravanserais in the western 'Arabah and an-Naqab, see Cohen 1982; 1982a; 1982b; 1984; 1984a; 1984b; 1984c. For Nabataean caravanserais and forts from the eastern Wādī 'Arabah see Smith and Niemi 1994; Smith 1995; and Smith *et al.* 1997.



3. Plan showing the Nabataean village and its features, located on the eastern side of the Dead Sea Highway (by S.C. Fraser).

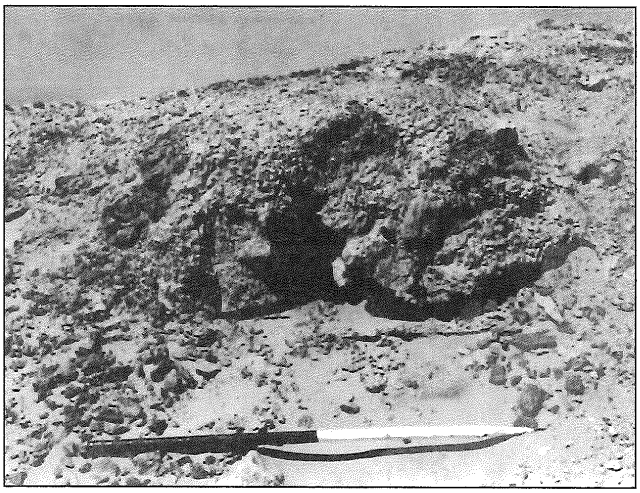
ties as "bathtubs" and cooking installations, such as the caravanserai at al-Maḥalla/ Sha'ar Ramon (قصر المحله) in the south-central an-Naqab (Cohen 1982: 88), and were large enough to accommodate groups of travellers with a relatively small caravan of camels. Of particular interest is that the Naba-



4. General view of Structure A001; view from the north (photo R.J. Cook).



5. West wall line of Structure A001; view from the south (photo R.J. Cook).



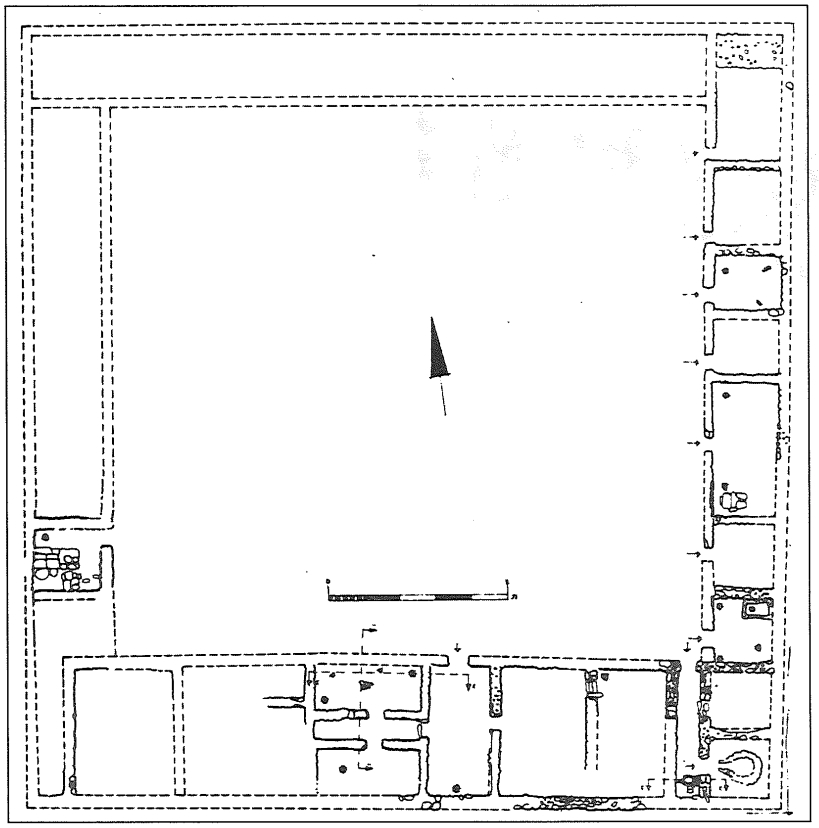
6. Preserved course of masonry from the south wall of Structure A001; view from the east (photo R.J. Cook).

taean caravanserais that have been excavated on the western side of Wādī 'Arabah and in an-Naqab were all constructed during the first century AD, although they were often occupied after the Roman annexation of Nabataea in AD 106 (T. Erickson-Gini: pers. comm.). Structure A001 at Rujm Ṭāba fits all of the criteria for a Nabataean caravanserai: it has the right size, shape and layout; it is located on level ground; and the surface pottery from the RTAP 2001 Survey and Reconnaissance strongly supports a date in the first century AD for its construction.

The Village

The general boundaries of the village were located by walking transects across the site until surface ceramics and architectural remains were no longer visible. The village (**Fig. 9**) occupies an area of 1.17 hectares and rises from 73m ASL to 86m ASL at its easternmost limit. The team mapped the centre of each probable architectural feature (**Fig. 10**) and estimated its physical extent (see **Fig. 3** above). In total, 22 such features were documented (C001-016, D001-006), making the village much more substantial than previously thought. While 11 of these features likely represent separate structures, the other features may well be smaller components of much larger buildings.

One of the features, C003 (**Fig. 11**), was partially located within the area of surface collection for the village and was examined in greater detail. It measures ca. 22 x 23m and consists of at least ten discernible rooms, including a courtyard; there are likely more rooms associated with C003. It also



7. *Plan of the Nabataean caravanserai at al-Maḥalla/Sha'ar Ramon in the south-central an-Naqab (after Cohen 1982: 88).*



8. *Interior of the northwest corner of Structure A001; view from the southeast (photo R.J. Cook).*

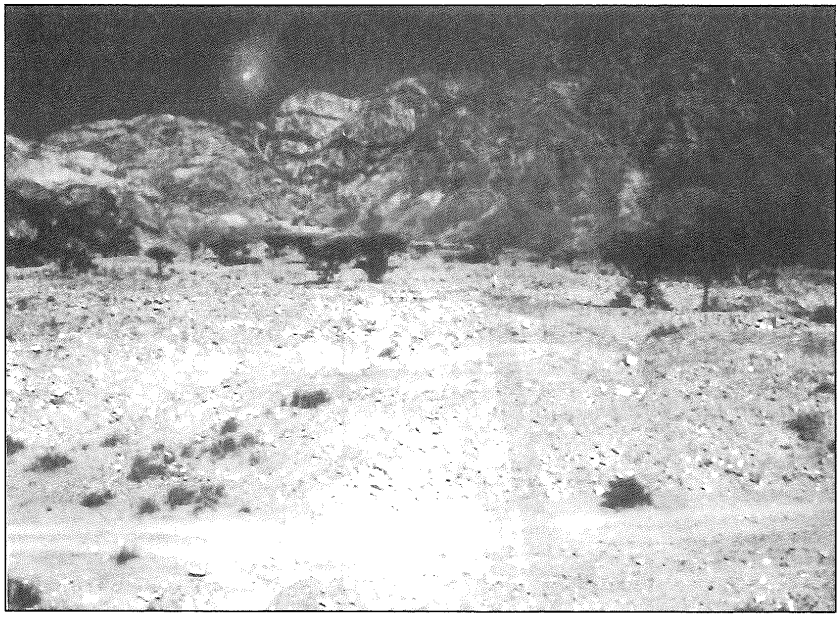
appears that the nearby Feature C002 (see **Fig. 3** above), which lies directly to the west of C003, may indeed be a component of the larger structure. The exterior walls of C003 measure ca. 1m in thickness, and the interior walls of the complex — e.g. the walls that comprise Rooms 4-7 (**Fig. 12**) — are between 70 and 80cm thick. It has been suggested (S. Fakhiry: pers. comm.) that the architectural remains of C003 bear a remarkable resemblance to the East and West Complexes at Wādī Ramm (وادي رم), which were re-excavated in the late 1990s (Tholbecq 1998; Dudley and Reeves 1997; 1998). The architecture of C003 and its relationship with structures at other Nabataean sites warrants further investigation.

In addition to the pottery and glass (see below) collected from the village, also found were the following: fragments of two imported basalt grinders and a spouted mortarium made from local stone; part of an extremely worn terracotta figurine; and a Nabataean bronze coin of Rabbel II, dating to AD 90/91 (Meshorer 1975: 76-78, 110, no. 153), that was found in the village just outside of the surface collection area (D005/043).

Preliminary analysis of the artefact distribution from the surface collection in the village has revealed the presence of at least one area that was devoted to food preparation and cooking activities. In the sector delimited by squares C002/048-049 and C003/048-049 were found an imported basalt grinder, a mortarium rim, several sherds (including handles and a base) from a Nabataean cooking pot, and a *ṭābūn* fragment. It is hoped that future intensive surface survey at the site will suggest the specific functions of other areas in the village.

The Necropolis

The largest component of the three main archaeological sites at Rujm Ṭāba is the necropolis (see **Fig. 1** above). It measures approximately 1.7km around its perimeter, covering a total area of ca. 11 hectares, and is bounded by two streambeds that flow from the base of the escarpment of the steep granitic slopes above. The necropolis is located be-



9. General view of the Nabataean village; view from the west (photo R.J. Cook).



10. Feature C009 in the Nabataean village; view from the southwest (photo R.J. Cook).

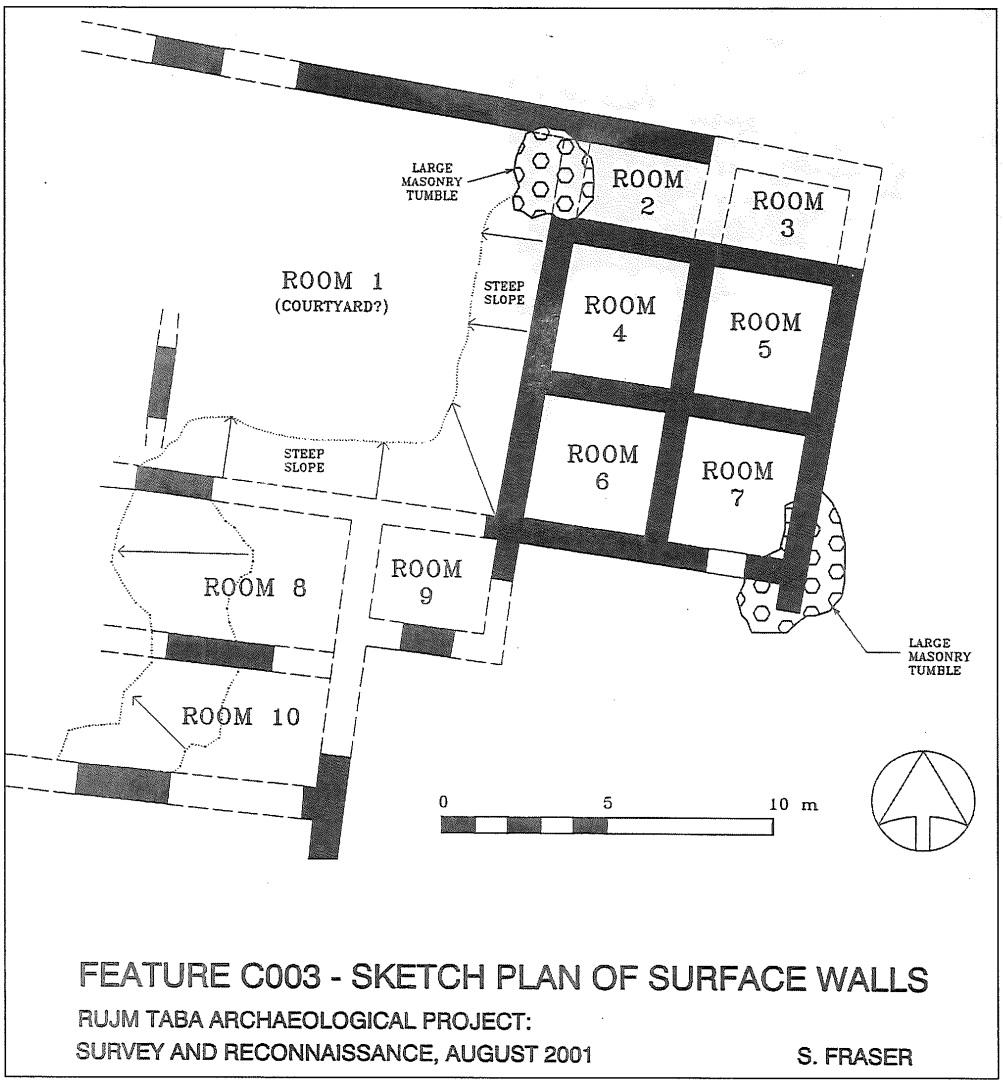
tween 80 and 90m due east of the village, up the slopes of the alluvial fan. It rises from ca. 95m to 225m ASL, measures ca. 700m east-west, and at its widest point measures 250m north-south.

Although time did not allow a more detailed investigation of the necropolis, survey was conducted by RTAP at the easternmost limit of the alluvial fan, where the *sīq* into the *jabal* begins (**Fig. 13**). Nineteen tombs were discerned in an area measuring ca. 1900m^2, a very small portion of the overall cemetery. If this rate of tombs/m^2 were to remain constant, there could well be over 1000 burials throughout the cemetery; a conservative estimate would suggest a minimum number of between 500 and 600 tombs. Unfortunately, the majority of the burials on the lower part of the slope have been completely looted (**Fig. 14**); those on the upper slopes, however, appear to be more intact and undisturbed. The team was unable to locate even a single sherd in the necropolis, making interpretation of the tombs problematic.

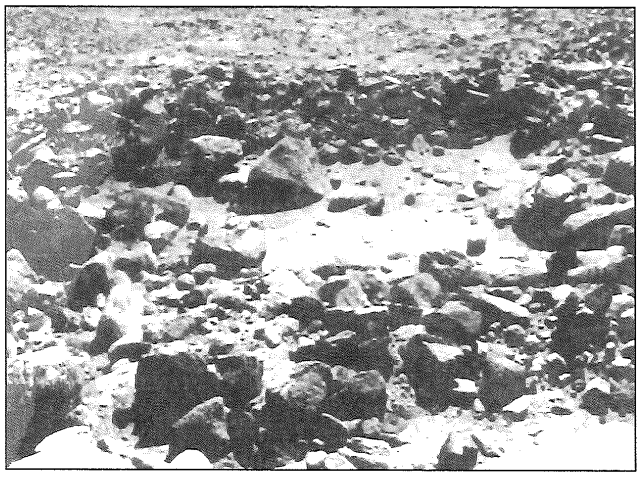
Many of the large and loosely piled cairns of local cobbles in the necropolis share attributes with Late Bronze Age tombs found elsewhere in the valley (K. Hamdan: pers. comm.). With the exception of three sherds that have been attributed to the Iron Age (C. Whiting: pers. comm.), there is no ceramic evidence earlier than the first century BC from the surface collection at the main habitation site. If the necropolis were of an earlier date, it is unclear where the inhabitants of the Nabataean-period village would have buried their dead. Perhaps there is a local tradition of tomb construction that spans millennia. At any rate, the date of this cemetery remains elusive and will only be determined by further investigation.

The "Tall Solitary Rock"

The final feature of interest from the RTAP survey is a large monolithic stone located on a peak above the village (see **Fig. 1** above). This is certainly what Raikes referred to as a "tall solitary rock" (Raikes n.d.: 15) when he surveyed the area in the late-1960s and early 1970s. Located ca. 1800m east of the village, this large rectangular stone is situated some 560m ASL and nearly 1.75km above the benchmark established for the site by RTAP. According to a local informant, there is no oral history for this monument-like rock; however, he suggested that there is a similar stone located directly to the west on a granitic peak of the western escarpment of Wādī ʻArabah. The function of this stone is unknown, but Raikes (n.d.: 15) proposed that it might have marked an ancient signalling station. Due to time constraints, the



11. Sketch plan of the surface walls from Feature C003 in the Nabataean village (by S.C. Fraser).



12. Rooms 4 and 5 from Feature C003 in the Nabataean village; view from the south (photo R.J. Cook).

RTAP survey was unable to visit this feature.

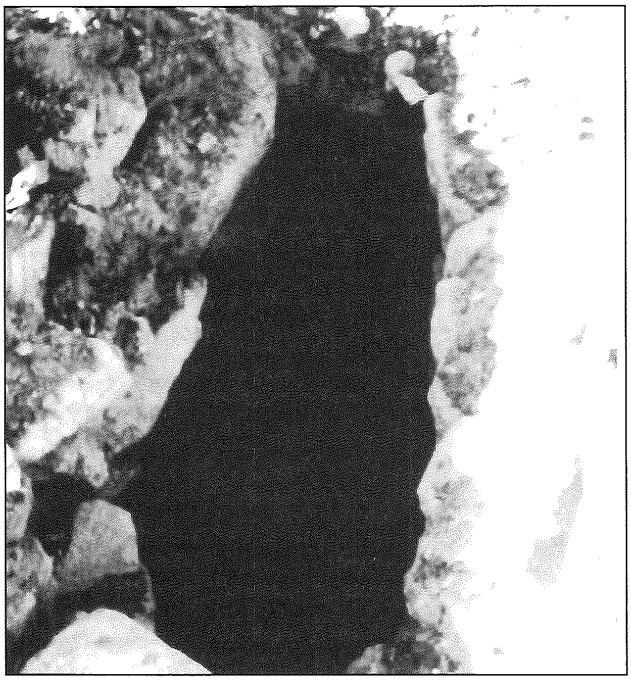
Pottery (B. Dolinka)

A total of 1539 sherds were collected during the RTAP 2001 survey and reconnaissance. Only 325 pieces of pottery were recovered from Structure A001. The presence of this rather small amount of ceramic material is no doubt due in part to the fact that the Nabataean caravanserai at Rujm Ṭāba was sherded heavily during previous survey work conducted by both Raikes and Smith. Preliminary assessment of the surface pottery from Structure A001 provides a tentative chronological sequence for the building and reinforces its Nabataean origin. Of the 325 sherds collected, the vast majority (74.5%) were of the distinct, thin Nabataean painted and unpainted fine wares, ranging in date from the early first through the mid-second centuries AD. Interestingly, there was a paucity of cooking (6.8%) and coarse (1.8%) wares from the surface collection. No pottery of apparent Late Roman or Byzantine date was recovered from Structure A001.

Ceramics collected from the village offer a glimpse of its occupational history and reinforce its domestic nature. Of the 1214 sherds collected, the overwhelming majority (83.5%) were Nabataean



13. Survey area of the necropolis, at the easternmost limit of the alluvial fan; view from the west (photo R.J. Cook).



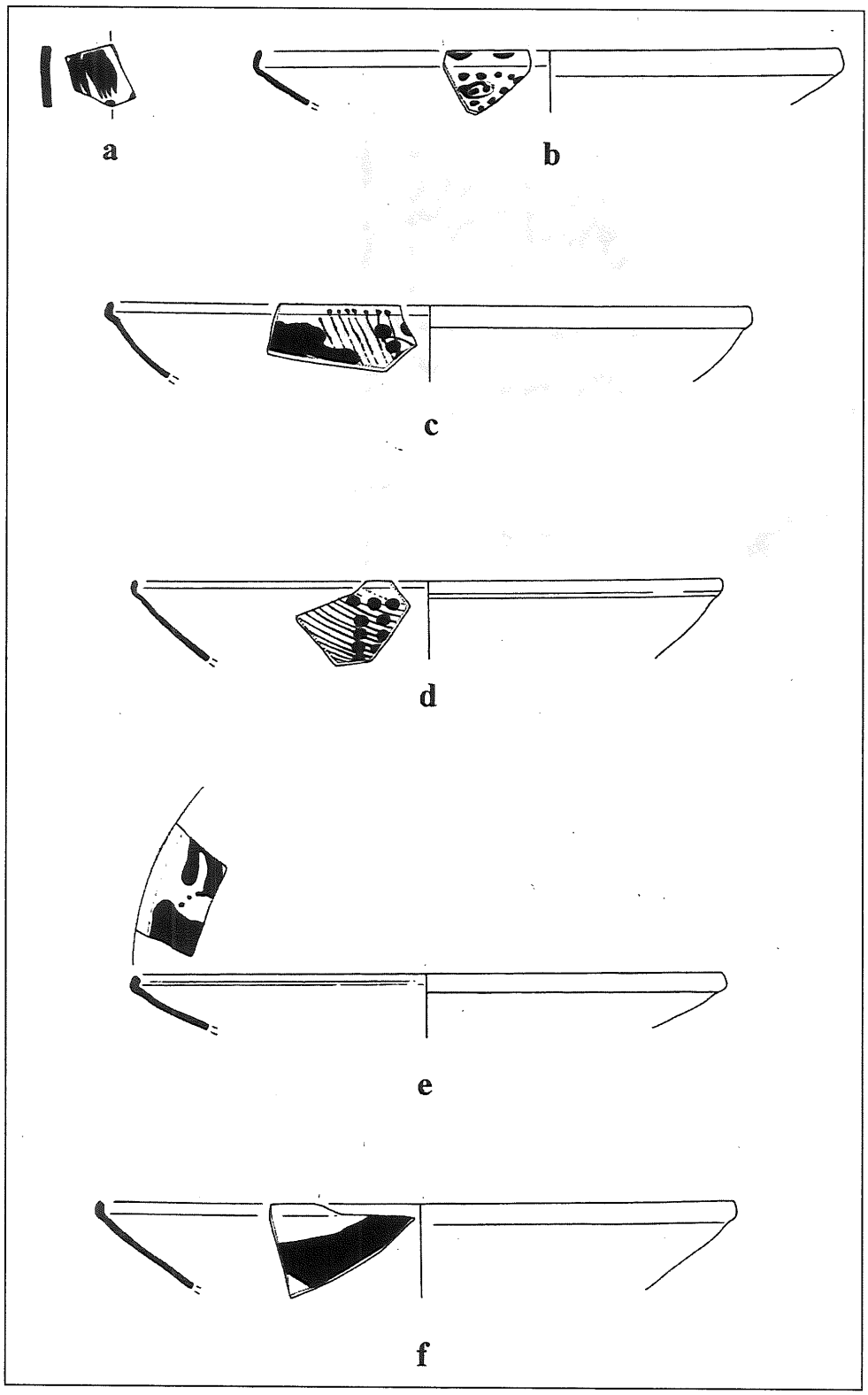
14. One of the numerous looted tombs from the necropolis (photo R.J. Cook).

painted and unpainted fine wares, ranging in date from the mid-first century BC through the mid-second century AD. Also present were 22 fragments (mostly body sherds) of imported Eastern Sigillata A. In addition to the finewares found in the village, there were a number of cooking wares of contemporaneous date to the finewares, as well as sherds from storage jars and Nabataean unguentaria and lamps. It should be noted that only 13 sherds, less than 1% of the pottery recovered from the village, were of Late Roman date (see below).

Nabataean Painted Fine Ware Bowls **(Fig. 15)**

Nabataean painted fine ware (hereafter NPFW) has received more scholarly attention than all other types of Nabataean pottery. Although information about the NPFW provided by most excavations conducted during the past century is of little use (Dolinka 1999: 61-79, 84-90), recent fieldwork and reports have clarified the origins and development of this fine ware. While studies concerning the decorative motifs (e.g. Schmitt-Korte 1984) have provided insight into the variety of patterns employed by the Nabataean potters, they are of little chronological value. All previous studies concerning the chronology of the NPFW (e.g. Parr 1970), as well as chronological schemes based upon petrographical analysis (e.g. Gunneweg *et al.* 1988) need to be revised in light of the recent work conducted by the Swiss at Petra/az-Zanṭūr (Schmid 2000), which provides the most recent typo-chronology of the NPFW to date.

NPFW bowls from Petra are well attested in the ceramic repertoire recovered from the surface collection conducted by RTAP, and they represent a significant portion (23%) of the total pottery assemblage from Rujm Ṭāba. The examples illustrated here exhibit well-known forms and decorative motifs for these vessel types. The rim diameter of the NPFW bowls collected by RTAP averages 17.6cm. The first piece **(Fig. 15a)**, although only a body sherd, comes from C001/047 and is important because of its early date. It belongs to Schmid's Dekorphase 2c and dates to the early first century AD (Schmid 2000: 28, 184, Abb. 88). A total of five sherds from this Dekorphase were collected



15. Sherds from Nabataean painted fine ware bowls recovered at Rujm Ṭāba scale 1:2 (drawings by M. Faulkner).

from the village, representing 2% of the NPFW collected there; none were found in Structure A001. The piece has a very dark grey (N3) core and a red interior (2.5YR 6/8) and exterior (10R 5/8). The painted decoration of small leaves is also rendered in a red (10R 4/6) colour.

The next five vessels are all typical NPFW carinated bowls with inverted rims of varying types. The rim sherd in **Fig. 15b** was discovered during a preliminary collection in the village during the first day of the RTAP survey. The fabric, interior and exterior are all red (2.5YR 6/7). The so-called "peacock eyes" and dots motif (Schmitt-Korte 1984: 16) are painted in a dark red (2.5YR 4/6)

colour. The vessel dates from Schmid's Dekorphase 3a, or AD 20-70 (Schmid 2000: 28, 184, Abb. 89), but the closest parallel to the example from Rujm Ṭāba comes from 'Abda/Oboda (Negev 1986: 56 no. 400).

Another NPFW carinated bowl from Dekorphase 3a was collected from square C002/047 **(Fig. 15c)**. It has a red (2.5YR 5/8) fabric and interior and a light red (10R 6/7) exterior. The painted decoration is rendered in a dark reddish grey (10R 4/1) colour. While the vessel form and rim stance are paralleled at Petra (Schmid 2000: Abb. 90), the decoration of "radial cypresses dots and lines" from this vessel are reminiscent of examples found at Oboda (e.g. Negev 1986: 51 no. 367). Vessels dating to Dekorphase 3a made up the second largest category of NPFW collected by RTAP, representing 21% and 25% of the sherds from A001 and the village, respectively.

The largest category of NPFW recovered by RTAP comes from Schmid's Dekorphase 3b, which he dates to the late-first century AD (Schmid 2000: 28-29, 184, Abb. 91). Nearly half (48%) of the NPFW from Structure A001 and exactly half of it from the village fall under this category. The decorative motif on these vessels is almost unequivocally made up of stylised palmettes, double cones and clusters of dots — often interpreted as "grapes" — on a background of fine lines. The example illustrated here **(Fig. 15d)** was gathered during a preliminary collection in Structure A001 conducted on the first day of the RTAP survey. It has a red (2.5YR 5.5/8) fabric and interior, a red (10R 6/7) exterior and is decorated with dark reddish brown (5YR 3/2) paint. These vessels, with their distinct decorative motifs, are ubiquitous throughout the Nabataean kingdom.

Vessels from Schmid's Dekorphase 3c are also well represented in the ceramic corpus from Rujm Ṭāba and comprise the third largest category of NPFW found at the site, or 8% from A001 and 15% from the village. These bowls date to the early second century AD. The first example **(Fig. 15e)** comes from the preliminary collection in A001. It has a light red (10R 6/8) fabric and interior, light red (2.5YR 6/8) exterior, and reddish black (10R 2.5/1) paint. Interestingly, the decoration was carelessly applied by the painter, demonstrated by the three dribbles of paint between the palmette and the cone. The rim form of this bowl has an exact parallel from Petra (Schmid 2000: 29, 184, Abb. 92). The second NPFW 3c bowl **(Fig. 15f)** comes from C006/048. It has a light red (2.5YR 6/7) fabric, light red (2.5YR 5.5/8) interior and exterior, and a reddish black (10R 2.5/1) painted decoration. This example is also paralleled at Petra (Schmid 2000: 29, 184, Abb. 93). Both of the NPFW 3c bowls from RTAP exhibit the typical decorative motif found in the 3b bowls, but they lack the fine background lines and the paint is much darker and more thickly applied.

Nabataean Unpainted Fine Ware Bowls **(Fig. 16)**

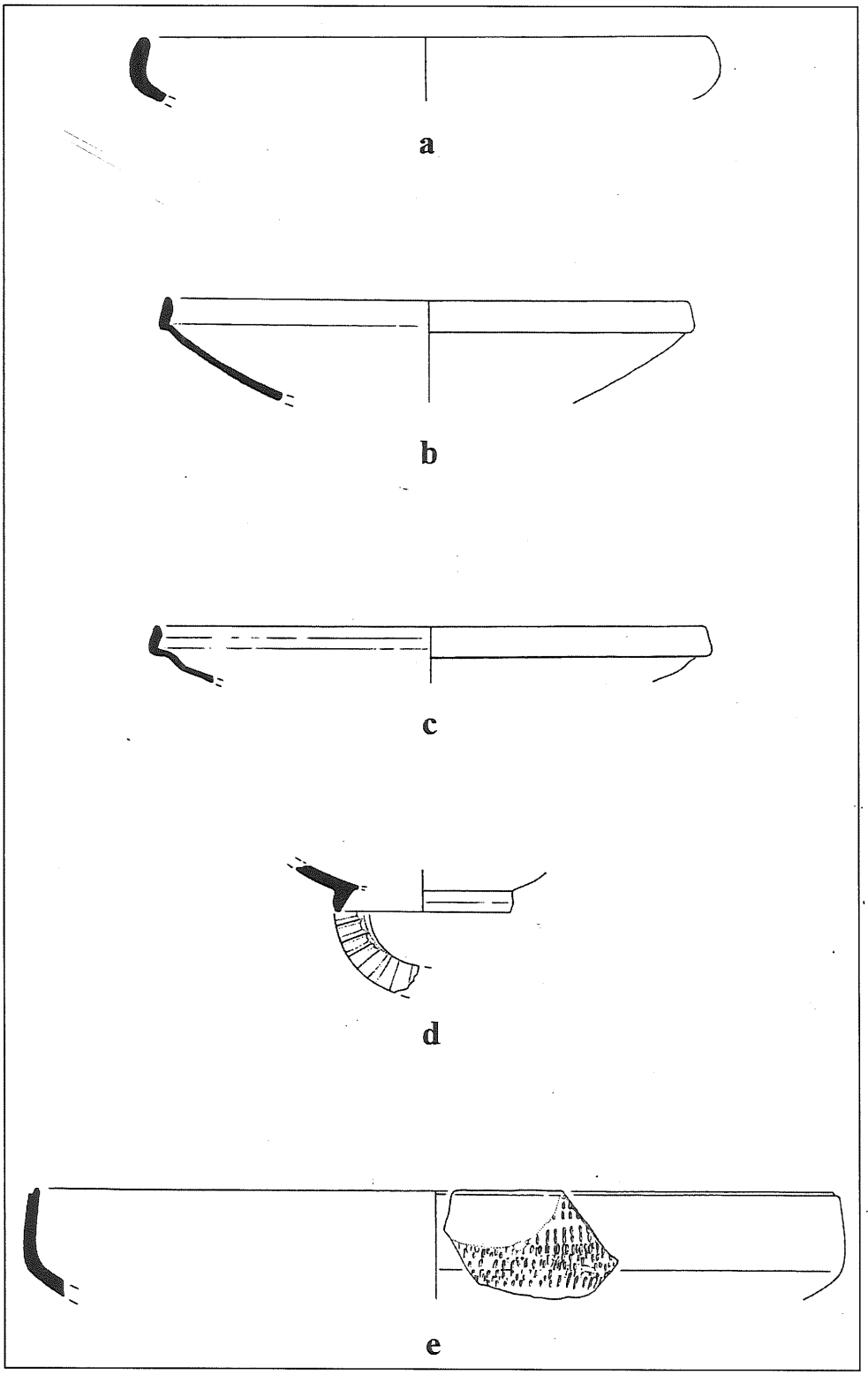
The overwhelming majority of the pottery collected by RTAP is represented by the Nabataean unpainted fine ware (hereafter NFW), aptly referred to as "Petra red ware" ('Amr 1987). Of the 1539 sherds recovered from the surface collection, 900 (58.5%) of them fall into this category. For the NFW, the typology of rouletted and impressed forms offered by Khairy (1982) is useful for identifying type patterns. And, once again, the typochronology provided by Schmid (2000) from the Petra/az-Zanṭūr excavations serves as a solid basis from which to work with this highly common type of fine ware.

The first NFW vessel, from square C001/047, found during the RTAP survey is a Gruppe 1 incurved bowl **(Fig. 16a)** from Phase 1 at az-Zanṭūr (Schmid 2000: 7, 24, 179, Abb. 3), broadly dated by the excavators from ca. 150-50 BC. The rim sherd has a red (2.5YR 5/6) fabric, yellowish red (5YR 5/8) interior and exterior, and a yellowish red (5YR 4/6) slip on the rim exterior. These bowls are commonplace in Late Hellenistic contexts throughout Nabataea, with the most examples of this type dating to the mid-first century AD (e.g. Zeitler 1990: fig. 14.4).

The majority of the identifiable NFW rim sherds recovered by RTAP conform to the Gruppe 6 bowls with vertical rims from az-Zanṭūr, which date from ca. 50 BC-AD 20 (Schmid 2000: 8, 24). The illustrated example (Fig. 16b) was found in square C005/049. It has a dark grey (N4) core, a yellowish red (5YR 5/6) interior, and a reddish yellow (5YR 6/6) exterior. An exact parallel for the sherd found at Rujm Ṭāba is attested at Petra (e.g. Schmid 2000: 181, Abb. 49).

Another NFW type well represented in the corpus from Rujm Ṭāba is the Gruppe 7 bowl with vertical rim, which dates to Phase 3, or AD 20-100, at az-Zanṭūr (Schmid 2000: 9, 25). The piece from the RTAP survey **(Fig. 16c)** was collected from square C002/047. Where the body and rim join together, there is a slightly indented bend on the vessel. Its fabric, interior and exterior are all yellowish red (5YR 5/6) in colour, and the form is paralleled at Petra (Schmid 2000: 182, Abb. 53).

Commonplace at Nabataean sites are the rouletted bowl bases that conform to az-Zanṭūr Gruppe 8, which is also dated from Phase 3 (Schmid 2000: 9, 25, Abb. 57-59). The RTAP exemplar **(Fig.**



16. Sherds from Nabataean unpainted fine ware bowls collected in the village at Rujm Ṭāba scale 1:2 (drawings by M. Faulkner).

16d), found in square C004/045, has a red (2.5YR 6/6) fabric and a red (2.5YR 6/8) interior and exterior. Several examples of this type were found in Petra North Ridge Tombs 1 and 2 (Bikai and Perry 2001: figs. 5:10, 8:2, 6-7).

Finally, an NFW rouletted bowl (**Fig. 16e**) was recovered by the RTAP survey team in square C006/049. The type corresponds to Schmid's Gruppe 9 bowl and dates to az-Zanṭūr Phase 3 (Schmid 2000: 9, 182, Abb. 61-65). The example from Rujm Ṭāba has a light red (10R 6/8) fabric, interior and exterior, and a rim diameter of 23cm. This large vessel has thin inclined walls and a carinated body that, although not illustrated, sat on a

ring-base. The rim has a fairly deep incised groove on the top, making it offset. The rouletting pattern on this vessel covers the area of the vessel from the rim to where the carination begins, and conforms most closely to Khairy Pattern 8 (Khairy 1982: 276). Bowls of this type are extremely common at Petra and are distributed throughout the Nabataean realm.[5]

Jars **(Fig. 17a-c)**

A few NFW jars were collected during the RTAP survey. The first **(Fig. 17a)** is a thin-walled jar rim from square C002/047. It has a rim diameter of 10.5cm and the vessel walls are extremely thin, measuring only 1.7mm thick. It has a red (2.5YR 6/7) fabric, interior and exterior. A close parallel is attested from Phases 1-2b at aż-Zanṭūr, which dates to the first century BC (Schmid 2000: 79-80, 196, Abb. 337). The second NFW jar rim **(Fig. 17b)** was found in square C005/045. It has a red fabric (10R 4/8), interior (2.5YR 5/8) and exterior (10R 5/8), and a rim diameter of 9cm. The rounded, externally thickened rim form can be found on similar vessels from Phase 2a (50-30/20 BC) at az-Zanṭūr (e.g. Schmid 2000: 62, 191, Abb. 226).

An interesting ceramic find from the preliminary collection in the village is a Late Roman jar base **(Fig. 17c)**. The fabric and interior are red (2.5YR 5.5/8), and it has a very pale brown (10YR 8/3) exterior slip. An exact parallel for this jar base was uncovered during excavation at Kurnub/Mampsis, where the form "...appears to be a predecessor of the refined bag-shaped juglet found in Late Roman and Early Byzantine [contexts]" (Erickson-Gini 1999: 49, fig. 12.1.2). These jars with thickly ribbed bodies are commonplace at Nabataean sites in Late Roman contexts.

Of interest, five jar rims dating from the Late Roman period (not illustrated) were found in the Nabataean village. All of them are comparable to a well-known type of jar from Petra dated to the mid-fourth century AD (Fellmann-Brogli 1996: Abb. 752-754, Type A12a). Almost all of them came from the RTAP grid y-coordinates 048 and 049, locales associated with food preparation and cooking activities during the Nabataean period. Their presence may suggest Late Roman occupation or reoccupation of structures just outside of the survey area.

Jug and Juglet **(Fig. 17d-e)**

Closed forms such as jugs and juglets were a rarity in the RTAP surface collection. Indeed, the only two rim sherds that were found are illustrated here. The first is an NFW jug rim, neck and handle vestige **(Fig. 17d)** from square C004/049. It has a rim diameter of 5cm and its fabric, interior and exterior are all the same colour red (2.5YR 5.5/8). A close parallel is attested at Oboda (Negev 1986: 86 no. 702). The second rim sherd comes from an extremely thin-walled NFW juglet **(Fig. 17e)**. Found in square A014/008, it has a rim diameter of only 2cm, and the sherd is only 1.9mm thick. The fabric, interior and exterior are all red (2.5YR 6/6), and an exact parallel dating to the late first century AD was uncovered during the Petra/az-Zanṭūr excavations (Schmid 2000: 77, 196, Abb. 325).

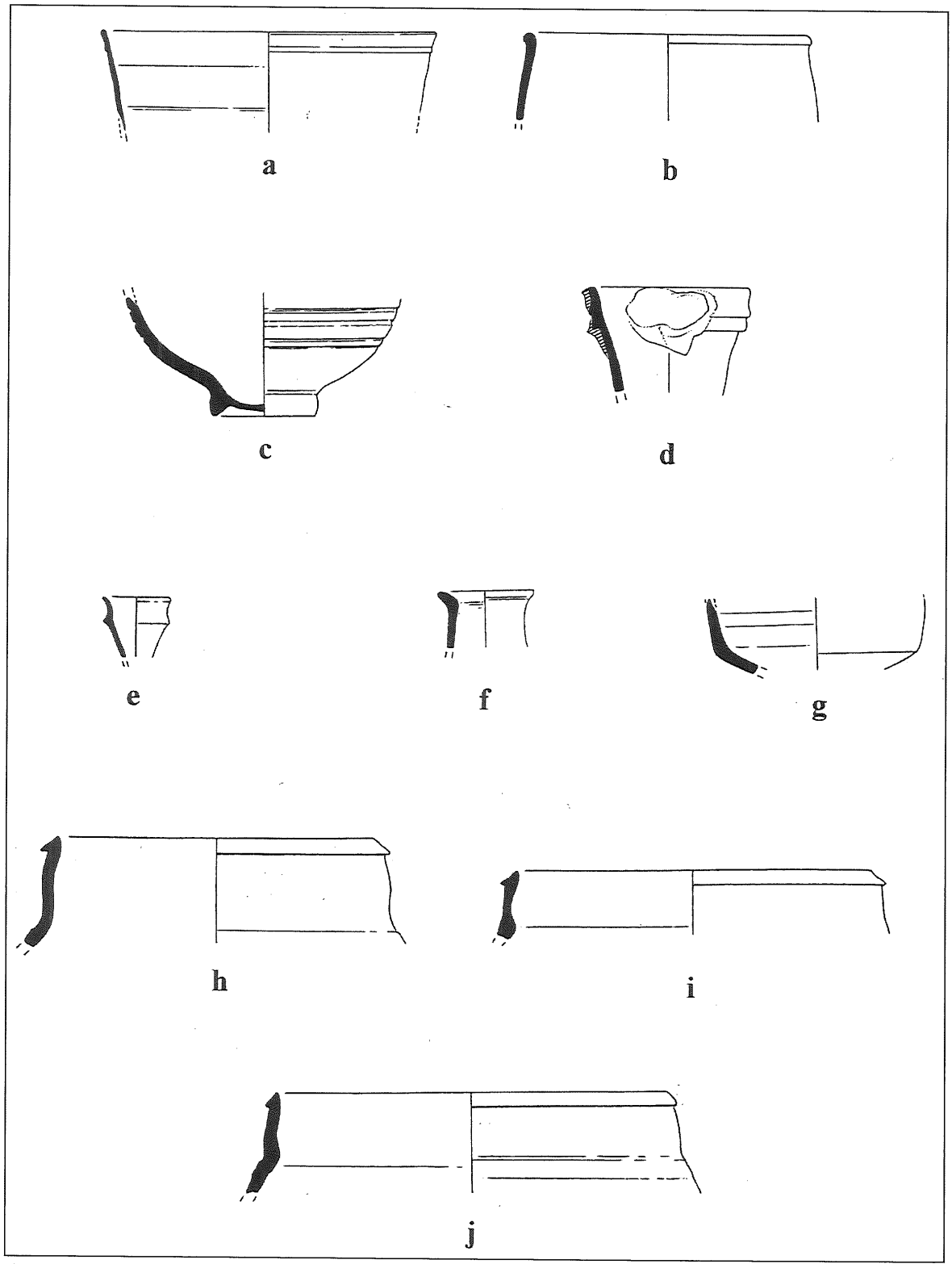
Unguentaria **(Fig. 17f-g)**

A total of six fragments from unguentaria were collected from the Nabataean village. These vessels were small bottles used for storing precious oils, perfumes and salves (i.e. unguents). These vessels have been found, along with complete NPFW bowls, within foundation deposits of Nabataean structures in an-Naqab and western 'Arabah (T. Erickson-Gini: pers. comm.). The only typochronology developed for the Nabataean piriform unguentaria was produced over a decade ago (Johnson 1990), although the date ranges employed for his vessel groups are rather broad.

Almost all of the unguentarium sherds collected by RTAP come from the lower part of the vessel, where the lower body joins the base. Five of the six pieces came from plain piriform unguentaria; the other was of the ribbed variety. A Nabataean piriform unguentarium rim and neck **(Fig. 17f)** was found in square C002/047. It has a rim diameter of 3cm. The fabric is red (10R 5/6), with a weak red (2.5YR 5/4) interior and an exterior slip that is light reddish brown (5YR 6/4) in colour. This unguentarium rim conforms to Johnson's Group One Form III, which he dated to "....before 27 AD" (Johnson 1990: 237, 245, fig. 1:III). Parallels for this type are found at other Nabataean sites, such as Oboda (Negev 1986: 107 no. 916) and Tomb 2 from the North Ridge at Petra (Bikai and Perry 2001: 74, fig. 9:12).

A Nabataean piriform unguentarium base fragment **(Fig. 17g)** was discovered in square C005/049. It is representative of the other unguentaria collected by RTAP. It has a dark grey (N4) core, and a red interior (10R 5/6) and exterior (2.5YR 5/8). The sherd comes from Johnson Group Three

5. For rouletted Nabataean bowls, see Crowfoot 1936: pl. 3:1; Murray and Ellis 1940: pls. 9:2 and 4, 31: 116 and 118; Parr 1970: fig. 7 no. 110; Khairy 1975: pl. 17:239 and 241 - type F2 Bowls; Negev 1986: 67 nos. 508-514; Erickson-Gini 1999: 24, fig. 1.9.1; Dolinka 1999: 119-120 nos. 31-32; and Bikai and Perry 2001:72, fig. 8:1.



17. Sherds from jars, jugs, juglets, an unguentarium and cooking pots recovered by the RTAP survey team; scale 1:2 (drawings by M. Faulkner).

Form VIII, which dates to mid-second century AD, i.e. "Trajanic and later" (Johnson 1990: 238, 247, fig. 3:VIII).

Jar-Shaped Cooking Pots **(Fig. 17h-j)**

Examination of Nabataean common and coarse ware vessels was neglected for a very long time, as ceramicists seemed to prefer studying the Nabataean finewares instead. It was not until the groundbreaking work of Khairy (1975) that this issue was addressed. While Khairy's work did provide a comprehensive typology of forms known at the

time (Khairy 1975: 203-246, 354, 413-424, pls. 44-55, F1-15), only very broad chronological dates were offered, and the study remains unpublished to this day. A published reconciliation between Parr's stratigraphic sequence from Petra (Parr 1970) and Khairy's typology could provide a solid basis for comparanda when dealing with these rather utilitarian forms that have often been neglected by excavators in the past. Thanks to the recent skillful work of Gerber (1996; 1997; forthcoming) there will soon be a comprehensive study on the Nabataean common wares. When completed, this will surely be the standard reference for the typo-chronology of Nabataean cooking pots and other common ware forms, just as *Late Roman Pottery* (Hayes 1972) is for the later fine wares in the Mediterranean.

The three examples of Nabataean jar-shaped cooking pots illustrated here all date from the late first/early second centuries AD and have the most common rim type for these vessels: a collared and everted rim that is slightly thickened on the interior and almost triangular in shape. The rim diameter on these cooking pots ranges from 10-12.5cm. The first example (**Fig. 17h**), from square C005/048, has a red (10R 5/6) fabric, interior and exterior and has numerous white calcite inclusions. Similar examples of these rather high-necked cooking pots have been found at Petra (Gerber 1996: 150, taf. 32e).

The second cooking pot rim (**Fig. 17i**) was discovered in square C002/050. It has a weak red fabric and interior (2.5YR 5.5/4) and an exterior slip that is a very pale brown (10YR 8/3) in colour. Parallels for this form are also attested at Petra (Gerber 1997: 410, fig. 7). The final cooking pot illustrated (**Fig. 17j**) comes from square C002/050. The fabric is a weak red (10R 5/4), and both the interior and exterior are dark reddish grey (2.5YR 4.5/1). An exact parallel was found at Petra (Gerber 1996: 148, 150, taf. 32f).

Interpretation

Analysis of the pottery collected during the RTAP 2001 Survey, particularly the Nabataean painted and unpainted finewares, provides valuable insights into the occupational history of Rujm Ṭāba. First, it appears that the village was founded before the construction of the caravanserai, the latter of which was built during the early to mid-first century AD. This notion is supported by the presence of NPFW sherds from az-Zanṭūr Dekorphases 2b-c and NFW dating from the mid-first century BC found in the village, and a lack of any NPFW earlier than Dekorphase 3a found in the caravanserai.

Second, the ceramic evidence gathered by RTAP suggests that both the village and the caravanserai at Rujm Ṭāba flourished during the late-first century AD, aptly demonstrated by the fact that half of the NPFW from the village and nearly half (48%) of the NPFW from Structure A001 are dated to Dekorphase 3b, or ca. AD 70-100. A high amount of activity at Rujm Ṭāba during this period seems to call into question the notion repeated by many scholars (e.g. Bowersock 1983: 156) that the discovery of the monsoon winds in the mid-first century AD caused a major decline in the Nabataean overland caravan trade. Quite contrary, Rujm Ṭāba seems to have thrived in an era of supposed economic deterioration.

Third, according to the RTAP ceramic repertoire there seems to have been a decline in activity and occupation at Rujm Ṭāba during the early to mid-second century AD, an idea supported by the fact that numbers of NPFW drop off sharply during this period, with only 8% of the total pottery from Structure A001 and 15% of the total ceramics from the village dating from az-Zanṭūr Dekorphase 3c. Whether or not this decline should be attributed to the Roman annexation of Nabataea in AD 106, or an earthquake that devastated the Rift Valley during the early-second century AD,[6] is still a matter of debate among scholars that could easily be resolved through stratified excavations at Nabataean sites, such as Rujm Ṭāba, located along the major trade routes that were in use during the period in question.

Finally, there is some evidence for either limited occupation or camping activities in the village during the late-third/early-fourth century AD, as evidenced by the handful of Late Roman jar sherds discovered during the RTAP surface collection. Taken together, the ceramic evidence gathered by RTAP has provided a tentative occupational history for Rujm Ṭāba, but only excavation at the site will provide definitive results.

Glass (D. Keller)

During the surface collection in the area of the Nabataean village, two glass sherds were found. The first one, from square C006/045, is a body

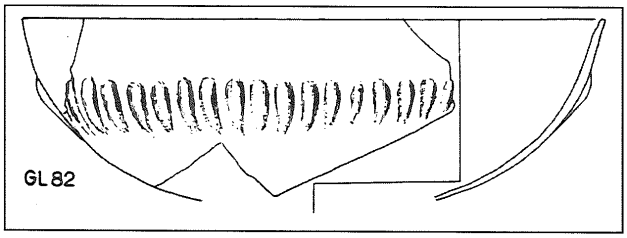
6. Russell 1985; Schmid 1997. See also the discussion in Dolinka 1999: 22-25, 54-57. There is clear evidence of earthquake destruction dating to the early-second century AD from the Nabataean site of Ein Rahel in the western-central 'Arabah; a study on this is being prepared by Tali Erickson-Gini (pers. comm.) of the Israel Antiquities Authority and Dr. Andrey Korjenkov, a seismologist at the Universität Potsdam.

sherd of a shallow ribbed bowl with short ribs that was formed from pale blue glass. This type (**Fig. 18**) is common during the early and mid-first century AD in the eastern Mediterranean and has been found at the following sites: Mytilene on Lesbos, Beirut, Macharaeus, Jerusalem and Alexandria.[7] However, such bowls are a rarity among the Early Roman glass finds from southern Jordan, with only a few examples from Petra (Keller: forthcoming) and Aila (Jones 2000: 148).

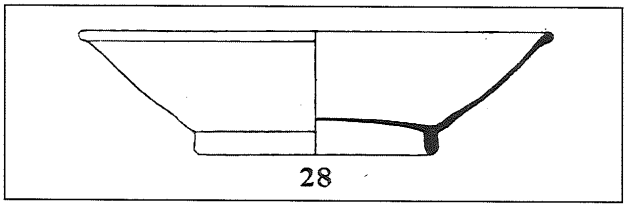
The second glass find, from square C003/048, is a rim sherd of a blown colourless plate with a rounded and thickened rim. As it has a fairly large diameter, it may well belong to an oval plate. There are no published parallels from Jordan, but there are smaller round plates with the same rim type (**Fig. 19**) attested at Karanis in Egypt (Harden 1936: 56, no. 28, pl. 11). Judging from the colour and quality of the glass, a second/early third century AD date is suggested, which would explain the lack of parallels in the area, as there is a paucity of stratified glass sherds from this period in Jordan (Keller: forthcoming). Both sherds from Rujm Ṭāba have to be considered as rather special glass finds from southern Jordan, but only further research at the site could provide a better understanding of their presence at a site in Wādī 'Arabah.

Site Integrity

Structure A001



18. Example of a ribbed glass bowl with short ribs from Jerusalem, from the same vessel type as the body sherd from C006/045 (Ariel 1990: 162, fig. 33).

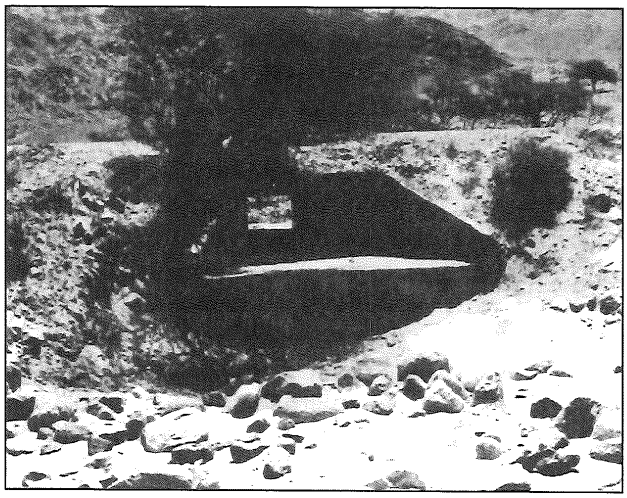


19. Example of an oval glass bowl from Karanis in Egypt, with a similar rim form to the sherd from C003/048 (Harden 1936: pl. 11 no. 28).

The Nabataean caravanserai faces numerous threats from both human activity and its environmental setting. The construction of the modern highway (ca. 1978) has significantly altered the landscape around A001. A culvert installed where the highway begins its gentle curve to the northwest (**Fig. 20**) now channels a large volume of seasonal runoff directly towards the structure. In fact, the wadi created by this diversion of water has eroded the soil at the southeastern corner of A001 to a depth of ca. 1.25m below the desert floor (**Fig. 21**). The most disturbed portion of the wadi, where it turns 90° to run south along the western side of the highway (see **Fig. 2** above), is now extremely close to the structure and will inevitable begin to damage A001 in the near future. Further investigation at Rujm Ṭāba should assess the feasibility of erecting a retaining wall or wadi diversion along the southeastern section of A001, where the structure is most threatened.

Human activity has also had a substantial impact on Structure A001. Vehicle tracks were clearly visible across the structure, suggesting stone robbing and/or bulldozing of the interior. A large pit, ca. 1.50m deep and now filling with windblown sand, suggests that there has been considerable disturbance in the recent past. Ironically, the best-preserved and least-robbed portion of the structure, along its eastern side, is also that which is most threatened by the wadi formed by the culvert underneath the modern highway.

A highly disturbed field of rubble and cultural

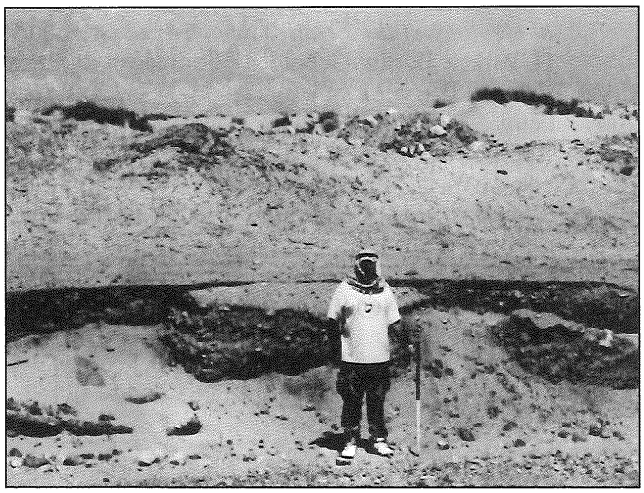


20. A culvert installed underneath the Dead Sea Highway channels a large volume of seasonal runoff directly towards Structure A001; view from the west (photo R.J. Cook).

7. Price and Cottam 2000: 58 (Mytilene); Jennings 2000: 49, 59, no. 9, fig. 4:9 (Beirut); Loffreda 1980: 389, 401, no. 75, pl. 97:75 (Macharaeus); Ariel 1990: 161, no. GL82, fig. 33 (Jerusalem); and Ashmolean Museum: Leeds Room, Case 42 no. 1950.41 (Alexandria). See also Ashmolean Museum: Leeds Room, Case 40 no. 1952.217, an exact colour match dated to the first century AD. For the type and its date in general, see Grose 1989: 245-246, 264-266, nos. 58-62.

debris, measuring 175 x 30m, was noted to the south of A001, but did not contain any identifiable architectural remains and stopped short of the structure. A local informant suggested the material had been dumped there during the construction of the modern highway. Presumably the bulk of the scatter — composed of sherds, many granitic pebbles and cobbles, and a few boulders — originated in the village area of the alluvial fan on the eastern side of the highway, although it is possible that some of the scatter may have been displaced from A001.

Finally, encroaching sand dunes located to the west and northwest of A001 pose yet another threat to the structure. Since the geological map for the *Wadi Darba 3049 IV Map Sheet* was created in 1986, the dunes appear to have moved a considerable distance to the east; if the dunes maintain this eastward movement, they will eventually overtake Structure A001.



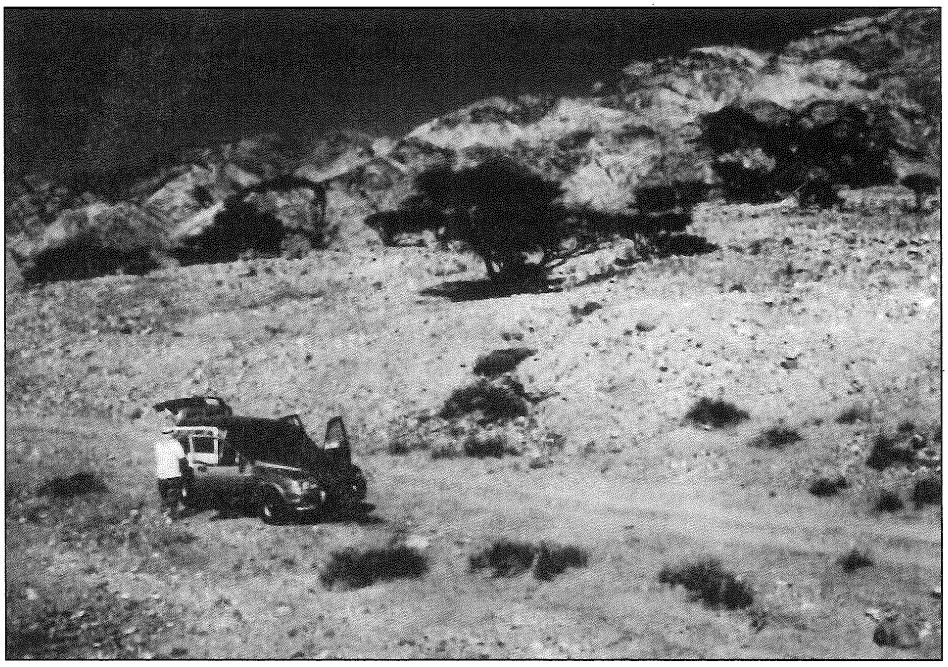
21. Wadi created by water flow from the culvert has severely eroded the soil near Structure A001; view from the east. Note Structure A001 directly behind the standing figure (photo R.J. Cook).

The Village

While under considerably less threat than Structure A001, the Nabataean village at Rujm Ṭāba has also been a victim of the modern economic and technological development of Wādī 'Arabah. A section of the village running ca. 125m along the eastern side of the modern road, covering an area of approximately 0.2 hectares, was bulldozed when electrical power lines were installed (see **Fig. 3** above). A cultural debris field, thickly strewn with thin Nabataean sherds and stone pavers, remains visible on the surface (**Fig. 22**). The bulldozed area is clearly part of the village that has been lost forever.

Concluding Remarks

Evidence recovered from the RTAP 2001 survey and reconnaissance has provided a glimpse into the occupational history of Rujm Ṭāba. Structure A001 apparently had a limited occupation that flourished during the first and second centuries AD. There seems to be very little artefactual evidence for either cooking or storage activities in that structure when compared to the material from the village. However, excavation of the building may unearth *ṭawābīn* and associated cooking wares such as those found in the aforementioned Nabataean caravanserai at al-Maḥalla/Sha'ar Ramon.



22. Section of the village bulldozed when a service road was created for installation of electrical power lines; view from the southwest (photo R.J. Cook).

The village (C001-016, D001-006) appears to have had a more complex occupational history than Structure A001. While the majority of the ceramics recovered from the village are contemporaneous with those from A001, there were several sherds from the first century BC, suggesting that the village was founded before the caravanserai. In addition, there was also a small but significant quantity of pottery (mostly jars) dating from the late third and early fourth centuries AD. Taken together, the artefactual evidence suggests continuous and extensive occupation of the village from the mid-first century BC to the late-second century AD, with subsequent "squatter occupation" during the Late Roman period, but only excavation will clarify the occupational phasing for the village.

Two seasons of excavation by RTAP are tentatively planned, with the primary focus being Structure A001 — a high-priority salvage excavation. The main objective for RTAP is to record as much of Rujm Ṭāba as possible, before the resource is lost completely. In order to preserve the site for future interpretation and appreciation, RTAP is developing strategies for post-excavation site conservation of the extant architectural features. The project also plans to work with the Jordanian Ministry of Tourism and Antiquities to investigate the cultural tourism potential of this highly accessible site. Located along the busy Dead Sea Highway connecting 'Ammān to al-'Aqaba, Rujm Ṭāba is well sited to provide visitors with a glimpse of life at an ancient Nabataean road station in southern Jordan.

Acknowledgments

Many thanks are due to Dr. Fawwaz al-Khraysheh, Director-General of the Department of Antiquities, for permission to examine the site. RTAP would also like to thank the following: Sawsan al-Fakhiry, Antiquities Inspector of the al-'Aqaba District, for her logistical assistance and enthusiasm; the Council for British Research in the Levant (CBRL), who provided equipment, advice and research support in the form of a small travel grant; Dr. P.W.M. Freeman (University of Liverpool), who provided welcome encouragement and guidance; and Mr. Mark Faulkner, for his wonderful pottery drawings. Finally, special thanks and appreciation are due to Andrew M. Smith II (University of Maryland) and Tali Erickson-Gini (Israel Antiquities Authority) for sharing their vast knowledge of Wādī 'Arabah and for providing unpublished data.

B.J. Dolinka
Department of Archaeology
University of Liverpool
Hartley Building
Liverpool, England L69 3GS
sherd_boy@hotmail.com

Bibliography

'Amr, K.
1987 *The Pottery from Petra: A Neutron Activation Analysis Study.* BAR International Series No. 324. Oxford: British Archaeological Reports.
Ariel, D.T.
1990 *Excavations at the City of David 1978-1985, Volume II: Imported Stamped Amphora Handles, Worked Bone and Ivory, and Glass.* Qedem 30. Jerusalem: Institute of Archaeology, Hebrew University.
Bender, F.
1974 *Geology of Jordan: Contributions to the Regional Geology of the Earth.* Trans. M. Khedeir and H. Parker. Berlin: Gebrüder Borntraeger.
Bikai, P.M. and Perry, M.A.
2001 Petra North Ridge Tombs 1 and 2: Preliminary Report. *BASOR* 324: 59-78.
Bowersock, G.W.
1983 *Roman Arabia.* Cambridge, MA: Harvard University Press.
Burdon, D.J.
1959 *Handbook of the Geology of Jordan.* Colchester: Benham.
Cohen, R.
1982 Mesad Sha'ar Ramon. *IEJ* 32: 263-264.
1982a Mo'a. *IEJ* 32: 164-165.
1982b Mesad Neqarot. *IEJ* 32: 264-265.
1984 Mesad Be'er Menuha. *IEJ* 34: 204-205.
1984a 'En Tamar. *IEJ* 34: 201.
1984b Mesad Har Massa. *IEJ* 34: 205.
1984c Horvat Dafit. *ESI* 3: 16-17.
Crowfoot, G.M.
1936 The Nabataean Ware of Sbaita. *PEFQS* 4: 14-27.
Dolinka, B.J.
1999 *Towards a Socio-Economic History of Nabataean Aila (Aqaba, Jordan) from the 1st Century BC through the Early 2nd Century AD: Ceramic Evidence from the Roman Aqaba Project.* MA Thesis. Raleigh: North Carolina State University.
2002 A Nabataean Caravanserai at Rujm Taba. *Occident and Orient* 7,1.
Dudley, D.
1992 *The Nabataeans and Trade: Contributing Elements.* MA Thesis. Victoria: University of Victoria.
Dudley, D. and Reeves, M.B.
1997 The Wadi Ramm Recovery Project: Preliminary Report of the 1996 Season. *Echos du Monde Classique/Classical Views* 16,1: 81-106.
1998 Wadi Ramm Recovery Project. *AJA* 102,3: 591-592.
al-Eisawi, D.
1996 *The Vegetation of Jordan.* Cairo: UNESCO Re-

gional Office for Science and Technology for the Arab States.

Erickson-Gini, T.
1999 *Mampsis: A Nabataean/Roman Settlement in the Central Negev Highlands, in Light of the Ceramic and Architectural Evidence found in Archaeological Excavations during 1993-1994*. MA Thesis, Tel Aviv University.

Fellmann-Brogli, R.
1996 Die Keramik aus den spät-römischen bauten. Pp. 219-282 in A. Biagnasca *et al., Petra - Ez Zantur I: Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen, 1988-1992.* Terra Archaeologica, Band II. Mainz: Verlag Philipp von Zabern.

Frank, F.
1934 Aus der Araba I: Reiseberichte. *ZDPV* 57: 191-280.

Gerber, Y.
1996 Die Entwicklung der lokalen nabatäischen Grobkeramik aus Petra/Jordanien. Pp. 147-151 in M. Herfort-Koch *et al.* (eds.), *Hellenitische und kaiserzeitliche Keramik des östlichen Mittelmeergebietes. Kolloquium Frankfurt 24-25 April 1995.* Frankfurt am Rhein: Archaeological Institute, Goethe University.
1997 The Nabataean Coarse Ware Pottery: A Sequence from the End of the Second Century BC to the Beginning of the Second Century AD. Pp. 407-411 in *SHAJ* 6. Amman: Department of Antiquities.
n.d. *Typologie, Chronologie und Verbreitung der "nabatäischen Gebrauchskeramik.* PhD Dissertation, University of Basel (forthcoming).

Grose, D.F.
1989 *Early Ancient Glass: Core-Formed, Rod-Formed and Cast Vessels and Objects from the Late Bronze Age to the Early Roman Empire, 1600 B.C. to A.D. 50*. New York: Hudson Hills Press.

Gunneweg, J. *et al.*
1988 The Origin, Typology and Chronology of Nabataean Painted Fine Ware Pottery. *JRGZM* 35: 315-345.

Harden, D.B.
1936 *Roman Glass from Karanis found by the University of Michigan Archaeological Expedition in Egypt, 1924-29*. University of Michigan Studies Humanistic Series 41. Ann Arbor: University of Michigan Press.

Hart, H.C.
1885 A Naturalist's Journey to Sinai, Petra, and South Palestine. *PEFQS*: 231-286.
1891 *Some Account of the Fauna and Flora of Sinai, Petra, and Wadi Arabah*. London: Alexander P. Watt.

Hayes, J.W.
1972 *Late Roman Pottery*. London: British School at Rome.

Ibrahim, K.M.K.
1991 *The Geology of the Wadi Rahma*. Geology Directorate, Geological Mapping Division Bulletin 15. Amman: Ministry of Energy and Mineral Resources, Natural Resources Authority.

Jennings, S.
2000 Late Hellenistic and Early Roman Cast Glass from the Souks Excavation (BEY 006), Beirut, Lebanon. *Journal of Glass Studies* 42: 111-146.

Johnson, D.J.
1987 *Nabataean Trade: Intensification and Culture Change*. PhD Dissertation, University of Utah.
1990 Nabataean Piriform Unguentaria. *ARAM* 2: 235-248.

Jones, J.D.
2000 Roman Export Glass at Aila (Aqaba). *Annales de l'association pour l'histoire du verre* 14: 147-150.

Keller, D.
n.d. Glas *von Petra, Jordanien*. PhD Dissertation, University of Basel (forthcoming).

Khairy, N.I.
1975 *The Typological Study of the Unpainted Pottery from the Petra Excavations*. PhD Dissertation, University of London.
1982 Fine Nabataean Ware with Impressed and Rouletted Decorations. Pp. 275-283 in *SHAJ* 2.

Khouri, R.G.
1988 *The Antiquities of Jordan's Rift Valley*. Amman: al-Kutba.

Kitchner, H.H.
1884 Major Kitchner's Report. *PEFQS*: 202-221.

Loffreda, S.
1980 Alcuni vasi ben datati della Fortezza di Macheronte. *LA* 30: 377-402.

McCourt, W.J. *et al.*
1990 *The Geology, Geochemistry and Tectonic Setting of the Granitic and Associated Rocks in the Aqaba and Araba Complexes of Southwest Jordan.* Geology Directorate, Geological Mapping Division Bulletin 10. Amman: Ministry of Energy and Mineral Resources, Natural Resources Authority.

Meshorer, Y.
1975 *Nabataean Coins*. Trans. I. Levine. Qedem 3. Jerusalem: Institute of Archaeology, Hebrew University.

Murray, M.A. and Ellis, J.C.
1940 *A Street in Petra*. London: Quartich.

Musil, A.
1907 *Arabia Petraea II - Edom: Topographischer Reisebericht*. 2 vols. Kaiserliche Akademie der Wissenschaften. Vienna: A. Hölder. Reprint 1989, Hildesheim: Georg Olms Verlag.

Negev, A.
1973 The Staircase-Tower in Nabataean Architecture. *Eretz Israel* 11: 29, 197-207.
1986 *The Late Hellenistic and Early Roman Pottery of Nabataean Oboda: Final Report*. Qedem 22. Jerusalem: Institute of Archaeology, Hebrew University.

Parr, P.J.
1970 A Sequence of Pottery from Petra. Pp. 348-381 in J.A. Sanders (ed.), *Near Eastern Archaeolo-*

gy in the Twentieth Century: Essays in Honor of Nelson Glueck. Garden City, NJ: Doubleday.

Price, J. and Cottam, S.
2000 Glass Tablewares in Use at Mytilene in Lesbos in the Early-Mid 1st Century AD. *Annales de l'association pour l'histoire du verre* 14: 58-62.

Rabba, I.A. *et al.*
1988 *Petrography of the Plutonic Rocks of the Aqaba Complex, Jordan.* Geology Directorate, Geological Mapping Division Bulletin 9. Amman: Ministry of Energy and Mineral Resources, Natural Resources Authority.

Raikes, T.
1985 The Character of the Wadi Araba. Pp. 95-101 in *SHAJ* 2.
n.d. *Ancient Sites in the Wadi Araba and Nearby.* Unpublished manuscript held in Amman at the American Center of Oriental Research Library.

Rashdan, M.
1988 *The Regional Geology of the Aqaba-Wadi Araba Area: Map Sheets 3049 III, 2949 II (1:50,000).* Geology Directorate, Geological Mapping Division Bulletin 9. Amman: Ministry of Energy and Mineral Resources, Natural Resources Authority.

Rosenthal, E. *et. al.*
1990 Flow Patterns by Environmental Tracers in the Multiple Aquifer System of the Southern Arava Valley, Israel. *Journal of Hydrology* 117: 339-368.

Russell, K.W.
1985 The Earthquake Chronology of Palestine and Northwest Arabia from the Second through the mid-8th Century. *BASOR* 260: 37-59.

Schmid, S.G.
1997 Nabataean Fine Ware Pottery and the Destructions of Petra in the Late First and Early Second Century AD. Pp. 413-420 in *SHAJ* 6.
2000 *Petra - Ez Zantur II: Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen, Teil 1. Die Feinkeramik der Nabatäer: Typologie, Chronologie und kulturhistorische Hintergründe.* Terra Archaeologica, Band IV. Mainz: Verlag Philipp von Zabern.

Schmitt-Korte, K.
1984 Nabataean Pottery: A Typological and Chronological Framework. Pp. 7-40 in *Studies in the History of Arabia II: Pre-Islamic Arabia.*

Smith II, A.M.
1995 *An Historical-Geography of Wadi Araba.* MA Thesis. Raleigh: North Carolina State University.

Smith II, A.M. and Niemi, T.M.
1994 Results of the Southeast Araba Archaeological Reconnaissance. *ADAJ* 38: 469-483.

Smith II, A.M. *et al.*
1997 The Southeast Araba Archaeological Survey: A Preliminary Report. *BASOR* 305: 45-71.

Tholbecq, L.
1998 The Nabataeo-Roman Site of Wadi Ramm (Iram): A New Appraisal. *ADAJ* 42: 241-254.

Winnett, F.V. and Reed, W.L.
1964 *The Excavations at Dibon (Dhibân) in Moab. AASOR* 36/37.

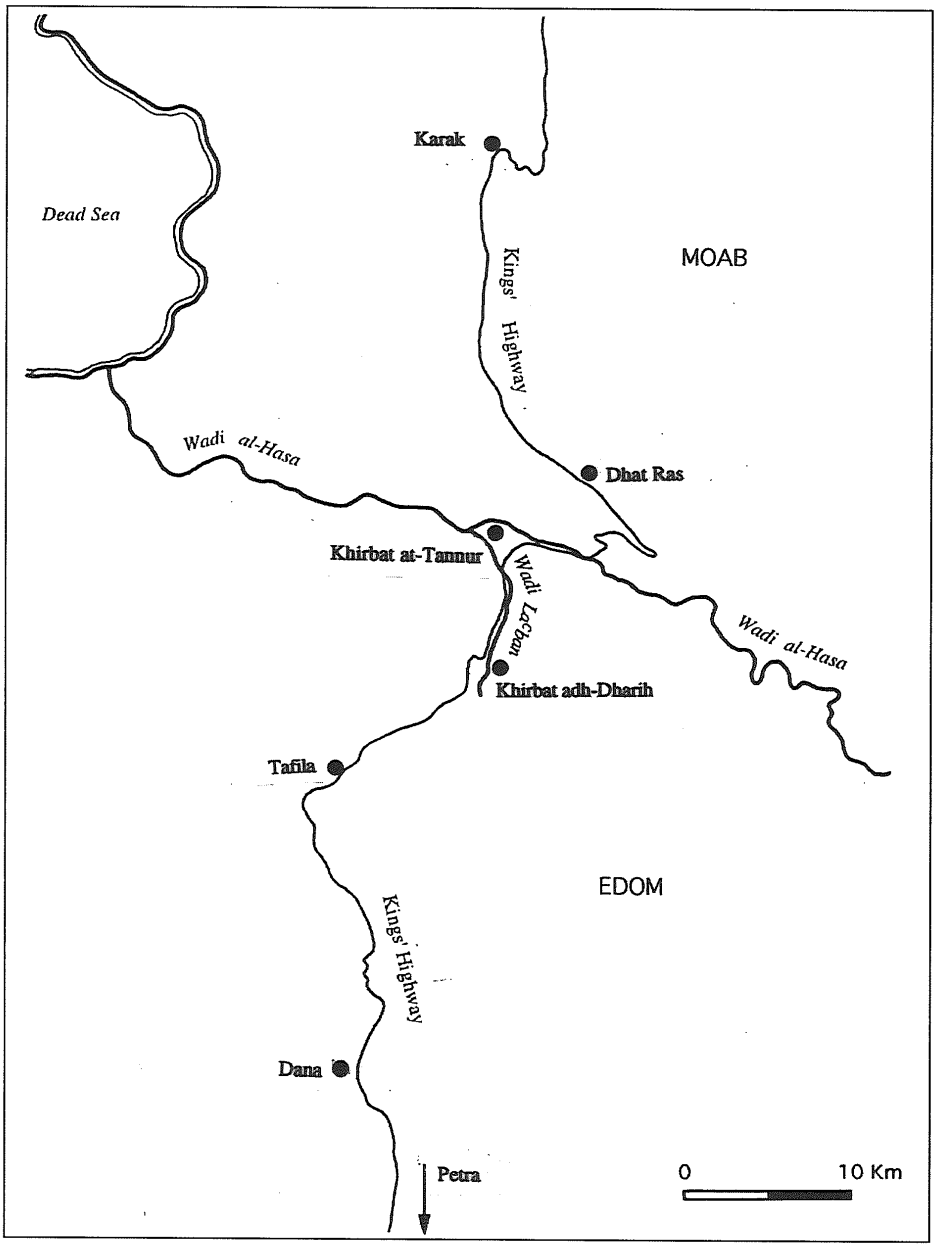
Zeitler, J.P.
1990 A Private Building from the First Century B.C. in Petra. *ARAM* 2: 385-420.

KHIRBAT AT-TANNŪR IN THE ASOR NELSON GLUECK ARCHIVE AND THE RECONSTRUCTION OF THE TEMPLE

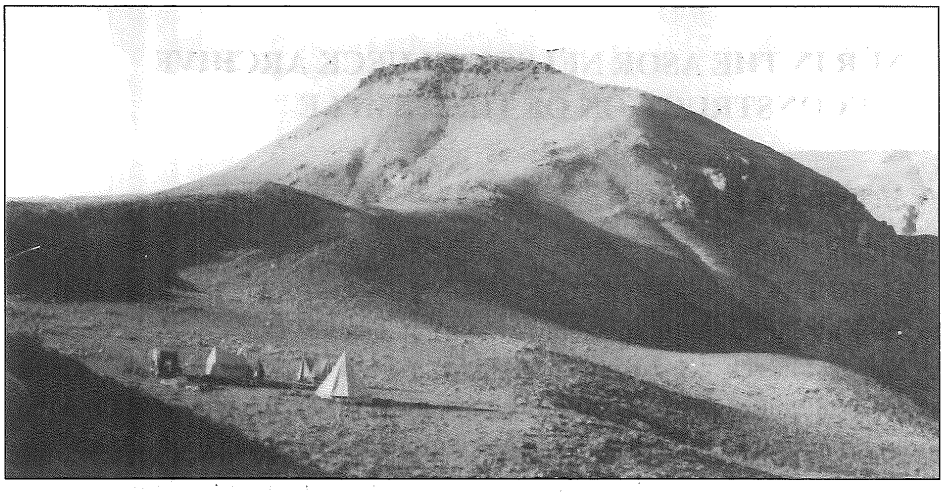
Judith McKenzie, Andres Reyes and †Sheila Gibson

The Nabataean temple complex of Khirbat at-Tannūr (خربة التنور) was excavated by Nelson Glueck in conjunction with the Department of Antiquities of Transjordan in 1937, after attention was drawn to it by 'Abdullah Rihani Bey, the aṭ-Ṭafīla district police officer.

Khirbat (ruins of) at-Tannūr is located at the top of Jabal (Mount) at-Tannūr (جبل التنور) beside the Kings' Highway, south of al-Karak, and about 70km north of Petra (**Fig. 1**). Jabal at-Tannūr is the isolated mountain at the confluence of Wādī al-La'bān (وادي اللعبان) to the south and Wādī al-Ḥasā (وادي الحسا) to the north (**Fig. 2**). Wādī al-Ḥasā is the biblical Zered (Num. 21.12), the gorge which



1. Map showing location of Khirbat at-Tannūr.



2. Jabal at-Tannūr, at the top of which is Khirbat at-Tannūr, 1937.

divides Moab to the north from Edom, the territory of the Edomites who were the predecessors of the Nabataeans. The name La'bān is preserved in one of the inscriptions at Khirbat at-Tannūr (Glueck 1965: 512-513). The ancient name of Jabal at-Tannūr was possibly Hurawa, mentioned in another inscription there (Healey 2001: 60-61).

This location suggests a sanctuary of some importance. The ruins consist only of the temple complex on the mountain top and, further down the mountain, a cistern. There are no associated remains of a village, indicating that it was solely a religious site. This contrasts with Khirbat adh-Dharīḥ (خربة الذريح) 7km to the south on the Wādī al-La'bān **(Fig. 1)** where there was a settlement with houses beside the Nabataean temple.

Deities and Dolphins, by Nelson Glueck, which functioned as the final report on the excavation of Khirbat at-Tannūr, was not published until nearly three decades after the excavation, in 1965. There were problems with some aspects of the reconstructions of the building presented in it, previously noted by Starcky (1968) and McKenzie (1988: 81-85). Consequently, the aim of the first stage of our project was to establish a more accurate reconstruction of the temple complex, with more plausible positions for its sculptural decoration, correcting the inconsistencies apparent in *Deities and Dolphins*. This was based on a detailed re-examination of the published evidence, including Glueck's earlier reports (Glueck 1937a; 1937b; 1937c; 1938; 1945), and the first hand examination in March 2001 of the fragments in the Jordan Archaeological Museum in 'Ammān, and the evidence still at the site. For comparative purposes the other main Nabataean temples in Jordan were also visited.

This resulted in the completion of new elevations, as well as axonometric drawings of the temple complex, and a detailed discussion of the evidence on which they are based (McKenzie *et al.* 2002). This work was essential before the design of the complex can be further explored in relation to other Nabataean temples, or aspects of Nabataean religious practice.

After our study on the reconstructions was submitted, we discovered that the records of the excavation were in the ASOR Nelson Glueck Archive at the Semitic Museum, Harvard University. Consequently, references to these, where relevant to the reconstructions, were added to the text of our report, but not any of the unpublished photographs from the archive. For those interested in the finer details of the reconstruction and the chronology, that report should be consulted in conjunction with this paper.

The main purpose of this paper is to publish those photographs from the archive which provide important evidence concerning the reconstruction of the building. They were taken before and during the excavation, sixty-five years ago. In *Deities and Dolphins* Glueck generally blocked out any background in the photographs of the sculptures. This had the effect of depriving many of them of the context in which they were found. This was unfortunate because some were found where they had fallen in the final collapse of the building, especially those from the façade of the Inner Temenos Enclosure. Thus, the find-spots of some of them provide essential information about their original locations, including, notably, that of the cult statue.

Beside these photographs, the archive includes photographs of some unpublished blocks and fragments, Glueck's dig journal (hereafter GJ), the registration book, the field-notes of the architect Clarence Fisher who drew the plans and elevations (FFN) published in *Deities and Dolphins*, Fisher's notes on the architecture (FAN) and its reconstruction (FRN), the field-notes of Carl Pape who measured the profiles of the mouldings (PFN), the final drawings of the moulding profiles, the organic re-

mains, and nearly 6,000 pottery sherds. The publication of the pottery, sherds, lamps and organic remains will form the subject of a separate publication, as will the drawings of the mouldings. This evidence provides more additional information about the temple than might be expected, including aspects of its chronology and cult practice. These records also give a sense of how the excavation proceeded, taking a total of seven weeks.

The temple of Khirbat at-Tannūr is best known for its sculpture because Glueck focused on this in *Deities and Dolphins* (hereafter *DD*). Half of it is in the Jordan Archaeological Museum, including the famous "Atargatis panel", illustrated here with the main members of Glueck's team, except the local workmen (**Fig. 3**). The other half went to the Cincinnati Art Museum in Ohio, where Glueck was president of the Hebrew Union College.

In this paper, firstly, we will work through the reconstruction of the building, which is discussed in more detail in McKenzie *et al.* 2002, concentrating here on the additional information about the reconstruction provided by the unpublished photographs. Secondly, we will consider some aspects of the interpretation of the sculpture at Khirbat at-Tannūr. We need to begin with the reconstruction of the temple complex itself to provide a spatial and chronological context for the sculpture.

When Glueck excavated it, the plan of the complex was fairly clear, with a monumental altar inside a walled enclosure (the Inner Temenos Enclosure) (**Fig. 4**). There was a walled court in front (the Forecourt) with rooms along both sides of it, some with benches for dining. The first phase of the building included an altar, and Glueck considered the basic design of the sanctuary went back to that period (*DD* 89, 179-180). The earliest coin found at the site dates to the late third century BC (*DD* 12, pl. 57e-h), and the first phase seems to date before 8/7 BC, when there are two dedicatory inscriptions, although not found *in situ* (*DD* 101-102, 138, 512-514, pl. 194d-195). The plan and reconstruction of the whole temple complex presented here were largely built in the main period, Period II, ca. AD 50-150 (for discussion of chronology see McKenzie *et al.* 2002).

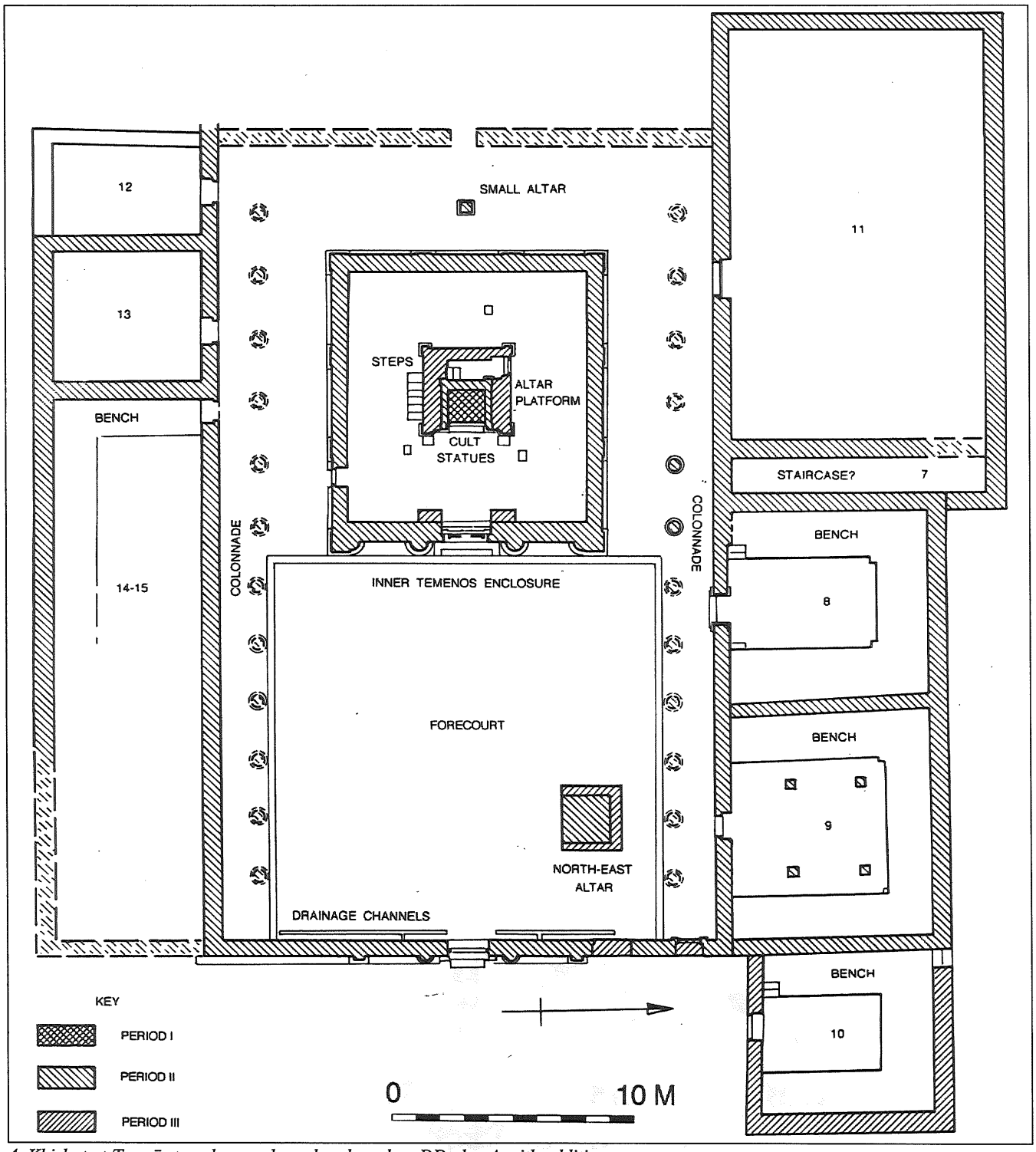
Reconstructing a building is like doing a jigsaw in three dimensions. You have the foundations already in position, then you have a pile of pieces. Most pieces can only go in one place, i.e. where they fit correctly. This means if you have a column base (or a series of them), the only capital which can have gone on it is one the correct size for it. If you have one this size amongst the remains, then you almost certainly have the correct one. If the capital is too large or too small for the column, then it definitely did not belong to it. The reconstruction can also be helped by other details, such as the style of the carving, with pieces of the same style belonging to the same period. When we prepared the reconstructions we largely had only this method. However, our results are confirmed by the additional evidence of the photographs, as will be shown below.

Reconstruction of the Altar

The focal point of the complex is the main altar platform. This was built in three clear phases with shells like a Russian doll (**Fig. 4**). The lower parts



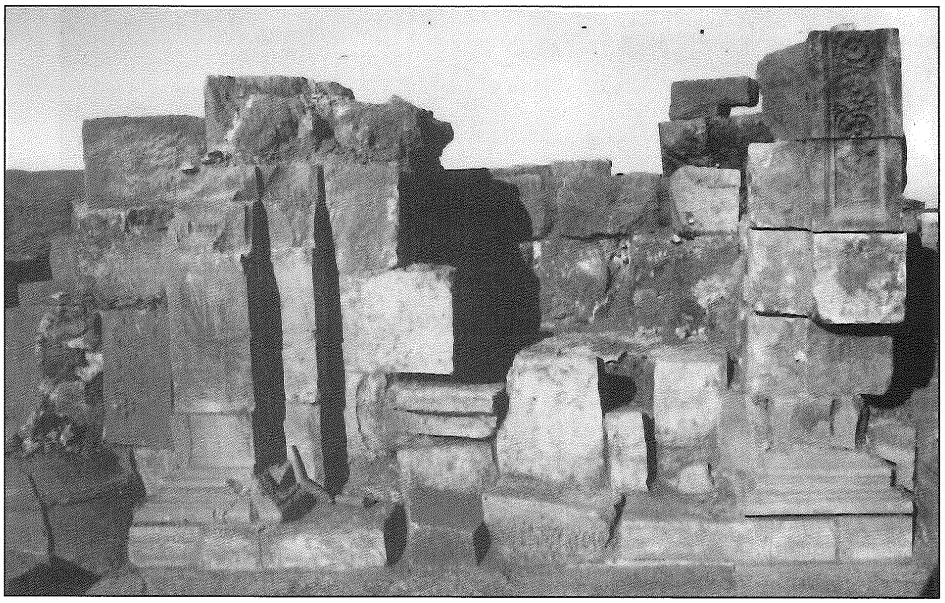
3. Some blocks of "Atargatis Panel" with the team, 1937: Clarence Fisher, Carl Pape, Helen Glueck, Nelson Glueck, S.J. Schweig and Atarah.



4. Khirbat at-Tannūr temple complex: plan, based on DD plan A with additions.

of each phase were found *in situ* (**Fig. 5**). The first phase of the altar was plain (*DD* 89-90, plans D-E). That it was an altar is indicated by the remains of burnt offerings of grain and small animals found in it. These were mentioned by Glueck (*DD* 87, 90), and noted in his dig journal (GJ 10 March 1937). Some of them are preserved in the archive.

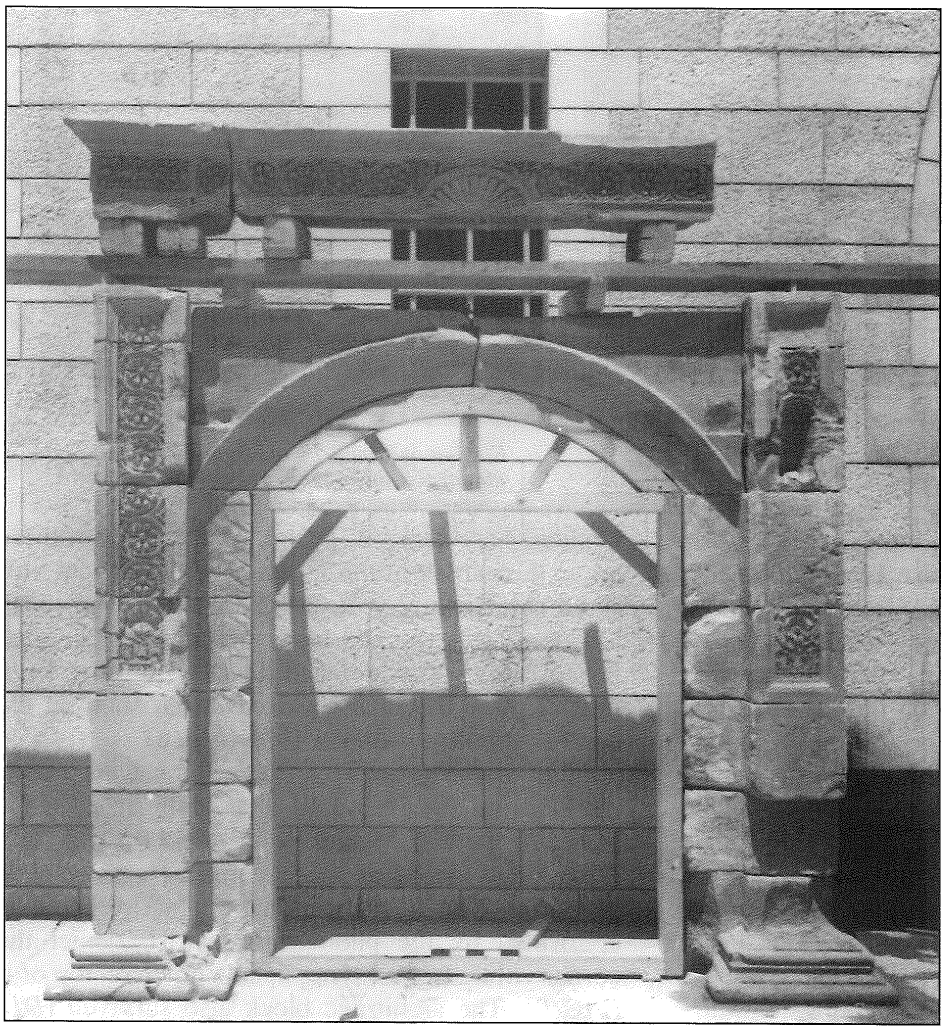
After the area around the first altar was paved, the Period II altar was built around the sides and back of it (*DD* 92, 138, pl. 111-2) (**Fig. 4**). The lower parts of the Period II altar pilasters were found *in situ*, including some with floral decoration (**Fig. 5**). The joining pieces of these were found around the site, including the lintel above them, forming the frame of a niche which is depicted here with the pieces put back together (**Fig. 6**). It



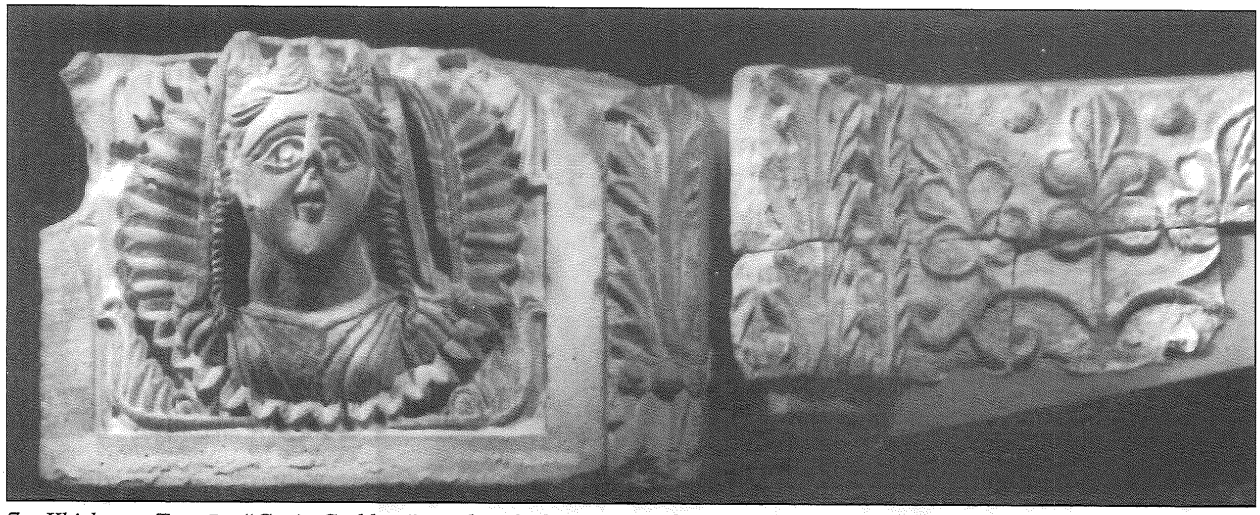
5. Khirbat at-Tannūr, altar platform after excavation, 1937, with three phases in situ. The broken sceptre is visible to the right of the left-hand pilaster base.

was later shipped to the Cincinnati Art Museum. Note the identical flowers on the lintel and pilasters. This altar had steps across the back to provide access to it (*DD* 103).

In the third phase the altar was enlarged again around the sides and back to form an altar platform (*DD* 120-122, pl. 110b-113a, c) (**Fig. 4**). The bases of the pilasters and engaged quarter columns of this Period III altar platform were found *in situ* (the base of one visible on the far left of **Fig. 5**), so we



6. Khirbat at-Tannūr, Period II niche frame, now in Cincinnati Art Museum.



7a. Khirbat at-Tannūr, "Grain Goddess" re-identified as Virgo, from Period III altar platform. Cincinnati Art Museum



7b. Khirbat at-Tannūr, "Fish Goddess" re-identified as personification of Pisces, from Period III altar platform, 2001. Jordan Archaeological Museum.

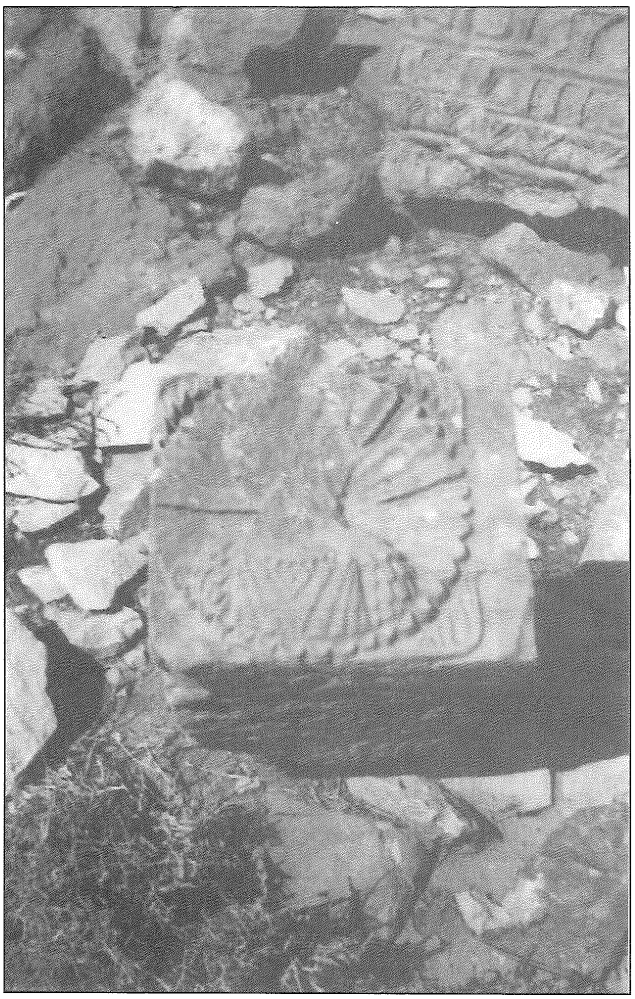


7c. Khirbat at-Tannūr, block from Period III altar platform. Cincinnati Art Museum.

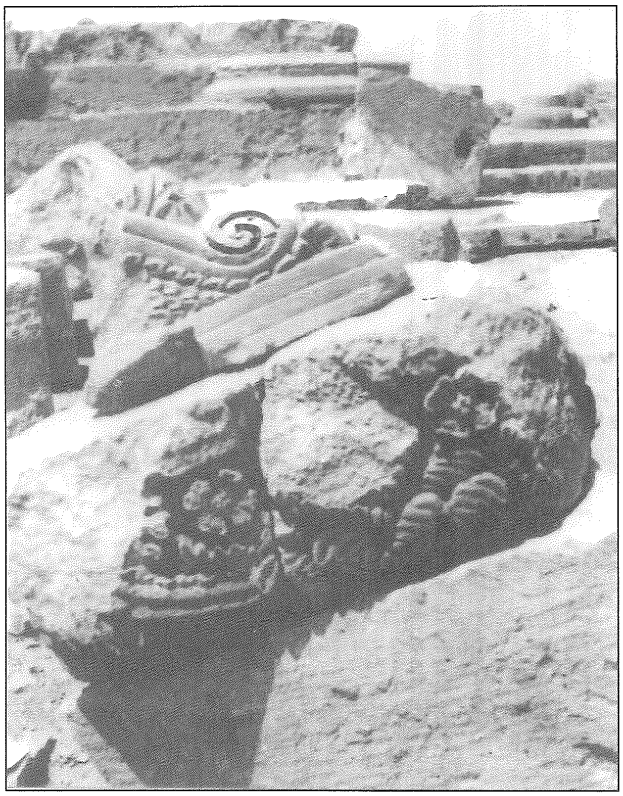
can reconstruct them with the joining blocks, the way you build up a jigsaw. These blocks include (above some plain blocks) the "Grain Goddess" which goes on the lower left, along with the decorated blocks joining it (**Fig. 7a**). The "Fish Goddess" went in the same position on the lower right (**Fig. 7b**).

The quarter columns beside them were decorated with vines rising out of a basket of acanthus leaves (McKenzie *et al.* 2002: fig. 7a, c) (see **Fig. 10**). To the side of these quarter columns were panels with an alternating pattern of five-lobed leaves (**Fig. 7a**) or serrated leaves (**Fig. 7c**) (*DD* pl. 29; McKenzie *et al.* 2002: fig. 7b). The busts which went above the "Fish Goddess" and the "Grain Goddess" are defaced (*DD* pl. 27-8). Some of these are in the garden of the Jordan Archaeological Museum (McKenzie *et al.* 2002: fig. 7a). The "Fish Goddess" was rescued from the site by 'Abdullah Rihani Bey. The defaced busts had also been moved prior to Glueck's excavation, such as the one here photographed in 1936 (**Fig. 8**).

One of the pilaster capitals which went above the busts on the Period III altar platform is in the Museum garden (McKenzie *et al.* 2002: fig. 9a). Glueck had identified it as a cornice fragment (*DD* pl. 175c). The identification of it as a capital is confirmed by the photographs which depict the corner volute from it lying upside down on top of it (**Fig. 9**). The architrave block also survived (*DD*



8. Khirbat at-Tannūr, defaced bust from Period III altar platform, 1936.



9. Khirbat at-Tannūr, pilaster capital and corner volute (upside-down) from Period III altar platform, 1937.

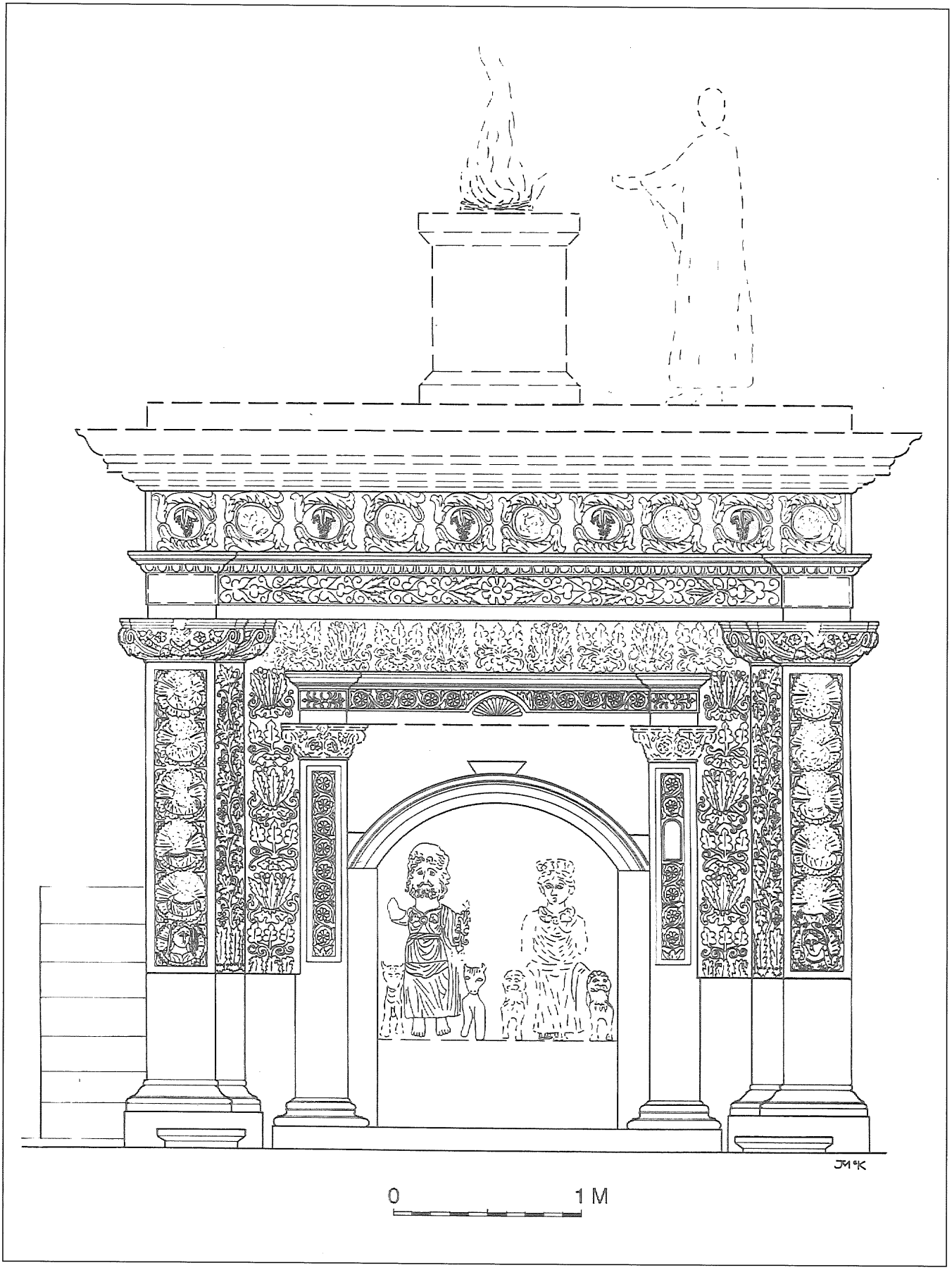
pl. 86b, 178b), and there is a fragment from a vine frieze (*DD* pl. 30a) which is the correct size and style to have come from the frieze above it. There was probably a cornice above this which has not been identified **(Fig. 10)**.

Steps were built along the sides and back of this phase to provide access to the top where a small altar would have been erected (*DD* 121-122). This is hinted in the reconstruction in order to make clear the function of this phase as an altar platform, rather than leaving the top empty **(Fig. 10)**. We will discuss the contents of the niche below, but first we will establish the reconstruction of the Inner Temenos Enclosure which surrounded the altar platform, so that we complete the reconstruction of the architectural context before discussing the cult statues.

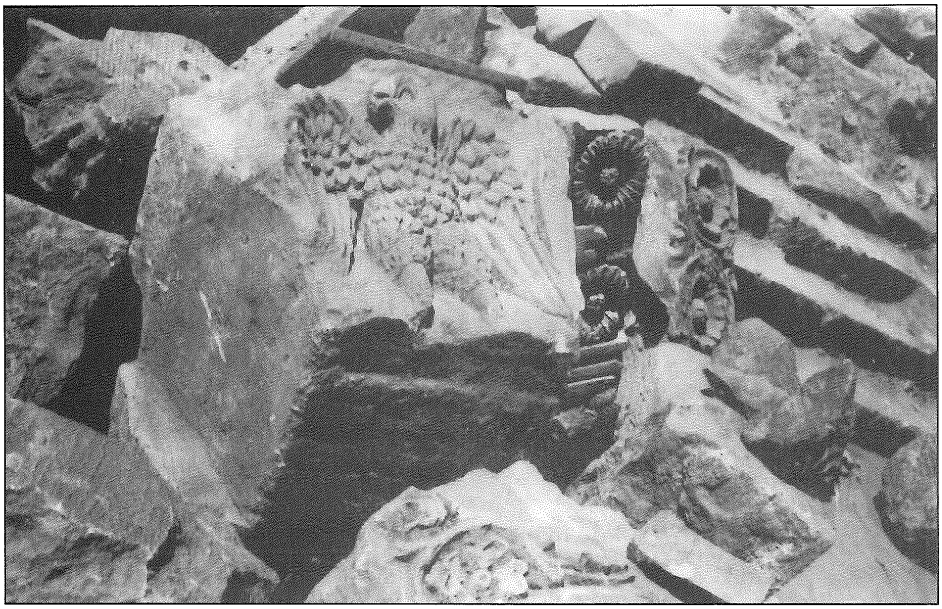
Reconstruction of the Inner Temenos Enclosure

A tall wall, forming the so-called Inner Temenos Enclosure, 9.72 x 10.38m, was built around the altar platform **(Fig. 4)**. Glueck found the blocks from the façade of it largely where they had fallen forward into the Forecourt in the final collapse, which was apparently accompanied by a fire (*DD* 142-143) **(Fig. 11a-b)**. Despite this, there are problems with the reconstruction of the façade published by him (*DD* plan B). He suggested it had two phases, one (Period II) with plain Nabataean capitals, before one (Period III) with floral capitals and the "Atargatis panel" (reasons of Glueck and Fisher from FAN, FRN and GNAN summarized in McKenzie *et al.* 2002).

The blocks of the floral capitals from the façade of the Inner Temenos Enclosure were found on the pavement in front of it, where they had fallen to the ground in its final collapse **(Fig. 12a-b)**. These include an upper drum with floral decoration **(Fig. 12a)**. The lower drum with acanthus leaves from a half column **(Fig. 12b)** was published by Glueck, but with the base of the façade of the Inner Temenos Enclosure (identifiable by the steps to its doorway) cropped out of the top of the photograph, thus removing the indication of where it was found (*DD* pl. 176a). There was also the upper drum from a quarter column engaged to a pilaster **(Fig. 13)**. The photographs include the scrolled end of an unpublished corner volute, such as would have broken off the capital block beside it **(Fig. 12a-b)**. This volute has a flower at the centre of it. From these pieces it will be possible to reconstruct on paper a complete one of these floral capitals. These blocks



10. Khirbat at-Tannūr, Period III altar platform: elevation (J. McKenzie).



11a. Khirbat at-Tannūr, fallen blocks from façade of Inner Temenos Enclosure in front of steps to it, 1937.



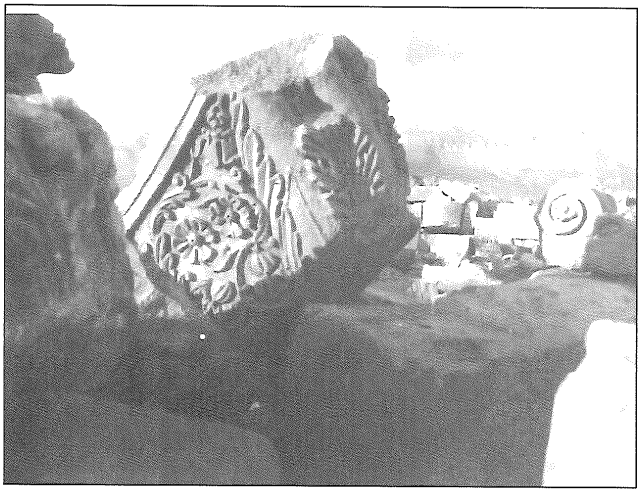
11b. Khirbat at-Tannūr, fallen blocks from façade of Inner Temenos Enclosure in front of it, 1937.

were largely preserved from weathering as they were covered by soil, unlike one which had remained exposed (**Fig. 14**).

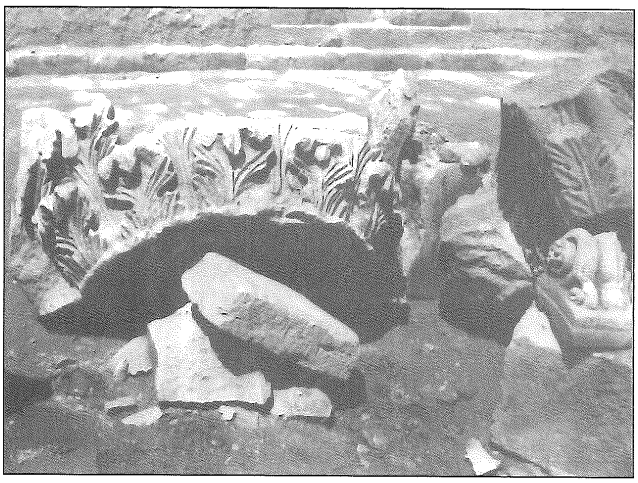
Blocks survive at the site of Type 1 Nabataean capitals, which are the correct size for the pilasters on the side and back walls of the Inner Temenos Enclosure (McKenzie *et al.* 2002: fig. 14a). This means that they did not go on the front of it in a phase before the floral capitals, contrary to the suggestion of Glueck and Fisher.

Some of the attic bases on which these capitals fitted were *in situ* in 1937 (*DD* pl. 98), but have since been moved (McKenzie *et al.* 2002: figs. 5b, 10b). Fisher (FAN p. 11) considered they found evidence of acanthus bases, which Glueck rejecte (DD 142). However, we can now suggest them in the reconstruction (see **Fig. 19**) as they have since been found at Petra (Will and Larché 1991: pl. B20.2).

The frieze of the main entablature above the floral capitals had a series of busts along it. The blocks with busts from the corners of the façade are in the garden of the Jordan Archaeological Museum (McKenzie *et al.* 2002: fig. 14a). As these blocks are decorated on two adjacent sides, it is only possible to know which one went on which corner because they were found where they fell in the final collapse of the façade, one (*DD* pl. 53a-b) near its north end, and the other near its south end with Zeus on the front face and a bust with a cornucopia on the side at right-angles to it (*DD* pl. 55-56). Their find-spots are recorded in the photographs, and the latter block is mentioned in the dig journal (GJ 1 December 1937). It is shown here be-



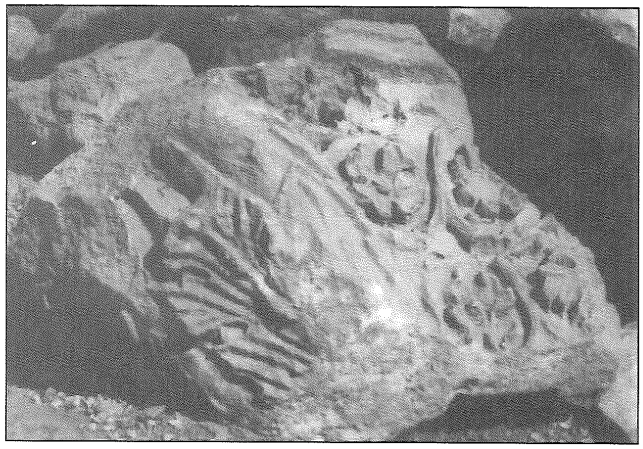
12a. Khirbat at-Tannūr, fallen floral capital from façade of Inner Temenos Enclosure, 1937.



12b. Khirbat at-Tannūr, fallen lower drum of floral capital of half column from façade of Inner Temenos Enclosure, 1937.



13. Khirbat at-Tannūr, upper drum of floral capital of quarter column engaged to pilaster from façade of Inner Temenos Enclosure, 1937.



14. Khirbat at-Tannūr, weathered floral capital block, 1936.

side the steps along the south side of the Forecourt, after it had been moved slightly to expose it fully (**Fig. 15**). This photograph was taken lined up with the block and its context was lost when the background was cropped out (*DD* pl. 55). Although at an angle, this image also provides a glimpse of the local work force.

There were also busts on panels which were the same height as the corner blocks. "A number of these lay in the debris in the court" [Forecourt] (FAN p. 11). Those without frames include the bust of Helios now in the Cincinnati Art Museum (*DD* pl. 136), and the damaged bust of Kronos-Saturn, with the lower part broken off, which is in the Jordan Archaeological Museum (**Fig. 16a**). A head of Zeus-Jupiter, also in the Museum, is the correct size and style to have come from one of these busts (McKenzie *et al.* 2002) (**Fig. 16b**). There are also two damaged busts which were not published by Glueck. These include one still at the site (McKenzie *et al.* 2002: fig. 15a), and one photographed in 1937 (**Fig. 16c**). Although badly damaged, it is reproduced here as it could help with identifying the busts at a later date if more evidence comes to light at other sites. The spacing suggests there were probably a total of seven unframed busts across the front of the façade, but there is no means for ascertaining the order in which they went between the framed busts above the half columns and pilasters (McKenzie *et al.* 2002).

A series of Nikes or winged victories were also found on panels the same height (0.55m) as these bust panels (FAN p. 14). Before the excavation, some were visible where they had fallen (**Fig. 17a**), near the weathered capital block from the façade of the Inner Temenos Enclosure in **Fig. 14**. The Nikes include one which was not published in *Deities and Dolphins*, but in one of his earlier reports (Glueck 1937c: fig. 8) (**Fig. 17b**). Although



15. Khirbat at-Tannūr, corner block from south-east corner of frieze of Inner Temenos Enclosure, 1937.

Fisher mentions seven Nike panels being found (FAN p. 14), this means eight are recorded in the photographs. The similarity in their sizes (not obvious from the scales on them when published in *Deities and Dolphins*, pl. 179-82) was clear when they were lined up at the site during the excavations (**Fig. 17c**).

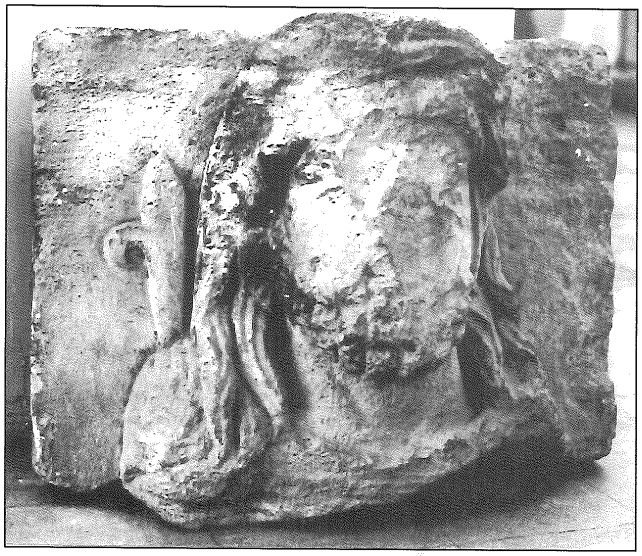
Glueck and Fisher were uncertain of the original location of these Nikes (details in McKenzie *et al.* 2002). It now appears that they went between the busts on the frieze of the main entablature, because this is the arrangement which has been found on the recently excavated temple at Khirbat adh-Dharīḥ (al-Muheisen and Villeneuve 1999: fig. on p. 46), which was decorated by the same sculptors (Dentzer-Feydy 1990).

The blocks from the cornice which went above this frieze are obvious from their size and where they were found, in front of the façade of the Inner Temenos Enclosure (FAN p. 11; *DD* 143, pl. 172). They have carved details on them including egg and tongue, dentils, and a form of lesbian cymation (McKenzie *et al.* 2002: fig. 11a-b, d) (**Fig. 18a**). Their corona is decorated with flat modillions with rosettes between them, and there is a vine pattern along the base of the sima, which has palmettes on it (**Fig. 18b**).

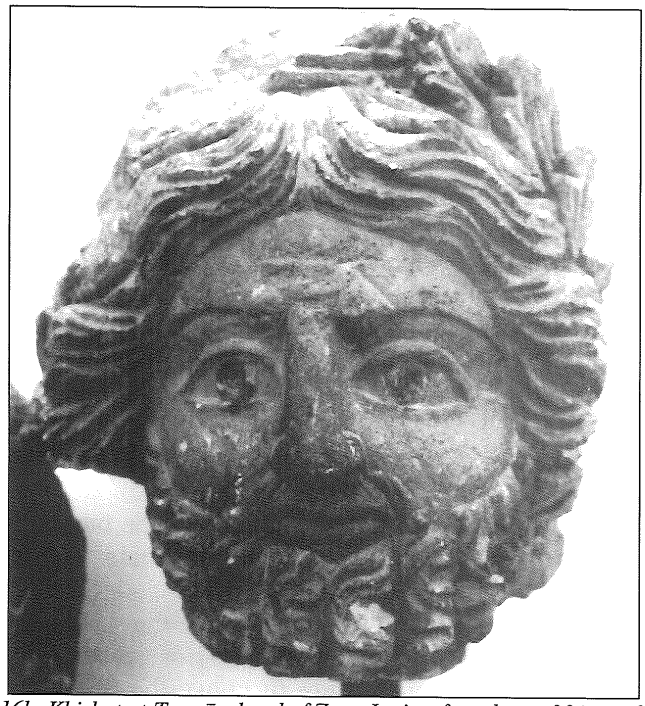
At the site we found the broken block from the apex of a pediment with these same mouldings (**Fig. 18c**), indicating that the main order of the Inner Temenos Enclosure had a pediment, like the temple at Khirbat adh-Dharīḥ (al-Muheisen and Villeneuve 1999: fig. on p. 46). Their notes show that Glueck and Fisher noticed this block but, as they did not measure or photograph it, they used it to suggest a pediment over the doorway of the Inner Temenos Enclosure (details in McKenzie *et al.* 2002). This pediment above the entablature of the Inner Temenos Enclosure did not form the front of a pitched roof. Rather, it was built into a wall crowned by a cavetto cornice, of which blocks remain at the site (McKenzie *et al.* 2002: fig. 12) (**Fig. 18d**).

Nearly all the pieces of the famous "Atargatis panel", now in the Jordan Archaeological Museum (**Fig. 3**), were found in collapse at the foot of the steps of the façade with the acroterion with an eagle on it which went at the top of it (FAN p. 12; *DD* 142-145, 289, plan B) (**Fig. 11a-b**). The florals on it are similar to those on the floral capitals of the façade (McKenzie 1988: 83, fig. 3b-c), and the eyes (with indented irises) and hair of the bust are like those on the busts from the main frieze (McKenzie 1988: 83, fig. 4). Fisher and Glueck placed this semi-circular panel above the main entablature of the Inner Temenos Enclosure because Fisher thought it would not fit above the doorway (FRN p. 4). However, it does fit, although flush with the columns (**Fig. 19**). The two blocks of the curved cornice which framed this panel, and were found with it (FAN p. 12), are in the Jordan Archaeological Museum. The "horns" on these, which Glueck thought were an eastern motif to represent the sun's rays, are in fact traditional classical acroteria (details in McKenzie *et al.* 2002: fig. 16).

Glueck and Fisher were perplexed by the fallen remains of a colonnade on either side of the Inner Temenos Enclosure, and did not indicate it in their reconstruction. Two of the bases were still *in situ*. They also did not notice the stylobate which indicates the colonnade continued along the Forecourt (McKenzie *et al.* 2002: fig. 20) (**Fig. 4**). Column



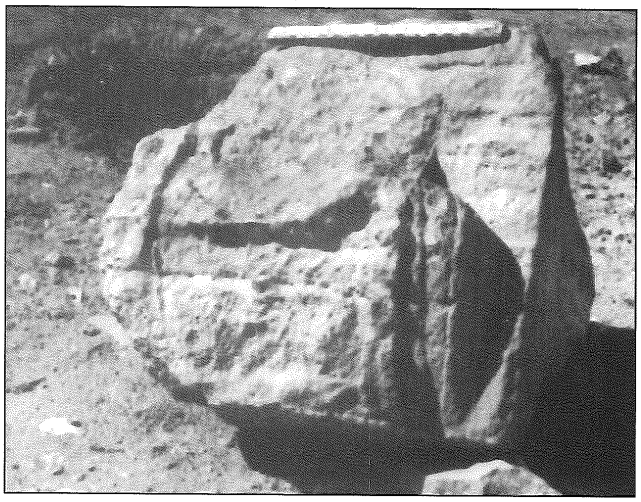
16a. Khirbat at-Tannūr, bust of Kronos-Saturn from frieze of Inner Temenos Enclosure. Jordan Archaeological Museum.



16b. Khirbat at-Tannūr, head of Zeus-Jupiter from bust of frieze of Inner Temenos Enclosure. Jordan Archaeological Museum.

drums, bases and capitals from these colonnades still survive at the site beside the Inner Temenos Enclosure (McKenzie *et al.* 2002: fig. 19a, b, d) **(Fig. 20)**. In the dig journal Glueck repeatedly uses the term "balatah" for the unpaved floors of the colonnades. This was a hard-packed floor with inclusions in it, such as flint, for added hardness. The term is now used for the composite tiles of concrete and stone-chips, used on the floors of most modern buildings in Jordan.

It is easier to visualize the plan if presented in three-dimensions, as in Sheila Gibson's drawing **(Fig. 21)**. We have already mentioned the basis for



16c. Khirbat at-Tannūr, damaged bust from frieze of Inner Temenos Enclosure, 1937.

the reconstruction of the altar platform, the Inner Temenos Enclosure, and the colonnades. Other details also survive, not mentioned here, such as the fragments of the façade of the Forecourt with plain Nabataean capitals and plain mouldings (details in McKenzie *et al.* 2002: fig. 17-18), and the triclinia with benches around three sides for dining (evidence summarized in McKenzie *et al.* 2002). This drawing provides a minimal indication of what the temple complex would have looked like, with details only added if there is evidence for where they went.

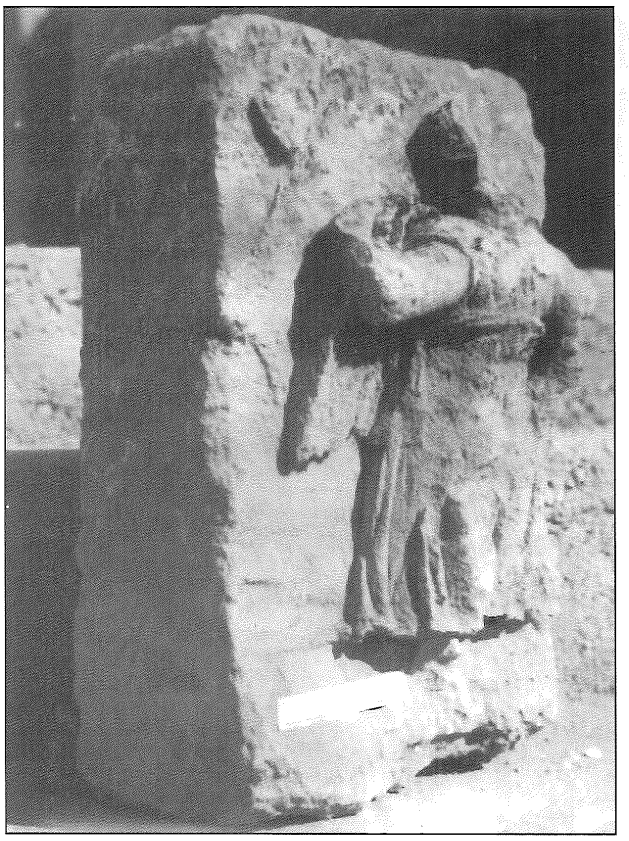
There are other blocks at the site which could be added to it if we had more indication of where they went (McKenzie *et al.* 2002: fig. 22a-b). The photographs include a floral pilaster capital of the type without a collar of acanthus leaves, not otherwise recorded at Khirbat at-Tannūr. It is visible in the background at the edge of a damaged photograph **(Fig. 22)**.

There are also some blocks in the same style as the Period III altar platform, but it has not so far been possible to ascertain with certainty their original positions. These include two small blocks, with a Doric frieze and busts at either end, which were found with other fallen blocks of the façade of the Inner Temenos Enclosure (*DD* 142, pl. 12a-b) **(Fig. 11a)**. Glueck and Fisher used them as the basis for two niches in the façade (*DD* 145-146, plan B). This would only be possible if they were inserted into the Period II façade in Period III, as the style of carving of Period III is distinctly different of that of Period II (details in McKenzie *et al.* 2002).

The other Period III blocks are the capitals and floral pilasters from either side of two niches (*DD* pl. 133a, 134; McKenzie *et al.* 2002: fig. 9b-c). Glueck suggested they came from an altar, Altar



17a. Khirbat at-Tannūr, Nike panels from frieze of Inner Temenos Enclosure before excavation, 1936.



17b. Khirbat at-Tannūr, Nike with raised right hand (?holding wreath) on panel from frieze of Inner Temenos Enclosure, 1937.

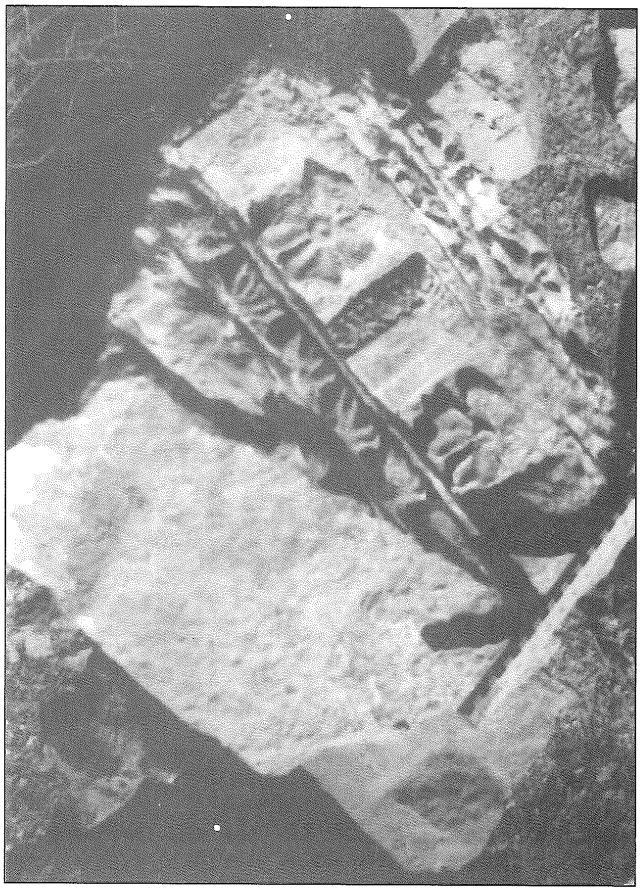


17c. Khirbat at-Tannūr, Nike panels from frieze of Inner Temenos Enclosure, with larger figure on far left, 1937.

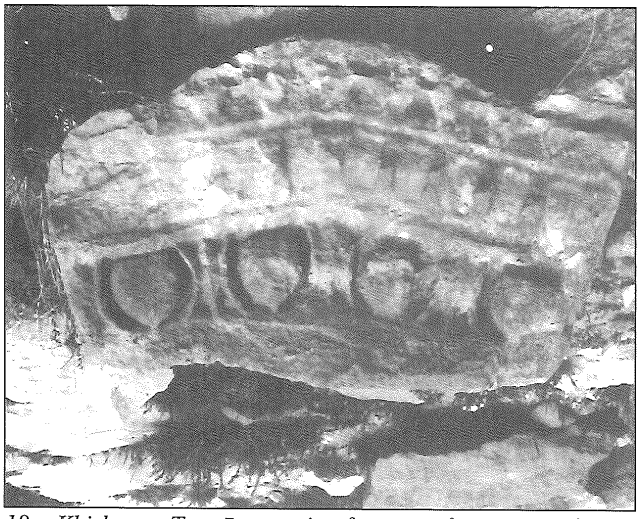
III, on top of the Period III altar platform (*DD* 124-126, plan C), but they would equally fit on the altar in the northeast of the Forecourt (**Fig. 4**). Unfortunately, the excavation records do not clarify the problem of their original location. The capitals from them, with a small head on the boss, were found in front of the Inner Temenos Enclosure, one near the south wall of the Forecourt and the other,



18a. Khirbat at-Tannūr, cornice fragment from main entablature of Inner Temenos Enclosure, 1936.



18b. Khirbat at-Tannūr, cornice fragment with modillions from main entablature of Inner Temenos Enclosure, 1937.



18c. Khirbat at-Tannūr, cornice fragment from apex of main pediment of Inner Temenos Enclosure, 2001.



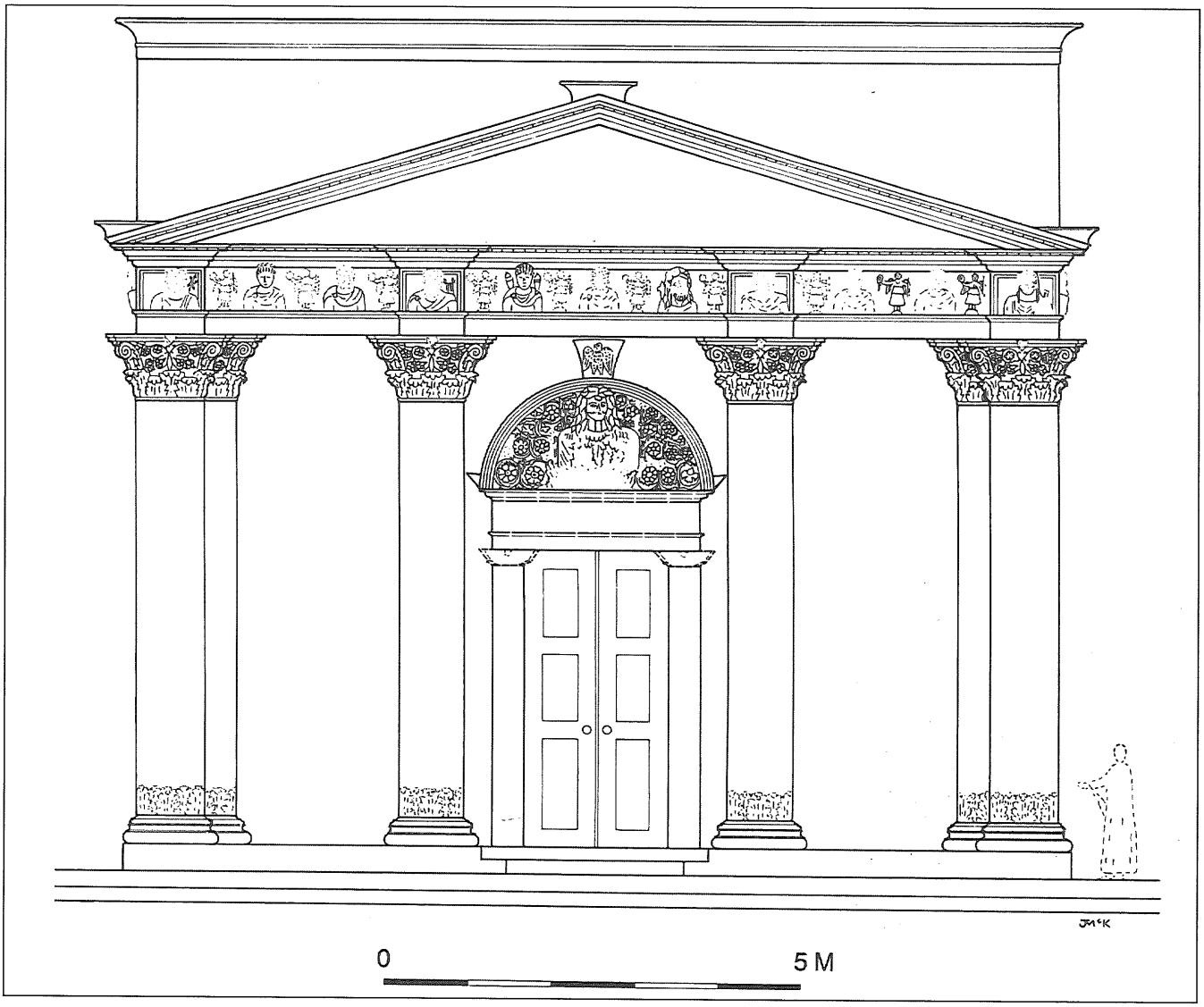
18d. Khirbat at-Tannūr, cavetto cornice block, 2001.

near the north end of the façade (GJ 6 March 1937; Registration Book, no. 48). The blocks are depicted in the excavation photographs lined up on the south side of the Forecourt, after they had been moved.

Date of Period II Complex

The details of the florals on the "Atargatis panel" are identical with those on the Period II altar platform (*DD* 32, pl. 104a, 175a; McKenzie 1988: 82-3, fig. 3a-c), indicating that the Inner Temenos Enclosure was built at the same time as this phase of the altar. The site is very windy so it is highly likely this enclosure was built to prevent the fire on the altar from blowing away.

These florals are identical with those at Khirbat adh-Dharīḥ, as are the details of the carving on the heads, such as the indented irises. Both were decorated by the same workmen (Dentzer-Feydy 1990),



19. Khirbat at-Tannūr, elevation of façade of Inner Temenos Enclosure (J. McKenzie).

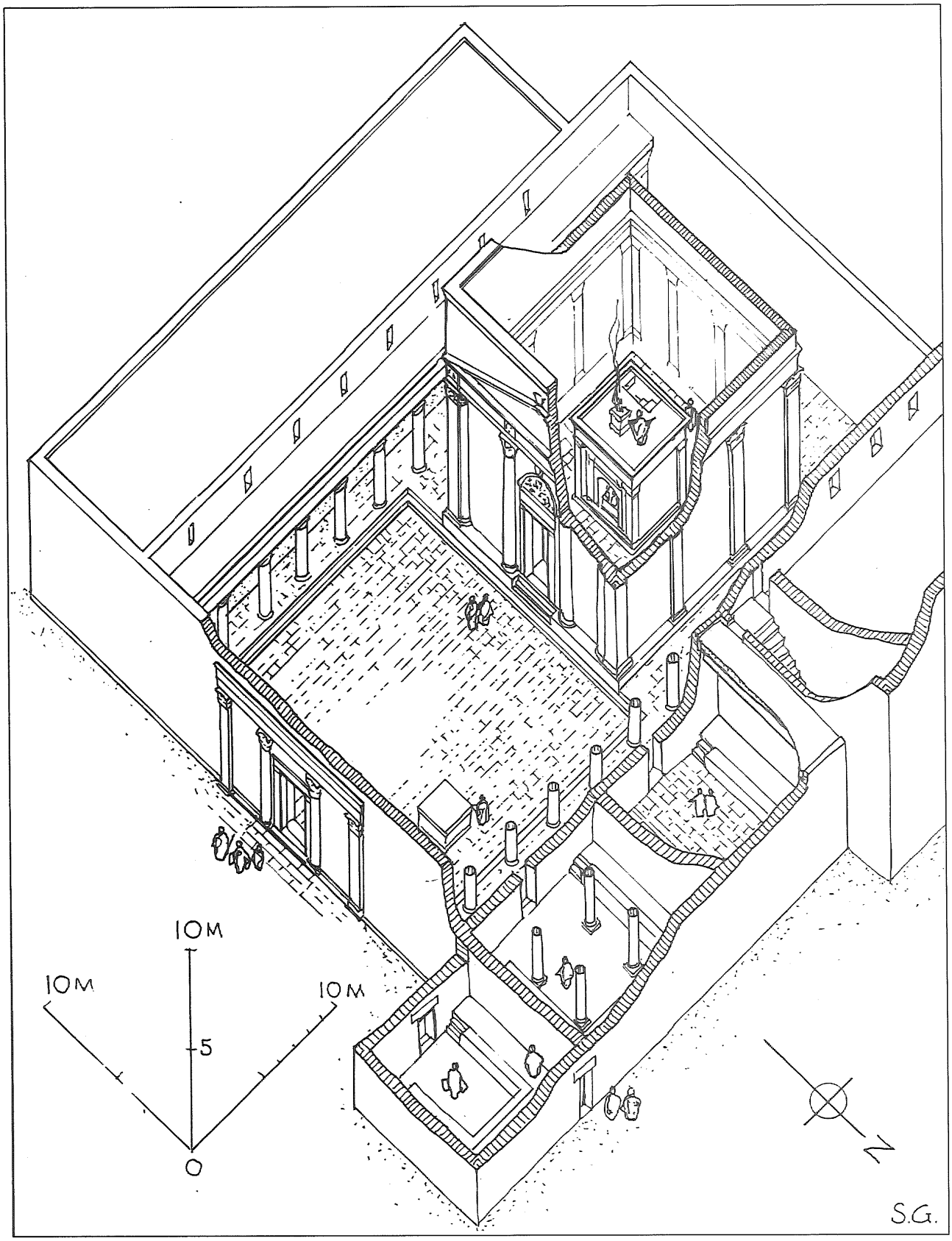


20. Khirbat at-Tannūr, blocks of colonnade bases and capitals on south side of Temenos, beside Inner Temenos Enclosure, 2001.

and so will have a similar date (discussed in McKenzie *et al.* 2002). Hopefully, a more precise date for Period II at Khirbat at-Tannūr will be provided by the excavations at Khirbat adh-Dharīḥ than the current date of the second half of the first or the first half of the second century AD (al-Muheisen and Villeneuve 1994: 739; 1999: 43). It is possible that the examination of the sherds from Khirbat at-Tannūr by Stephan Schmid might help clarify this chronology, as the comparative material from Petra is now more reliably dated than it was in 1937 (Schmid 2000). It would be useful to know if the Period II version of the temple complex were built before or after the Roman conquest of the Nabataean kingdom of Arabia in AD 106, because there are serious implications if a sanctuary of such size were built under Roman rule, as the third phase of the altar (**Fig. 10**) must have been (McKenzie *et al.* 2002).

Figured Sculpture

Having reconstructed the building, we can now consider the Nabataean use of the representation of gods in figured form, i.e. anthropomorphic repre-



21. Khirbat at-Tannūr temple complex, axonometric reconstruction (S. Gibson).

sentations.

In *The Formation of Nabataean Art, Prohibition of a Graven Image Among the Nabataeans*, published in 1990, Joseph Patrich discusses the innumerable examples of Nabataean gods depicted as rectangular blocks. These blocks, known as betyls,



22. Khirbat at-Tannūr, floral pilaster capital, 1937.



23. Khirbat at-Tannūr, "Zeus-Ḥadad" statue showing depth of the soil which completely covered it.

range from plain rectangular blocks to those with geometric eyes and a rectangular nose, called "eye-idols". The typology of the betyls, established by Dalman (1908: 70-74; Patrich 1990a: 75-95), has recently been summarized and rigorously analysed by Wenning (2001). The main point is that these blocks avoid the representation of the deity in human form, using the plain block instead of an anthropomorphic cult statue. That they represent deities is indicated by the inscriptions below some of them, such as the block from the Temple of the Winged Lions in Petra with eyebrows and a nose, identified as "the goddess" (Hammond 1980: 137, fig. 1), and those of al-'Uzza and al-Kutba carved in the rock together in Wādī Ramm (وادي رمّ) (Patrich 1990a: 61, ill. 9).

Patrich argues that the Nabataeans had a prohibition against the use of anthropomorphic representations, despite their use of figured sculpture (Patrich 1990a: 191). By contrast, Mettinger considers that the Nabataean preference for aniconism also allowed for the acceptance of anthropomorphic representations of deities (Mettinger 1995: 57-68; Healey 2001: 185-189).

The amount of figured sculpture at Petra is clear to the visitor there who sees about one hundred blocks with figured sculpture (pieces found up to 1986 listed in McKenzie 1988: 89-95). These include free-standing representations of classical gods and heroes, such as the marble statues of Heracles from the theatre and Venus (Hübner and Weber 1997: figs. 132, 133a). Blocks from buildings include panels with busts in high relief of readily recognisable classical gods on them, such as Athena and Hermes (McKenzie 1990: pl. 60a-b). Mortals are also represented, such as a man in a Roman toga carved in the round (Hübner and Weber 1997: fig. 137), the soldier on the Tomb of the Roman Soldier (McKenzie 1990: pl. 102a), and the figures leading camels recently uncovered in as-Sīq(السيق) (Nehmé and Villeneuve 1999: fig. 74). Figured representations on more everyday objects include those on the coins and terracottas.

How can the evidence from Khirbat at-Tannūr elucidate how figured sculpture was used in and on religious buildings by the Nabataeans?

Cult Statues at Khirbat at-Tannūr

One of the major discoveries of the temple at Khirbat at-Tannūr is the cult statue because this is the only Nabataean temple in which the largely



24a. Khirbat at-Tannūr, "Zeus-Ḥadad" statue while being excavated, 1937.



24b. Khirbat at-Tannūr, "Zeus-Ḥadad" statue in front of altar platform, before removal of soil at base of it, 1937.

complete cult statue has been found. It is a seated male statue carved in high relief on a sandstone stele (h. 1.15m, maximum w. 0.63m) (see **Fig. 25**).

Glueck records in his dig journal that it was found "just in front" of the altar platform (GJ 10 March 1937), and notes it was not in its original position when excavated (GJ 1 March 1937). However, as complete grains of wheat were found behind it (GJ 3 March 1937), it could not have been moved very far as these were also found behind it in the altar platform. The sides of it had remains of plaster on them indicating it had been inset (GJ 9 March 1937). The archive includes unpublished photographs of it while it was being uncovered (**Figs. 23, 24**). These record the exact position of it when it was uncovered, indicating it had not been moved when Glueck photographed it after removing the surrounding soil (**Fig. 25**). As Glueck did not publish these photographs, but only the cult statue by itself (*DD* pl. 42), the context of exactly where it was found was lost.

As would be expected from its find-spot, Glueck considered the cult statue had originally stood in the niche of the altar platform in front of which it was found (Glueck 1937b: 11-12; *DD* 269). It is the correct size to have stood in this niche, probably on a pedestal so the worshipper looked the god in the eye rather than down on him (**Fig. 26**). The record in the archive of the find-spot of the statue is important because it greatly increases the likelihood that the cult statue originally stood in this niche. This has implications concerning the function of this altar structure which will be discussed below.

A sceptre of hard limestone (**Fig. 27a**) was found behind the cult statue (GJ 9 March 1937 an-



25. Khirbat at-Tannūr, "Zeus-Ḥadad" statue in front of altar platform, after excavation, 1937.

notations on typed copy; *DD* 288, 186a). This was photographed while it was being excavated (**Fig. 27b**), confirming that the pieces of it had not been moved when it appeared in the photograph of the altar platform (*DD* pl. 112b) (**Fig. 5**).

The statue's attributes of the thunderbolt, and the throne decorated with bulls, are associated with the Syrian storm god Ḥadad. In his raised right hand, which is damaged, he probably held the sceptre found behind him. His clothes and hair reflect classical influences. Consequently, Glueck called him "Zeus-Hadad" to reflect this combination of eastern and western features (detailed discussion: *DD* 86, 195-199, 203-209). That name will be retained here to avoid confusion.

This statue is carved from sandstone, whereas the architecture of the temple complex is limestone. Sandstone fragments were also found of part of a lion throne and a foot of similar size to his (*DD* pl. 160-161b). The details of the indented irises on the eyes of the lion and bull on the thrones are identical, indicating they are contemporary (McKenzie *et al.* 2002). Thus, the fragments come from the cult statue of his consort Atargatis, for whom there is space in the niche beside him (Glueck 1937b: 12; *DD* 248, 269-270, 283). The details on the cult statue and the lion throne, such as the indented irises on the animals, indicate that they belong to Period II (McKenzie *et al.* 2002). As the small limestone sculpture of Atargatis from Khirbat at-Tannūr in the Jordan Archaeological Museum (*DD* pl. 44) also belongs to Period II, based on details such as her eyes and hair (McKenzie *et al.* 2002: fig. 23a-c), she can be used to provide an indication of how the missing parts of the cult statue of Atargatis might have looked (**Fig. 26**).

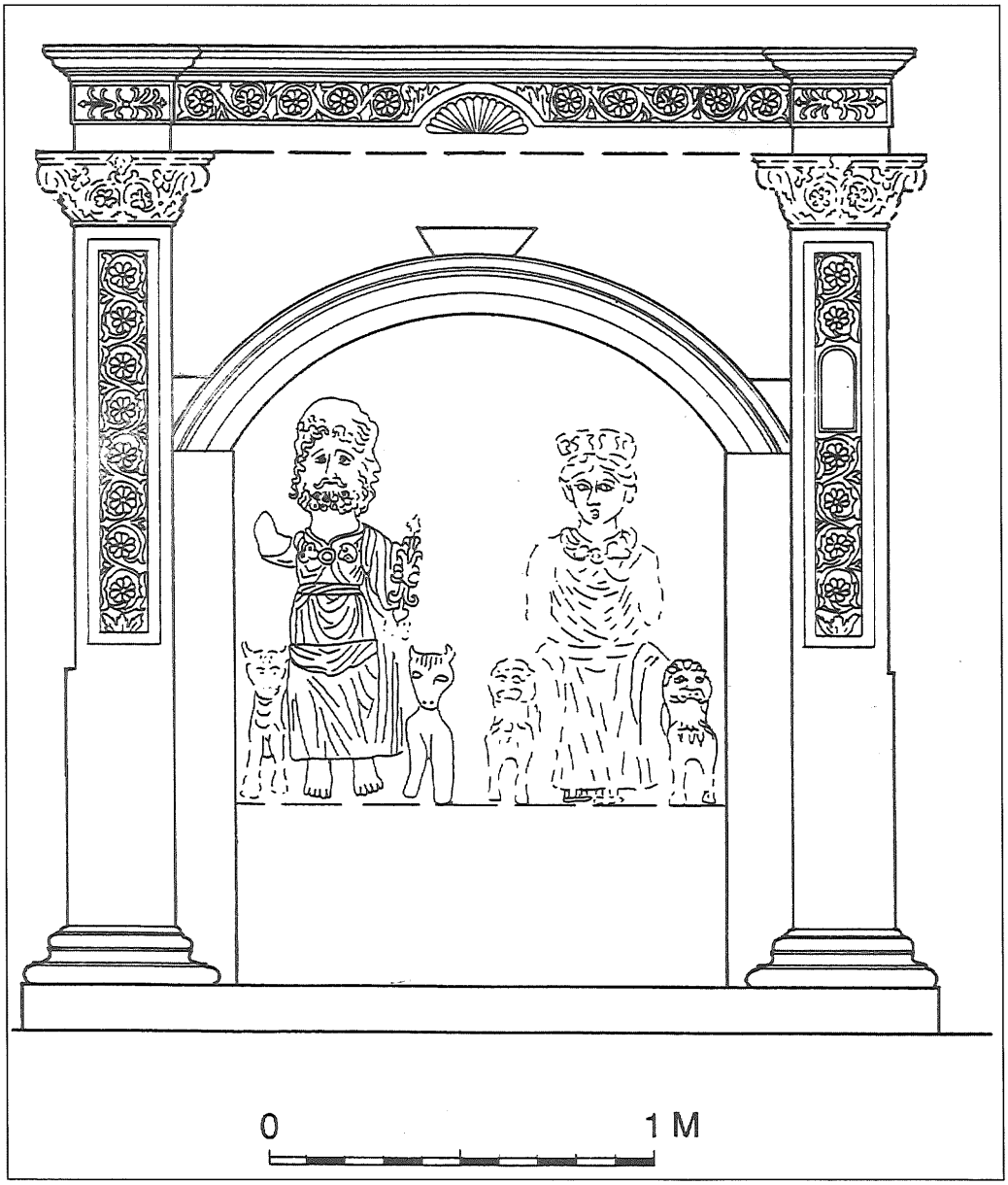
As these cult statues from Khirbat at-Tannūr have the form of Zeus-Ḥadad and his consort Atargatis, we need to consider whether the Nabataeans were worshipping these Syrian gods, or gods of their own, but represented in this form.

The only inscription at Khirbat at-Tannūr which mentions a deity refers to the Edomite god Qos, although it is written in Nabataean (*DD* 514-515, pl. 196-7; Healey 2001: 61). It is on a stone slab with an unusual shape, sometimes interpreted as a stele (Patrich 1990a: 63). Qos was the equivalent of the Arab Quzaḥ, god of the sky (Starcky 1968: 209), so he could have been worshipped in the form of Zeus-Ḥadad. The main Nabataean god Dushara was sometimes connected with Zeus (Healey 2001: 85-97, 101). Thus, the male cult statue at Khirbat at-Tannūr could represent the god of the sanctuary dedicated to a version of Qos-Dushara, in the form of Zeus-Ḥadad.

According to John Healey, it is not entirely certain which goddess was Dushara's spouse, but he considers al-'Uzza seems most likely at Petra, with Allāt who was worshipped elsewhere by the Nabataeans, being equivalent to her (Healey 2001: 44, 105, 116). Both al-'Uzza and Allāt acquired characteristics of other supreme goddesses of the Roman world, especially Isis and Atargatis (Healey 2001: 107, 182).

Who was the goddess represented at Khirbat at-Tannūr in the form of Atargatis? Atargatis of Hierapolis-Mambij (the centre of Atargatis worship) is attested at Petra where she is represented in the form of a rock-cut "eye-idol", identified by the accompanying inscription (Healey 2001: 140-1, pl. 7b). However, Healey considers there is now a consensus "that Atargatis, as such, was not worshipped as one of the main deities of the Nabataeans". This would mean that, at Khirbat at-Tannūr, the form of "this best known international goddess of the Semitic world", as he describes her, would appear to be used to represent the main Nabataean goddess (Healey 2001: 140).

Healey observes from his discussion of Dushara and Allāt/al-'Uzza there emerges "a distinct feature of Nabataean religion of a tendency to restrict the pantheon to a principal god and his partner, even if this tendency was not fully developed" (Healey 2001: 189). The representation of the main male and female Nabataean deities at Khirbat at-Tannūr



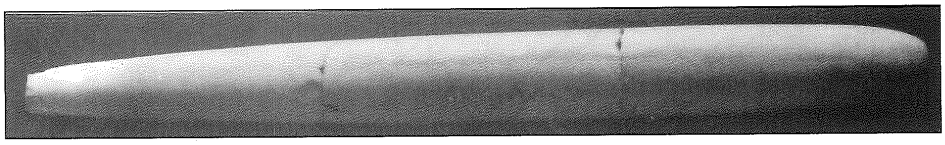
26. Khirbat at-Tannūr, Period II altar: elevation (J. McKenzie).

would accord with this.

The use of the cult statues at Khirbat at-Tannūr has a further feature of note, arising from the fact that the evidence in the archive and our reconstruction has given them both a firmer chronological and an architectural context. As mentioned, the cult statues are contemporary with the Period II altar with the niche in the front for them (**Fig. 26**). This means that this structure was designed to function as both a compressed cella and an altar. In Period III this arrangement continued with the altar enlarged to form an altar platform with the altar on top of it (**Figs. 10, 28**).

Starcky (1968: 212-221) discussed this at length because he assumed it could only be either an altar or a cella, not both. The arrangement of a compressed cella, with the cult statues in it, combined with an altar, is not as surprising as it at first seems. There are written sources from Syria from the first to second centuries AD which indicate that the altar was sometimes equated with the deity, such as "to the Great Zeus-Altar, hearer of prayers", and Porphyry mentions "the altar which they used as an idol" at Dūmah (*De Abstinentia* ii, 56, 6) (Mettinger 1995: 63; Healey 2001: 159 with references). The iconography of an altar is not so far removed from the rectangular blocks sometimes used by the Nabataeans to represent the deity.

A similar blurring of forms occurs with the cult statue at Khirbat at-Tannūr. It is not completely carved in the round, but rather in very high relief still attached to the stele behind it (**Fig. 25**). This god and his consort are notably not carved from the



27a. Khirbat at-Tannūr, sceptre of hard limestone. Cincinnati Art Museum.

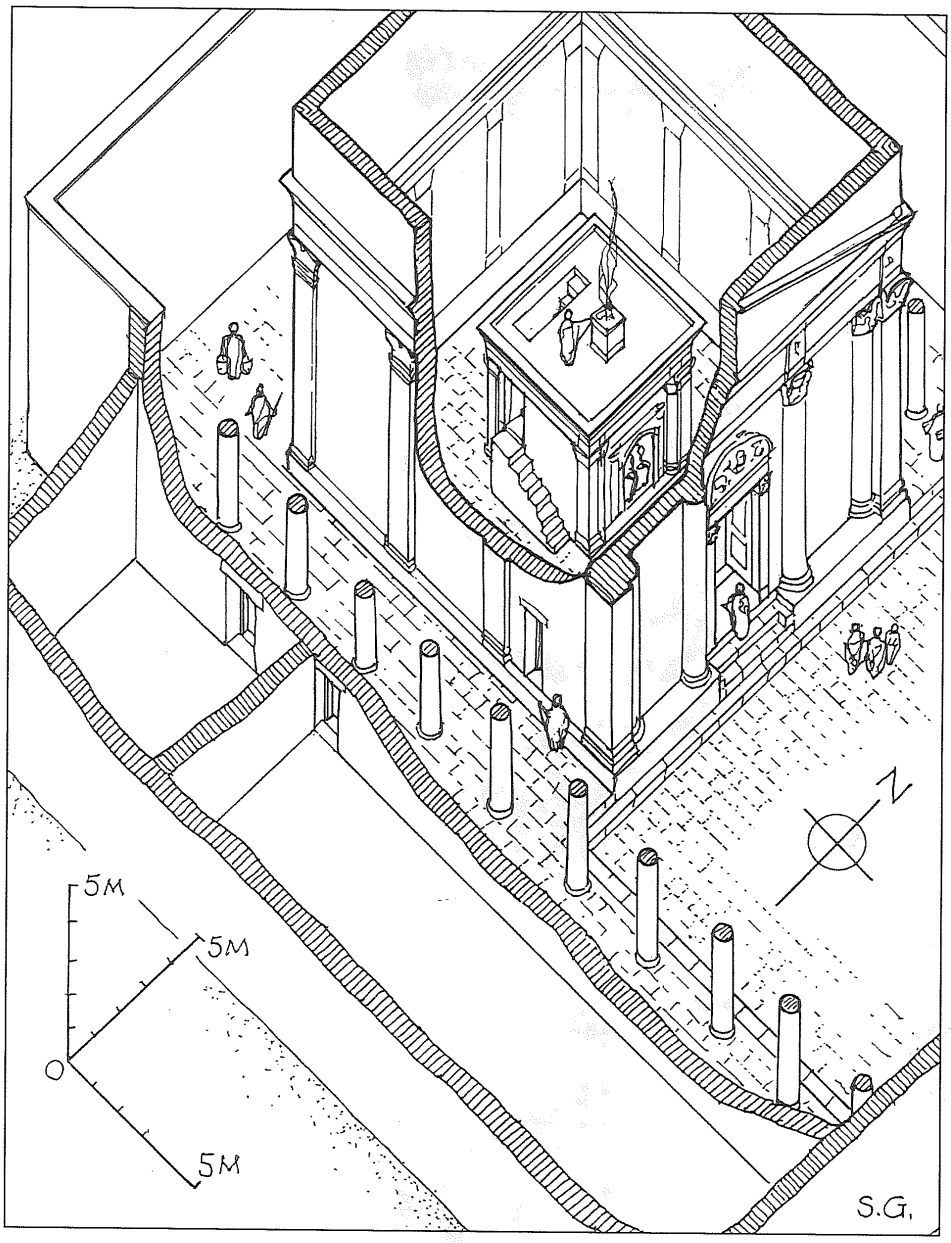


27b. Khirbat at-Tannūr, discovery of pieces of sceptre behind "Zeus-Ḥadad" statue, 1937.

local limestone, but of sandstone which must have been deliberately brought to the mountain-top site, with some difficulty. The questions arise as to whether this stone was transported from Petra, and if so, what was its significance.

Thus, at Khirbat at-Tannūr we have the cult statues of the main Nabataean god and goddess represented in figured form. That this was a major sanctuary is indicated by its location, and the energy and expense which would have been necessary to construct it. In the light of this, it would not be so surprising if other major Nabataean temples had an anthropomorphic cult statues. With this in mind, we will briefly examine the evidence from Petra and Wādī Ramm, before returning to Khirbat at-Tannūr.

A fragment was found apparently from the cult statue of Qaṣr al-Bint(قصر البنت) at Petra. This fragment is from a marble hand which is about four times life size and would have come from a statue six to seven metres high, or slightly less if seated. It was found near the northeastern corner of the podium of Qaṣr al-Bint (Parr 1967-8: 18-19, pl. 8.14). The size of it indicates it belonged to the cult statue of a temple and its find spot suggests this temple was probably Qaṣr al-Bint (so also Healey 2001: 41). This would mean that the god of one of the main temples in Petra was represented



28. Khirbat at-Tannūr, Inner Temenos Enclosure and altar platform from south-east: axonometric reconstruction (S. Gibson).

in anthropomorphic form.

There are also rock-cut anthropomorphic cult statues at Petra. Isis is represented in Wādī aṣ-Ṣiyyagh (وادي الصيّغ) in figured form seated on a throne (Merklein and Wenning 1998: pl. 8a). The associated inscription mentioning Isis is dated to 25 BC (Merklein and Wenning 1998: 166-169, pl. 7; Healey 2001: 138). The position of this inscription, on either side of the relief (Milik and Starky 1975: 120-123, pl. 44.1), indicates it was carved after the statue. Thus, anthropomorphic cult statues were made by the Nabataeans by that date.

Another rock-carving of a seated Isis in anthropomorphic form occurs at a site near the foot of Jabal Hārūn (جبل هارون), identified by the Isis-knot in her drapery (Parr 1962: 21-23, pl. 11.7). Isis is also represented as an "eye-idol", identified by her crown with the solar disc and horns (Lindner 1988: fig. 5, pl. 10). Thus, both the rectangular stone block and figured form were used by the Nabataeans for the same deity.

In the temple at Wādī Ramm a broken block, 0.32m high, was found which is the lower half of a seated deity (Savignac and Horsfield 1935: 261-263, pl. 9; *DD* pl. 52c). This draped figure was carved from very fine limestone, with a serpent entwined around the lower part, and apparently with a small figure which is damaged standing between the legs. Although found in the temple, it was not in its original position. Savignac and Horsfield (1935: 262) considered it a statue of one of the deities worshipped in the temple, possibly Allāt. Patrich (1990a: 111) considers "there is no doubt the fragment is from the cult statue around which wor-



29. Khirbat at-Tannūr, zodiac-Tyche. Jordan Archaeological Museum and Cincinnati Art Museum.

ship centred", but without clarification of its identity and original location it cannot be certain that it was the sole cult statue. It is carved in the round, unlike the one from Khirbat at-Tannūr, and came from a statue which would have been only slightly smaller.

Thus, the statues of "Zeus-Ḥadad" and his consort at Khirbat at-Tannūr are not the only examples of anthropomorphic cult statues in a major Nabataean sanctuary. There also appear to have been anthropomorphic cult statues in some other Nabataean temples, as suggested by the evidence from Wādī Ramm and Qaṣr al-Bint, although this is not confirmed for them the way it is at Khirbat at-Tannūr by the fact that the statue is nearly complete, and was found not far from where it originally stood.

Figured Busts of Deities

The other representations of gods and goddesses in figured form at Khirbat at-Tannūr take the form of busts used as decoration. As mentioned, there was a series of male and female busts on the main frieze at Khirbat at-Tannūr depicting various deities (**Fig. 19**), such as Helios, Kronos-Saturn, and Zeus-Jupiter (**Fig. 16a-b**). Insufficient of them survive to indicate their exact order, nor the reasons for the choice of them (McKenzie *et al.* 2002). At Khirbat adh-Dharīḥ the busts on the main frieze represent male personifications of the symbols of the zodiac, such as the crab and the twins (al-Muheisen and Villeneuve in press). Thus, these busts do not individually reflect the worship of a specific deity in the temple. Similarly, the bust of Helios from a metope on the frieze of Qaṣr al-Bint at Petra (McKenzie 1990: pl. 67b), is just one of a decorative series, of which others were defaced.

As mentioned, there were twelve busts decorating the Period III altar platform at Khirbat at-Tannūr including the " Grain Goddess'' and the "Fish Goddess" (**Figs. 7a-b, 10**). Glueck considered they represent different aspects of Atargatis. This led him to associate the "Fish Goddess" with the mermaid version of Atargatis, Derketo of Ascalon (*DD* 282-283). Although the creatures in her hair are fish, Glueck also referred to her as the "Dolphin Goddess" (*DD* 315-319).

On the altar platform, the " Grain Goddess" was located on the lower left and the '' Fish Goddess'' on the lower right, as mentioned (**Fig. 10**). Their position, at the bottom of the series on each side, is indicated by the plain band across the bottom of them (**Fig. 7a-b**).

The key to the identity of these two busts is provided by the zodiac-Tyche from Khirbat at-Tannūr (**Fig. 29**). The details on it, such as the eyes on the Nike, indicate it belongs to Period II. We do not know where in the temple it went, except that it was built into a wall. The top block of it was found in the west part of the Inner Temenos Enclosure (Registration book 1 March 1937, no. 6).

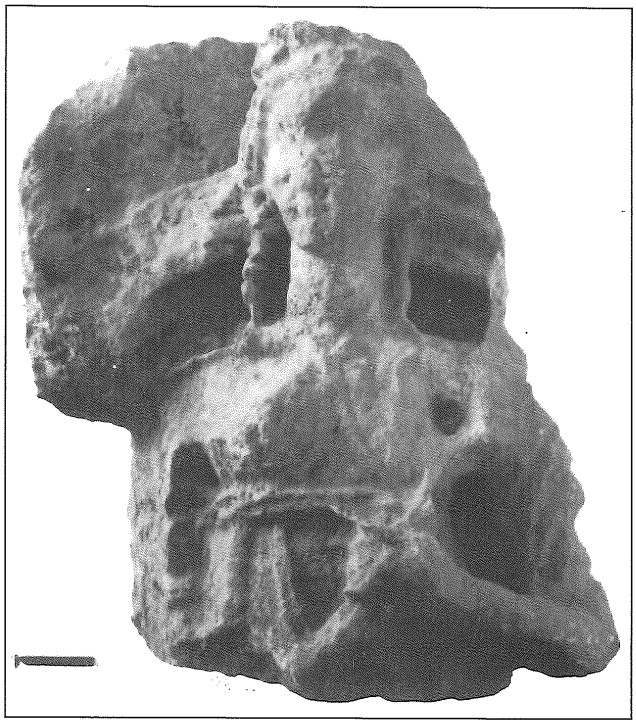
Normally, the symbols on a zodiac run in a single direction, either clockwise or anti-clockwise, although the symbol positioned at the top varies. On the Khirbat at-Tannūr zodiac half the symbols, Aries to Virgo run anti-clockwise from the top, and the other half, Libra to Pisces, run clockwise from the top (**Fig. 29**). Consequently, Virgo is on the lower left and Pisces on the lower right. This is



30a. Khirbat at-Tannūr, relief sculpture of female figure, 1937.

precisely the position of the "Grain Goddess" and the "Fish Goddess" on the altar platform, indicating that these busts are Virgo, and the female personification of Pisces. This is discussed in detail elsewhere, with additional evidence (McKenzie 2001: 108-109). If the "Fish Goddess" is the personification of Pisces, and not Atargatis, then there is no longer any evidence to connect her with Atargatis-Derketo.

In the archive there are photographs of an unpublished female figure carved in relief at Khirbat at-Tannūr (**Fig. 30a**) which is larger than the Nikes belonging to the series (on far left of **Fig. 17c**). Part of her lower skirt and feet are either damaged or unfinished. In her left hand she is holding something, which is possibly a cornucopia. Her head has been defaced, but behind it there is the shadow of a



30b. Khirbat at-Tannūr, top part of female figure.

curved shape with the top of the curve behind her head. This is similar to the arrangement on another female figure of similar size published by Glueck (*DD* pl. 45a) and reproduced here at about the same scale (**Fig. 30b**). Both of these figures are wearing a peplos and have a single curled lock of hair hanging down on either side their neck. Even though we at present do not know their original location on the building, these figures and the zodiac-Tyche suggest that the Nikes on the frieze of the Inner Temenos enclosure were not the only series of decorative figures carved in relief on the temple complex.

To conclude, we have seen the use of the anthropomorphic form for cult statues by the Nabataeans. Figured sculpture was also used for busts of deities in decorative contexts. The use of busts as personifications of the symbols of the zodiac displays a sophisticated understanding of the use of the anthropomorphic form by the Nabataeans. The accurate reconstruction of the temple complex at Khirbat at-Tannūr was necessary before these observations could be made. Future stages of the project involve the publication of other material in the archive, including the pottery and cult offerings, consideration of how the design of temple complex relates to other Nabataean temples, and what these tell us about Nabataean religious practice.

Acknowledgments and Sources of Illustrations

The preliminary axonometric drawings were

prepared by †Sheila Gibson and McKenzie before the visit to Jordan in March 2001 by McKenzie and Reyes. We would like to thank Dr Fawwaz al-Khraysheh, Director General of the Department of Antiquities of the Hashemite Kingdom of Jordan for his assistance. For other logistical help in Jordan we would like to thank Bill Findlayson and Nadja Qaisi of the CBRL-Amman, and our driver Aiman el-Qadi. For permission to publish material from the Nelson Glueck Archive in the Semitic Museum, Harvard, we are grateful to the American Schools of Oriental Research. For assistance with organising this we would like to thank Prof. Joe Seger, President of ASOR, Dr Rudolph Dornemann, Executive Director of ASOR, and Dr Joseph Greene, Dr James Armstrong, and Prof. L.E. Stager at the Semitic Museum.

We would like to thank Jacqueline Dentzer and François Villeneuve for their discussions about, and access to, their results from Khirbat adh-Dharīḥ. We are also grateful to Laurent Tholbecq, who has been working independently on elevations of the altar platform and Inner Temenos Enclosure. We would like to thank Ian Cartwright and Kristin Vagliardo for help with the photographs, Shaher er-Rababah for information about "balatah", and also: Dano DePietro, Carrie Duncan, Galit Goldshmid and Martina Minas.

The field-work was funded by the Palestine Exploration Fund, the Seven Pillars of Wisdom Trust, the Dillon Fund of Groton School, a T.W. Greene Grant and a grant from the Craven Committee of the University of Oxford. The work on the archive is funded by the British Academy and the Craven Fund.

All photographs, except those indicated below, are from the ASOR Nelson Glueck Archive, reproduced by permission of the American Schools of Oriental Research. **Fig. 7a** is reproduced by permission of the Cincinnati Art Museum. The photographs in **Fig. 7b, 16a-b, 18c-d, 20** are by McKenzie. Copyright for the remaining illustrations rests with McKenzie. McKenzie's photographs may be reproduced in academic printed publications (with acknowledgment) without the need to contact the authors. The elevations and plan were drawn by McKenzie, and the axonometric drawings by Sheila Gibson.

J. McKenzie
Institute of Archaeology
36 Beaumont St.
Oxford OX1 2PG, England

A.T. Reyes
Groton School, Box 991
Groton, Mass. 01450, USA

Abbreviations

DD	Glueck, N., 1965. *Deities and Dolphins* (New York).
FAN	Clarence Fisher's architecture notes in GA.
FFN	Clarence Fisher's fieldnotes in GA.
FRN	Clarence Fisher's reconstruction notes in GA.
GA	ASOR Nelson Glueck Archive in the Semitic Museum, Harvard University.
GJ	Nelson Glueck's dig journal (a handwritten copy and two typed copies with annotations) in GA.
GNAN	Nelson Glueck's notes on FAN in GA.
PFN	Carl Pape's fieldnotes in GA.

Bibliography

For a more complete bibliography see McKenzie *et al.* 2002.

Dalman, G.
1908 *Petra und seine Felsheiligtümer*. Leipzig: Hinrichs.

Dentzer-Feydy, J.
1990 Khirbet edh-Dharih: Architectural Decoration of the Temple. *Aram* 2: 229-234.

Freyberger, K.S.
1998 *Die frühkaiserzeitlichen Heiligtümer der Karawanenstationen im hellenisierten Osten*. Mainz: Philipp von Zabern.

Glueck, N.
1937a Explorations in Eastern Palestine III. *BASOR* 65: 15-19.
1937a The Nabataean Temple of Khirbet et-Tannûr. *BASOR* 67: 6-16.
1937c A Newly Discovered Nabataean Temple. *AJA* 41: 361-376.
1938 The Early History of a Nabataean Temple. *BASOR* 69: 7-18.
1945 *The Other Side of the Jordan*. New Haven: American Schools of Oriental Research.
1952 The Zodiac of Khirbet et-Tannûr. *BASOR* 126: 5-10.
1965 *Deities and Dolphins*. New York.
1978 Et-Tannur, Khirbet. Pp. 1152-9 in M. Avi-Yonah and E. Stern (eds.), *Encyclopedia of Archaeological Excavations in the Holy Land*. Vol. 4. Oxford: Oxford University Press.

Hammond, P.C.
1980 Ein nabatäisches Weiherelief aus Petra. *Bonner Jahrbücher des Rheinisches Landesmuseums in Bonn* 180: 137-141.

Healey, J.F.
2001 *Religion of the Nabataeans*. Leiden: Brill.

Hübner, U. and Weber, T.
1997 Götterbüsten und Königsstatuen. Pp. 111-125 in T. Weber and R. Wenning (eds.), *Petra. Antike Felsstadt zwischen arabischer Tradition und*

griechischer Norm. Mainz: Philipp von Zabern.
Lindner, M.
1988 Eine al-'Uzza-Isis-Stele. *ZDPV* 104: 84-91.
McKenzie, J.S.
1988 The Development of Nabataean Sculpture at Petra and Khirbet et-Tannur. *PEQ* 122: 81-107.
1990 *The Architecture of Petra*. Oxford: Oxford University Press.
2001 Keys from Egypt and the East: Observations on Nabataean Culture in the Light of Recent Discoveries. *BASOR* 324: 97-112.
McKenzie, J.S., Gibson, S. and Reyes, A.T.
2002 Reconstruction of the Nabataean Temple Complex at Khirbet et-Tannur. *PEQ* 134 (in press).
Merklein, H. and Wenning, R.
1998 Ein Verehrungplatz der Isis in Petra. Neu untersucht. *ZDPV* 114: 162-178.
Mettinger, T.N.D.
1995 *No Graven Image? Israelite Aniconism in Its Ancient Near Eastern Context*. Stockholm: Almqvist and Wiksell.
Milik, J.T. and Starcky, J.
1975 Inscriptions recemment decouvertes à Pétra. *ADAJ* 20: 111-130.
al-Muheisen, Z. and Villeneuve, F.
1994 Découvertes nouvelles à Khirbet edh-Dharih (Jordanie), 1991-1994: autour du sanctuaire nabatéen et romain. *CRAI*: 735-757.
1999 Sanctuaire nabatéen près de Pétra. *L'Archéologue* 41 (Avril-Mai): 43-46.
in press Nouvelles recherches à Khirbet edh-Dharih 1996-1999.
Nehmé, L. and Villeneuve, F.
1999 *Pétra métropole de l'Arabie antique*. Paris: Seuil.
Parr, P.J.
1962 A Nabataean Sanctuary near Petra. *ADAJ* 6-7: 21-23.
1967-8 Recent Discoveries in the Sanctuary of the Qasr Bint Far'un at Petra. *ADAJ* 12-13: 5-19 (= *Syria* 45, 1968: 1-24).
Patrich, J.
1990a *The Formation of Nabataean Art. Prohibition of a Graven Image Among the Nabataeans*. Jerusalem: Magnes.
1990b Prohibition of a Graven Image among the Nabataeans: the Evidence and its Significance. *Aram* 2: 185-196.
Roche, M.-J.
1997 Tannur, Khirbet et-. Pp. 153-155 in E.M. Meyers (ed.), *The Oxford Encyclopedia of Archaeology in the Near East*. Vol. 5. Oxford: Oxford University Press.
Savignac, M.-R. and Horsfield, G.
1935 Le Temple de Ramm. *RB* 44: 245-278.
Schmid, S.G.
2000 *Die Feinkeramik der Nabatäer, Petra ez Zantur* II.1. Mainz: Philipp von Zabern.
Starcky, J.
1968 Le temple nabatéen de Khirbet Tannur: à propos d'un livre récent. *RB* 75: 206-235.
Wenning,
2001 The Betyls of Petra. *BASOR* 324: 79-95.
Will, E. and Larché, F.
1991 *'Iraq al Amir. Le château de Tobiade Hyrcan*. Paris: Geutner.
Zayadine, F. (ed.)
1990 *Petra and the Caravan Cities*. Amman: Department of Antiquities.

THE ṬAFĪLA-BUṢAYRA ARCHAEOLOGICAL SURVEY: PHASE 3 (2001)

Burton MacDonald and Wayne Sawtell

Introduction

The third season of the Ṭafīla-Buṣayra Archaeological Survey (TBAS) (**Fig. 1**) took place over a six-week period from late April to mid-June 2001.[1]

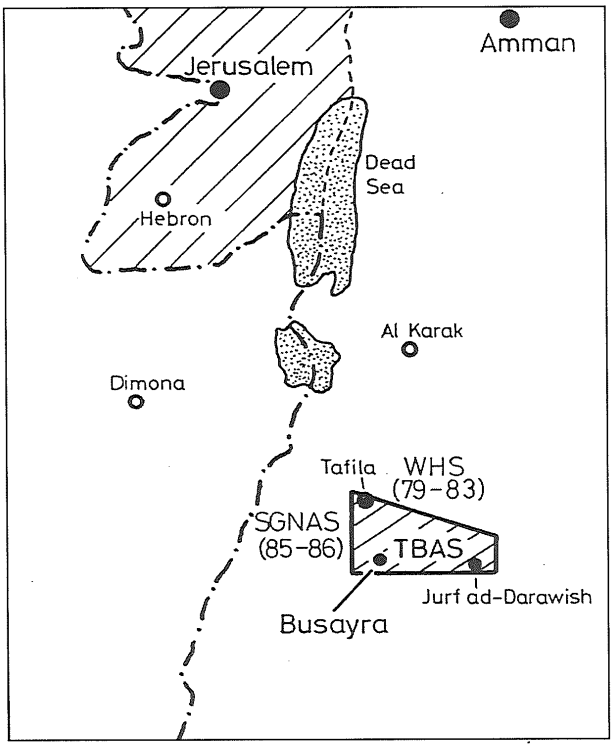
The 2001 Season

The principle goal of the 2001 season was to draw as many of the architectural sites that TBAS team members had surveyed during the 1999 (**Table 1**) and 2000 (**Table 2**) seasons as possible.

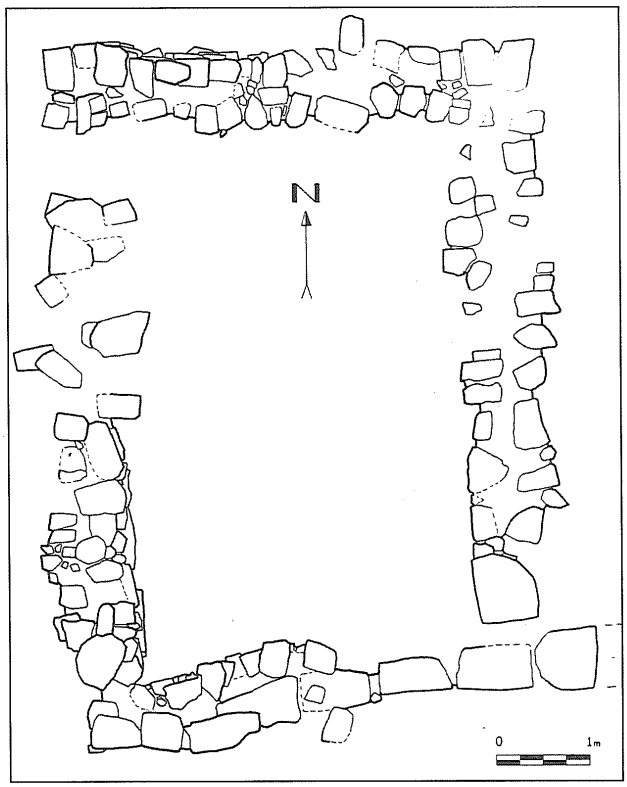
The intention was to draw various types of sites or actually structures at sites, e.g., domestic quarters, watchtowers, forts, in the various zones of the survey territory. TBAS team members realized that it would not be possible to draw an entire village site in the allotted time-period and they thus had to be content with drawing only one, but in some cases two, structure(s) at such a site. At many sites, however, although there were many architectural features, it was not possible to do a convincing drawing of even one structure because of its condition.

No attempt was made to draw any of the architectural remains at Sala' (سلع), Site 134, since Hamed K. Qatamin, Mu'tah University, was excavating the site at the time of the 2001 infield season. In addition, Bennett had excavated the Buṣayra Citadel (قلعة بصيره), Site 135, and Bienkowski (2002) has prepared a final report on these excavations. Thus, a drawing of a structure from this site would have been superfluous.

As a result of the season's work, TBAS team members completed 42 drawings at 36 sites (**Table**



1. The TBAS territory.



2. Site 1, Khirbat al-Ḥārith.

1. Reports on the 1999 and 2000 seasons of the TBAS can be found in MacDonald *et al.* 2000 and MacDonald *et al.* 2001 respectively.

Team members for the 2001 season were Burton MacDonald, director; Wayne Sawtell, architect; Zeyad Salamin, architect's assistant; Jihad Darwish, Representative of the Department of Antiquities; and Aladdin Madi, cook.

Table 1: Major architectural sites of the TBAS 1999 season.

Site #	Site Name		Coordinates (E/N)	Elev.	Periods Represented
001	Kh. al-Ḥārith	خربة الحارث	751554/3403996	1262	LRom-Byz; Byz; MIsl/LIsl
002	Kh. Qaṣr ad-Dayr	خربة قصر الدير	747700/3410100	1361	Iron II; Byz/EIsl; MIsl-LIsl
004	Kh. al-Fraydīs	خربة الفريديس	750424/3406468	1250	Ceramic period lithics; ERom; LRom; Byz
005	Kh. ʻAyn al-Bayḍā	خربة عين البيضا	749196/3407318	1220	Byz; MIsl/LIsl
006	Kh. al-Ḥanānah	خربة الحنانه	748050/3409692	1210	Iron II; Byz; LIsl
009	Kh. ʻAlāqah	خربة علاقه	751181/3409532	1300	Iron II; LRom; Byz; EIsl; LIsl
010	Kh. al-Janīn	خربة الجنين	751300/3404082	1155	Iron Age, poss; LRom-Byz; MIsl; LIsl; MIsl/LIsI; Classical
012	Unknown		751393/3403438	1260	Ceramic period lithics; Iron II; Byz; Byz-EIsl; LIsl, prob
013	Kh. ʻArafah	خربة عرفه	746700/3414000	1060	Ceramic period lithics; Iron II, dom; LRom-Byz; EIsl; Mod
015	Kh. ad-Dayr	خربة الدير	746400/3416400	760	Ceramic period lithics; EB (?) bod; Iron II (?); Iron Age, prob; Nab bod; Byz/EIsl, dom; EIsl; Ud, poss Ott (LIsl)
019	Kh. al-Qurr	خربة القرّ	744496/3413824	1022	Ceramic period lithics; Iron II; Rom; Rom-Byz; LIsl
024	Kh. Qarqūr	خربة قرقور	747537/3404792	771	Ceramic period lithics; Iron II; ERom (Nab); Byz; LIsl
026	Qaṣr Qarqūr	قصر قرقور	747926/3404187	820	Ceramic period lithics; Byz; MIsl; LIsl
027	Ad-Dabbah	خربة الدبّه	747237/3404543	708	Iron II; Rom; MIsl; LIsl
032	Al-Maʻṭan	المعطن	748450/3406800	1140	LIsl
036	Ramsīs I	رمسيس	746512/3406221	891	Iron II; Rom; Byz; Byz/EIsl; LIsl, poss
037	Ramsīs II	رمسيس	746297/3408841	878	Iron I, poss; Iron II; Rom-Byz
043	Kh. al-Brayj	خربة البريج	748372/3402478	986	Iron II; Nab
044	Kh. al-Mabrak	خربة المبرك	747688/3402760	1141	Ceramic period lithics; Chal (?); Iron Age; Rom; Byz
047	Unknown		747356/3403571	1036	Cramic period lithics; Iron II; Byz
048	ʻAyn Qrayān	عين قريان	748099/3401567	116	Byz
049	Kh. al-Faṭāṭ	خربة الفطاط	748528/3401279	1200	Iron II; ERom; LRom; Byz; LIsl
050	Kh. Umm Zaʻrūrah	خربة ام زعروره	749995/3401406	1245	Iron II; ERom; Byz; LIsl
051	Kh. az-Zanātiyah	خربة الزناتيه	750322/3401426	1199	Iron Age; Byz; MIsl/LIsl
059	Unknown		743170/3405944	820	Ceramic period lithics; Iron Age, poss; Byz
061	Rujm al-Musayknah	رجم المسيكنه	743800/3405264	953	Ceramic period lithics; Iron II; ERom (Nab)
062	Qaṣr Karayim bin ʻAlī	قصر كريّم بن علي	745330/3403314	1050	Iron II; Byz, prob; Ud, MIsl-LIsl painted ware
065	Unknown		741194/3407803	653	MPL; Byz; LIsl
071	Kh. al-Kūlā	خربة الكولا	746932/3403163	1258	Ceramic period lithics; Hell-ERom; Byz; MIsl/LIsl, dom
072	Kh. al-Qaʻīr	خربة القعير	746247/3401661	1110	Ceramic period lithics; Late Iron I; Iron II; Byz; Ud
081-83	Kh. al-ʻ Īṣ	خربة العيص	752542/3414080	1289	Ceramic period lithics; Hell-Rom (Nab); LRom; Byz; LIsl; Mod
086	Kh. Talʻat Ḥusayn	خربة تلعة حسين	755201/3413123	1278	Ceramic period lithics; Rom; Byz, dom; LIsl

Table 1: cont.

Site #	Site Name		Coordinates (E/N)	Elev.	Periods Represented
087	Kh. Ḥid	خربة حد	750614/3415205	970	Ceramic period lithics; Iron Age; Rom; Byz; EIsl, prob; LIsI
116	Kh. Ḥasan al-Ḥusayn	خربة حسن الحسين	751173/3412378	1199	Early Iron I (all close to LB, if not LB); Iron II; Hell, prob (could be LB); Rom/Byz; Ud
117	Kh. Zūbrah	خربة زوبره	750942/3408578	1337	Iron II; Iron Age; Byz; EIsl
126	Kh. Naqad	خربة نقد	753698/3407925	1344	Early Iron II; Byz/EIsl
130	Kh. Umm ash-Sha'īr// Kh. aṣ-Ṣlaybiyāt	خربة ام الشعير// خربة الصليبيات	744104/3418173	720	Iron II; Byz; LIsl, prob
132	Tall Buṣayra	تل بصيره	749628/3403378	1110	Early Iron II; Iron II; Rom; Nab; Rom, prob; Byz; EIsl; LIsl; Mod
134	Sala' (Sela)	سلع	746614/3408269	856	Iron II; Iron Age; Rom (Nab)
135	Buṣayra Citadel	قلعة بصيره	749600/3404000	1140	EB, prob; Iron II; Iron Age Ud; Rom-Byz
137	Kh. Umm al-Malāfīs	ام الملافيس	754110/3406702	1142	Iron II; Rom (Nab); Byz; Ud
138	Kh. ad-Dahbā'	خربةالدهباء	747986/3415200	807	Byz; LIsl
140	Qaṣr al-Bint	قصر البنت	774914/3397959	1037	MPL, Iron II; ERom; LRom
141	Jurf ad-Darāwīsh Castellum	جرف الدراويش	774544/3398590	952	Ceramic period lithics; Ud lithics; Hell-Rom (no Nab)
142	Kh. Ḥarīr	خربة حرير	755812/3408009	1278	Ceramic period lithics; Ud lithics; Chal-EB (?); EB; Iron I; Iron II; Iron Age; ERom (Nab); Rom; Byz; MIsl/LIsl
142	Kh. Ḥarīr	خربة حرير	755800/3408170	1289	Chal-EB; EB; Iron I; Iron II; Iron Age; ERom; Rom; Byz; MIsl/LIsl
143	Kh. Umm al-Ḥarmal	ام الحرمل	756204/3407669	1317	Iron Age; Rom; Byz; MIsl/LIs
147	Kh. al-Masalla	خربة المسلّة	755907/3406831	1337	Iron Age, poss; Byz
151	Qal'at aṭ-Ṭafīla	قلعة الطفيله	748918/3414717	1067	Iron II; Iron Age; Rom; Byz, dom; EIsl; LIsl; Ud

3). As **Table 4** indicates, two drawings were done at six sites. In addition, team members did measurements at one site, namely, Jurf ad-Darāwīsh Castellum (قصر جرف الدراويش), Site 141, at which it was not possible to do a drawing because of erosion and silting.

The intention is to publish as many of these drawings as possible in the final report on the TBAS. Samples of these drawings are given here: Site 1, Khirbat al-Ḥārith (خربة الحارث) (**Fig. 2**); Site 5, 'Ayn al-Bayḍā (عين البيضا) (**Fig. 3**); Site 172 (**Figs. 4, 5**); and Site 192, Khirbat at-Tuwānah (خربة التوانه) (**Figs. 6, 7**).

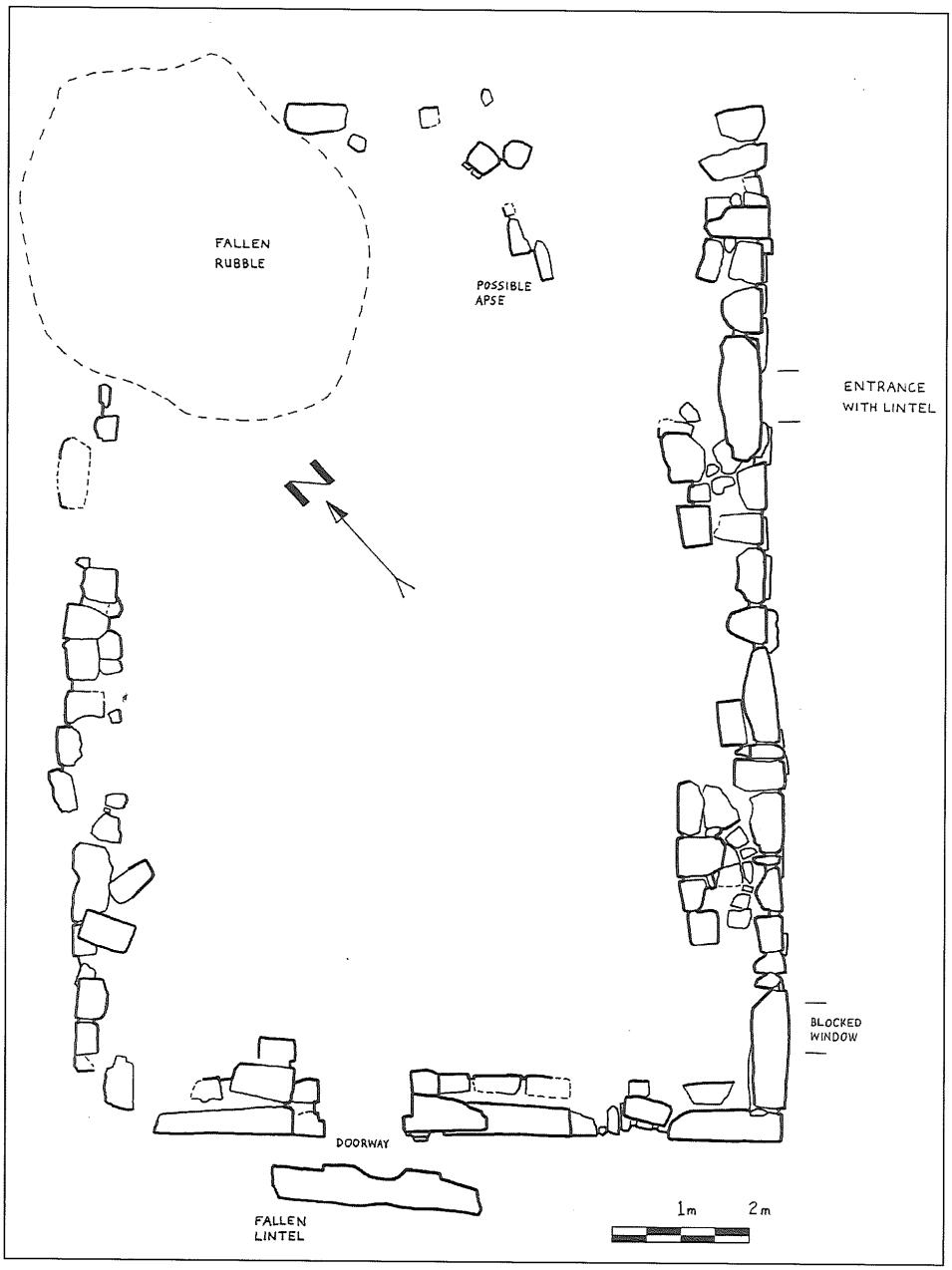
Acknowledgments

TBAS team members wish to thank Dr. Fawwaz al-Khraysheh, Director-General, Department of Antiquities, for granting permission to carry out this third infield season of the project. Gratitude is also expressed to staff members of the Department of Antiquities and especially to Jihad Darwish of the department's aṭ-Ṭafīla office.

The Social Sciences and Humanities Research Council of Canada, the Joukowsky Family Foundation, and the University Council for Research of St. Francis Xavier University provided funding for both the infield work and subsequent analyses.

Once again Dr. Pierre Bikai, director, and the staff of the American Center of Oriental Research in Amman provided assistance to and a home base for TBAS team members.

B. MacDonald
Department of Religious Studies
P. O. Box 5000
St. Francis Xavier University
Antigonish, Nova Scotia B2G 2W5
Canada
E-mail: bmacdona@stfx.ca
Websites:
http://www.stfx.ca/people/bmacdona/tbasweb/welcome.htm
http://www.stfx.ca/people/bmacdona/welcome.html



3. Site 5, 'Ayn al-Baydā.

W. Sawtell
30 Cherrywood Dr.
Nepean, Ontario K2H 6G7
Canada

References

Bienkowski, P.
2002 *Busayra: Excavations by Crystal-M. Bennett 1971-1980.* British Academy Monographs in Archaeology. Oxford: Oxford University Press.

MacDonald, B. *et al.*
2000 The Tafila-Busayra Archaeological Survey: Phase 1 (1999). *ADAJ* 44: 507-522.
2001 The Tafila-Busayra Archaeological Survey: Phase 2 (2000). *ADAJ* 45: 395-411.

Table 2: Major architectural sites of the 2000 season.

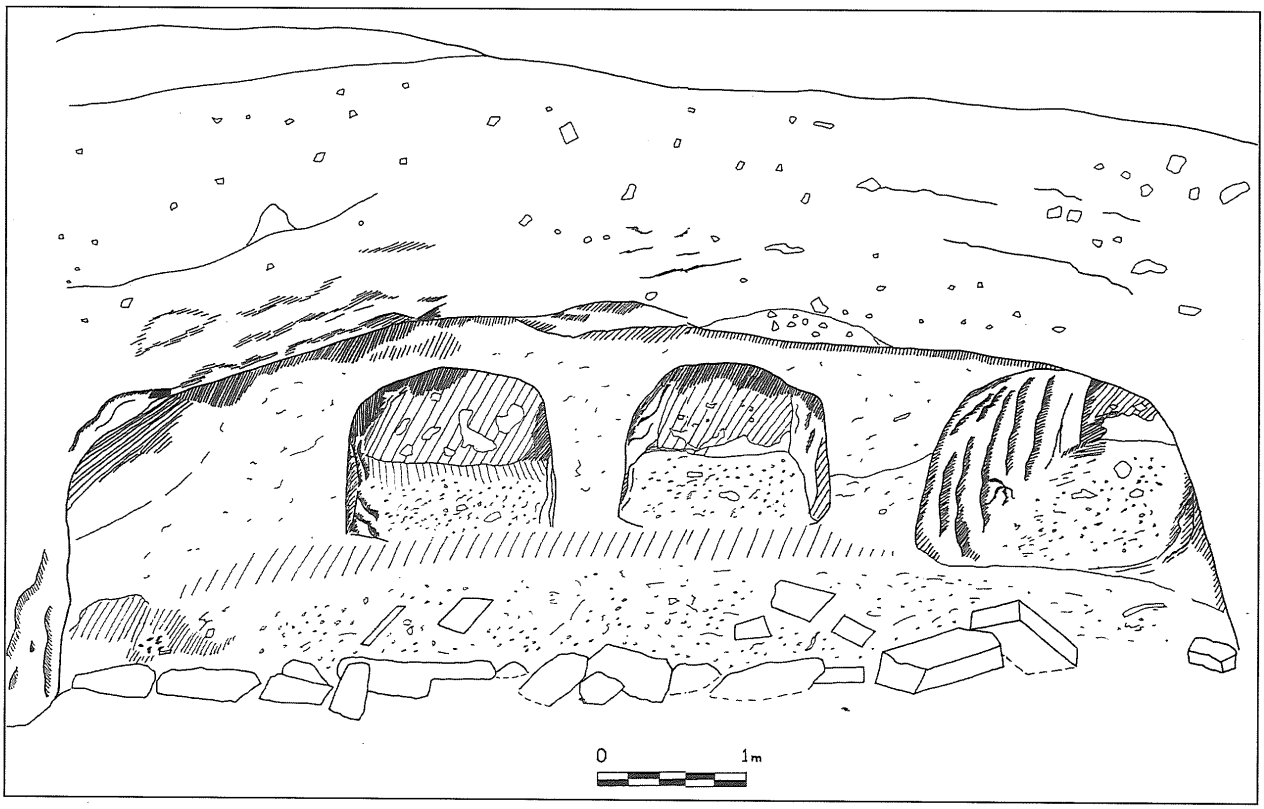
Site #	Site Name		Coordinates (E/N)	Elev.	Periods Represented
157	Kh. Umm Sarāb	خربة ام سراب	752528/3403485	1280	Iron II; Byz; EIsl; MIsl/LIsl
159	Kh. Ibn Hadāyah	خربة إبن هداية	754787/3402326	1482	Late NL/Chal/EB lithics; EB; Byz
160	Kh. ash-Sharī'ah	خربة الشريعة	755615/3403870	1848	IronII; ERom (Nab); LRom; Byz; LIsl
164	Kh. aṭ-Ṭawlāniyah	خربة الطولانية	764331/3405499	1444	Ceramic period lithics (?); ERom (Nab) Rom; Byz; LIsl, prob
166	Kh. al-Frayj	خربة الفريج	754747/3410120	1358	ERom (Nab); Byz; MIsl/LIsl
167	Kh. al-'Adāwīn	خربة العداوين	757118/3415538	1167	Iron II; ERom (Nab); LRom; Byz; EIsl; MIsl/LIsl
168	Kh. an-Naṣrāniyah	خربة النصرانيه	756822/3413400	1203	Ceramic period lithics; Iron II; Rom, poss; Byz, dom
169	Kh. aṣ-Ṣīr	خربة الصير	757684/3413552	1185	Iron II; Byz; MIsl and/or LIsl
170	Kh.'Ābūr	خربة عابور	759705/3410519	1276	Iron Age I/II; ERom; Byz; MIsl/LIsl
173	Kh. al-Frayj	خربة الفريج	755567/3410820	1337	Ceramic period lithics; Iron II, poss; Byz
176	Rujm ath-Thalīthuwāt	رجم الثليثوات	757951/3408115	1377	Ceramic period lithics; Iron II, prob; Byz; LIsl
177	Kh. Mughāmis	خربة مغامس	756562/3408277	1385	Ceramic period lithics; Iron II, dom; MIs1/LIsl
178	Unknown		763033/3411991	1168	Ceram ic period lithics; ERom (Nab); Byz
180	*Via Nova Traiana*	طريق تراجان	Roman Road		Roman
182	Unknown		762786/3411672	1155	Ceramic period lithics; ERom (Nab); Byz
183	Qaṣr al-Bāshā	قصر الباشا	762649/3410510	1192	Ceramic period lithics; ERom (Nab); Byz; MIsl/LIsl
186	Khaṭṭ Shabīb	خط شبيب	764354/3411384 (within RS 26, Zone 2)	1178	Neither lithics nor ceramics collected
190	Kh. al-Khunayṣrah	خربة الخنيصره	760103/3403436	1325	Ceramic period lithics; ERom; LRom; Byz, dom; MIsl
192	Kh. at-Tuwānah	خربة التوانة	760865/3405214	1243	Ceramic period lithics (?); Iron II, prob; ERom (Nab); Byz; EIsl; MIsl/LIsl
196	Unknown		759150/3405850	1280	Neither lithics nor sherds found
248	Unknown		777124/3404612	930	Iron II; Rom-Byz
251	Rujm al-Ḥāj	رجم الحاج	776609/3404869	933	Ceramic period lithics; Byz
259	Rujm al-Qirān	رجم القران	766908/3401378	1363	Ceramic period lithics; Iron II; ERom (Nab); L;Rom; Byz
260	Rujm al-Ḥamra	رجم الحمرة	767686/3408782	1155	Iron Age; Rom; Byz, dom
268	Unknown		777275/3405906	900	Byz; MIsl-LIsl
272	Rujm Umm al-'Aẓām	رجم ام العظام	764673/3416771	1167	Ceramic period lithics; Iron II; Rom; Byz
273	Kh. ad-Dabbah	خربة الدّبة	759819/3400256	1480	Ceramic period lithics; Late Iron II, Poss; ERom; LRom; Byz; MIsl

Table 3: Structures drawn during the 2001 season.

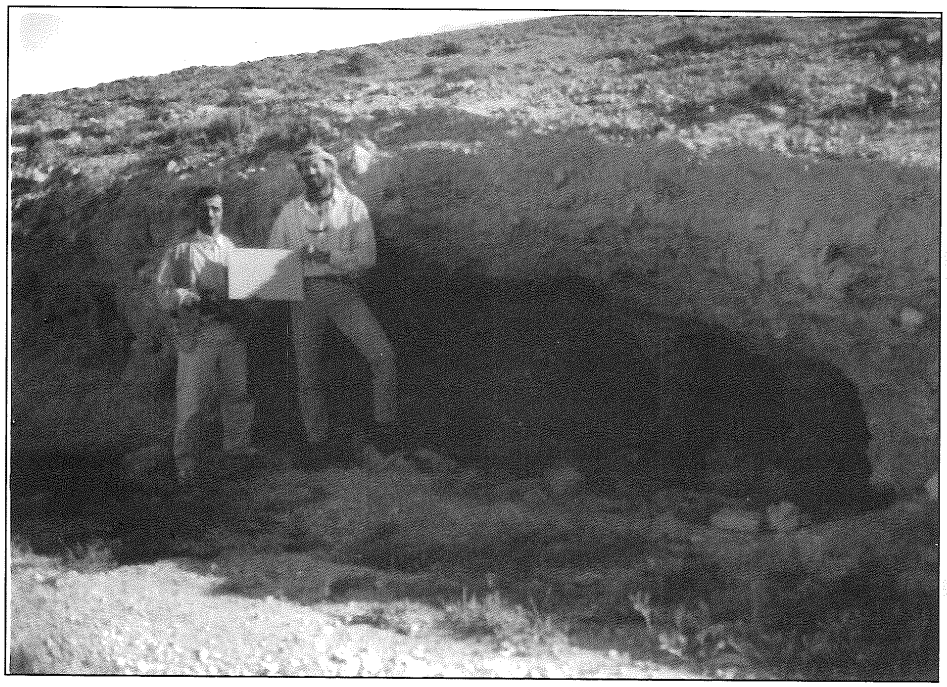
Site#	Site Name		Structure Drawn
051	Kh. az-Zanātayah	خربة الزناتية	Rectilinear structure at village site
050	Kh. Umm Za'rūrah	خربة ام زعروره	Rectilinear structure/watchtower (?) at village site
062	Qaṣr Karayim bin'Alī	قصر كريم بن علي	Rectilinear structure
071	Kh. al-Kūlā	خربة الكولا	Structure built of large stones at village site
049	Kh. al-Faṭāṭ	خربة الفطاط	Rectilinear structures at village site
026	Qaṣr Qarqūr	قصر قرقور	Fort (?)
001	Kh. al-Ḥārith	خربة الحارث	Rectilinear structure at village site
005	Kh. 'Ayn al-Bayḍā	خربة عين البيضا	Rectilinear structure (church ?)
006	Kh. al-Ḥanānah	خربة الحنانه	Small, rectilinear structure
004	Kh. al-Fraydīs	خربة الفريديس	Large, rectilinear structure at village site
157	Kh. Umm Sarāb	خربة ام سراب	Rectilinear structure (church ?)
036	Ramsīs I	رمسيس	Fort (?)
126	Kh. Naqad	خربة نقد	Watchtower (?) at village site
142	Kh. Ḥarīr	خربة حرير	Dwelling (?) and rock-cut tombs at village site
172	Unknown		Rock-cut tombs - robbed
147	Kh. al-Masalla	خربة المسلّه	Watchtower (?) and cistern at village site
164	Kh. aṭ-Ṭawlāniyah	خربة الطولانية	Fort/Watchtower
177	Kh. Mughāmis	خربة مغامس	Fortress
268	Unknown		Watchtower/Tomb
251	Rujm al-Ḥāj	رجم الحاج	Watchtower/Tomb
117	Kh. Zūbrah	خربة زوبره	Watchtower (?) at village site
009	Kh. 'Alāqah	خربة علاقه	Large, rectilinear structure at village site
130	Kh. Umm ash-Sha'īr/ Kh. aṣ-Ṣlaybiyāt	خربة ام شعير/ خربة الصليبيات	Watchtower and/or agricultural facility
192	Kh. at-Tūwānah	خربة التوانه	Caravanserai (?) and dwelling at town site
182	Unknown		Watchtower (?)/Robbed Tomb
183	Qaṣr al-Bāshā	قصر الباشا	Complex of rectilinear structures at caravanserai
170	'Ābūr	خربة عابور	Large, rectilinear structure at village site
190	Kh. al-Khunayṣrah	خربة الخنيصرة	Agricultural facility at fort (?)
211	Unknown		Circular enclosure
239	Unknown		Water catchment facilities
233	Unknown		Circular enclosure
232	Unknown		Circular enclosure
282	Unknown		Circular enclosure
260	Rujm al-Ḥamra	رجم الحمرة	Watchtower
169	Kh. aṣ-Ṣīr	خربة الصير	Large, rectilinear structure at village site
012	Unknown		Rectilinear Structure (church ?)

Table 4: Sites at which two drawings were done.

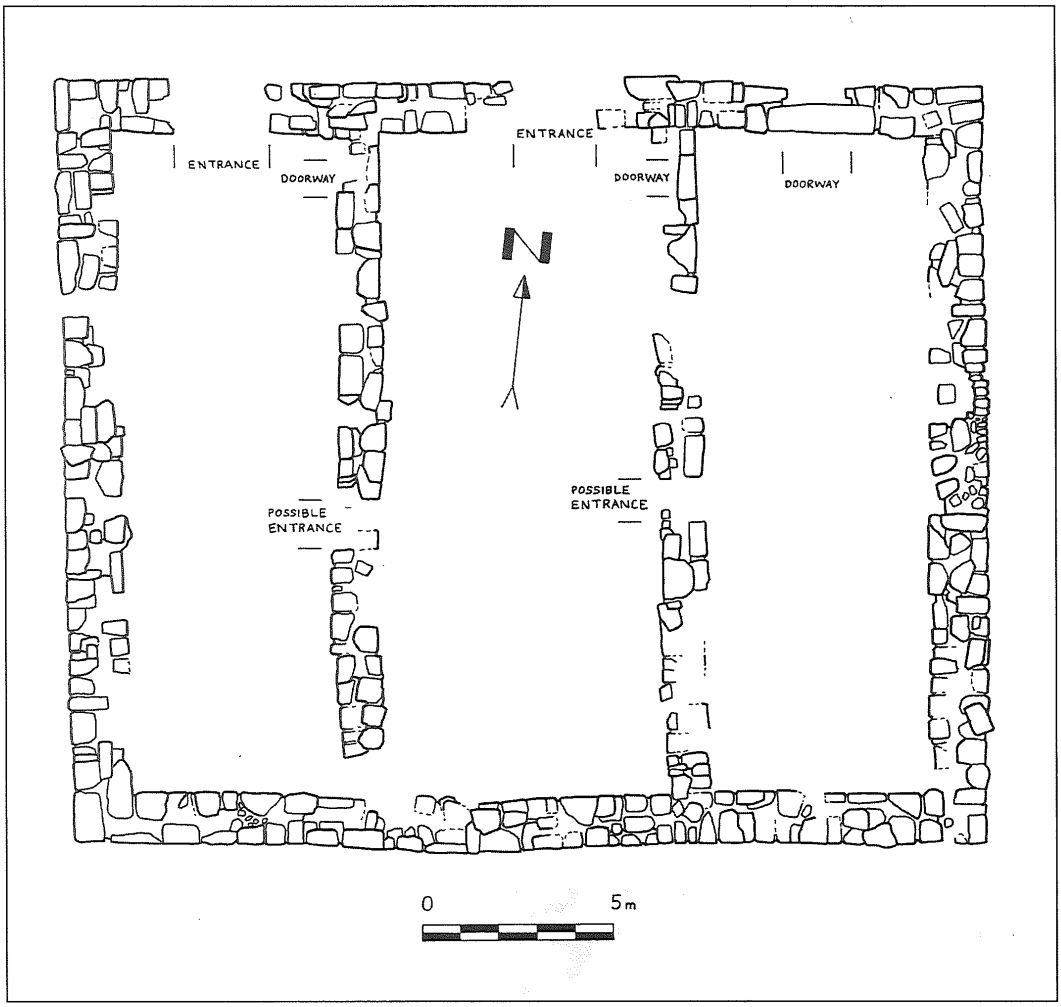
Site #	Site Name		Structure(s) drawn
005	Kh.'Ayn al-Bayḍā	خربة عين البيضا	Possible church and lintel over west end of structure
049	Kh. al-Faṭāṭ	خربة الفطاط	One major structure and one associated with a cistern/cave
142	Kh. Ḥarīr	خربة الحرير	One residential structure and one series of rock-cut tombs
147	Kh. al-Masalla	خربة المسلة	One watchtower and one cistern
192	Kh. at-Tūwānah	خربة التوانه	One possible caravanserai and one residential building
239	Unknown		Two water-catchment facilities



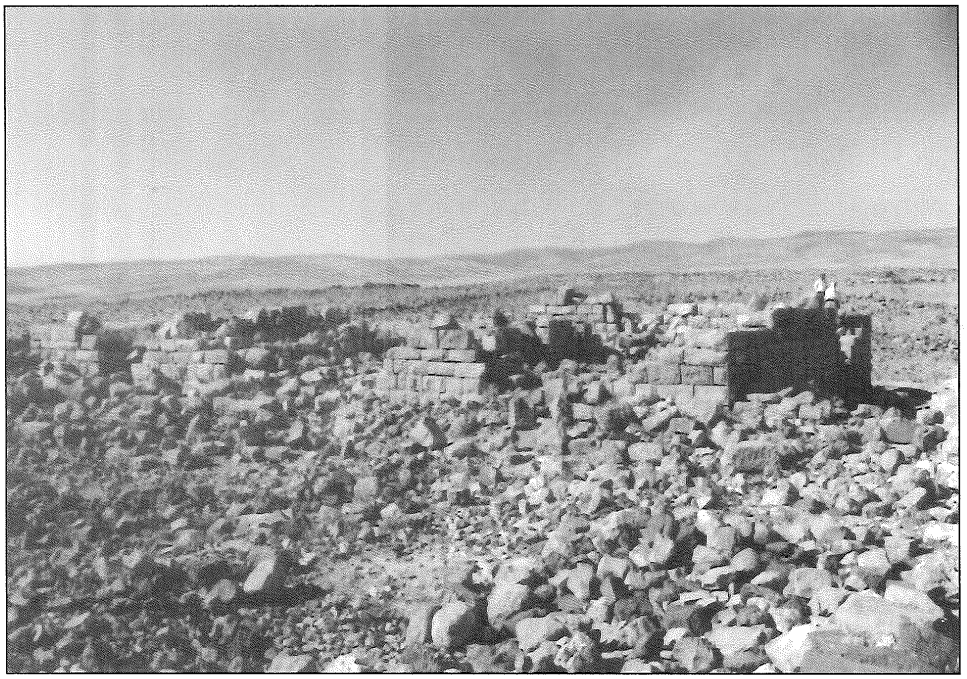
4. Rock-cut tombs.



5. Site 172, robbed, rock-cut tombs.



6. Site 192, Khirbat at-Tuwānah.



7. Site 192, Khirbat at-Tuwānah; east side, looking southeast.

A BRIEF GROUND SURVEY OF RUWĀTH (ROBATHA), SOUTH JORDAN, 28 OCTOBER – 16 NOVEMBER 2000

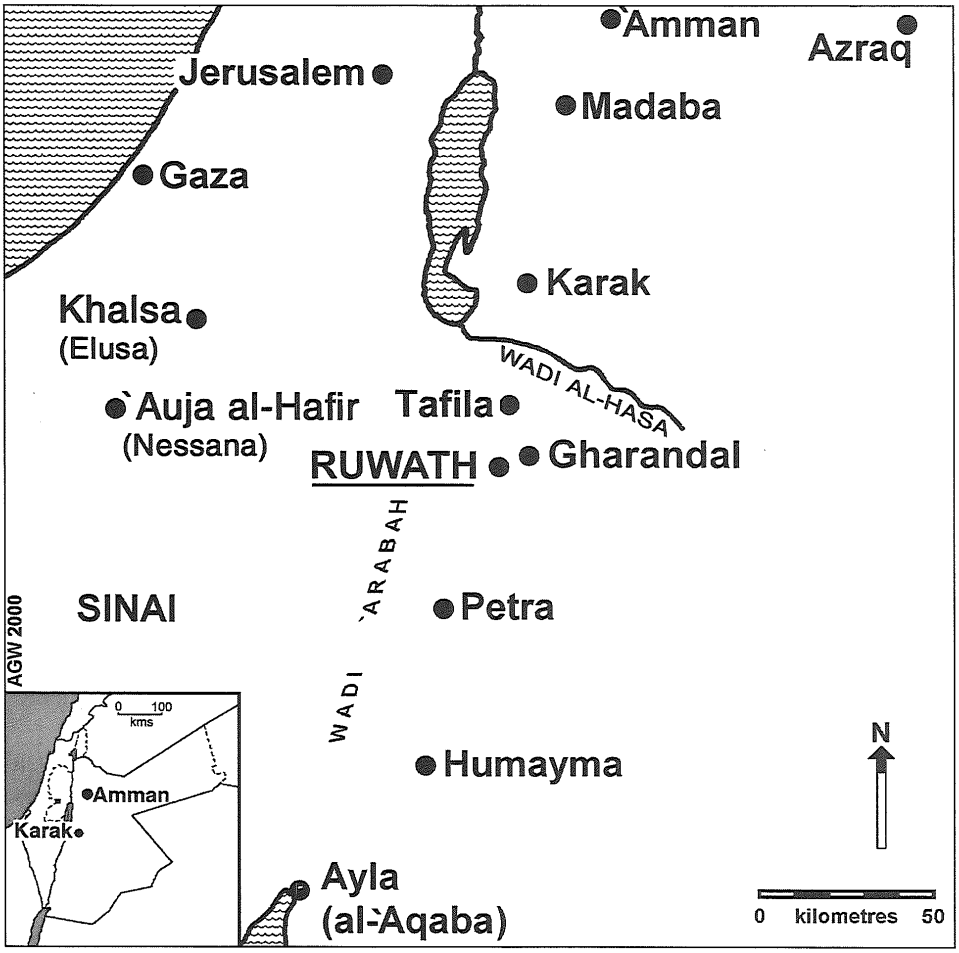
Alan Walmsley and Hugh Barnes

In memoriam Jum'a Kareem

Background

In 1998, as part of the second season of archaeological investigations at Gharandal (غرندل) (Byzantine Arindela) in the aṭ-Ṭafīla District (الطفيلة), an attempt was made to survey and record the extensive surface remains belonging to the site of Ruwāth (رواث). These critically important ruins, almost certainly those of Roman Robatha, are positioned some 1.75km to the west of Gharandal and immediately east of the "Kings Highway" (**Fig. 1**). The site is privately owned, and the surveyor, Mr. Hugh Barnes, was regrettably prevented from doing any further recording by the landowners after only two days of preliminary reconnaissance during the 1998 season (Walmsley *et al.* 1999: 475). In 2000, an attempt was made to return to the site in order to undertake a thorough ground survey of visible remains.

The historical significance of Ruwāth cannot in any way be doubted. The settlement and its inhabitants were active participants in the far-reaching political and social changes that swept over south Jordan during two millennia, beginning with the Edomite and Nabataean periods and continuing into the later Mamluk sultanate. An indication of this role is contained in the few literary sources that deal with this region. In the earliest relevant written works, Ruwāth appears under its Late Roman name of Robatha. According to the *Notitia Dignitatum* (ed. Seeck 1962 [1879]: Or. 37.27) of



1. Location of Ruwāth and Gharandal, aṭ-Ṭafīla District, Jordan.

around AD 400, Robatha functioned as the base for the *Equites Sagittarii Indigenae Robathae*, a small force of native mounted archers particularly suited to the rugged terrain of south Jordan because of their great mobility. Thereafter, no mention is made of Ruwāth in Byzantine or early Islamic sources, for during this time nearby Arindela (Gharandal) served as the administrative capital of the al-Jibāl district (الجبال) — a result, surely, of ethno-political considerations. In the tenth century AD (fourth H.), however, Ruwāth abruptly reappears in the historical works in place of Gharandal. The Arab geographers al-Iṣṭakhrī and Ibn Ḥawqal describe Ruwāth and its district of al-Jibāl as fertile yet inhabited by the *'Arab* (by which is meant Bedouin groups) who had, they noted, gained (political) mastery over the district (Iṣṭakhrī, ed. De Goeje 1927: 58.7–10; Ibn Ḥawqal, ed. Kramers 1938: 173.12–14). It would seem, then, that by the tenth century Ruwāth had successfully displaced Gharandal as the main centre of al-Jibāl after centuries of circumvention; certainly the site is prominently depicted in the map of the region that accompanies Ibn Ḥawqal's text. Apparently, the sources are observing a significant transfer of political power in al-Jibāl. It would appear as though the traditional urban elites, based in the primary towns of Late Antiquity, had retained their position in the Early Islamic period until a generation or two after the fall of the Umayyad caliphate. Thereafter, in the ninth and especially tenth centuries, they were supplanted by new tribal leaders whose power base lay in other, but equally long established, settlements. For a parallel to this process in al-Jibāl we can compare the major shift in power from Areopolis (Ma'āb, ar-Rabbah ربة، مآب) to al-Karak (الكرك) at about the same time (discussed in Walmsley 2001: 554–555).

Cognisant of Ruwāth's considerable historical importance and the extensive remains noted in the preliminary, but abruptly terminated, work of 1998, it was decided to make a second attempt at a detailed ground survey and photographic record of the site during the year 2000 survey season. With the dedicated and determined assistance of Mr. Jihad Darwish, then Inspector of the aṭ-Ṭafīla District, access to the site was approved after an initial few days of uncertainty, and I am extremely grateful to Mr. Jihad Darwish for pursuing this issue to its most satisfactory conclusion.

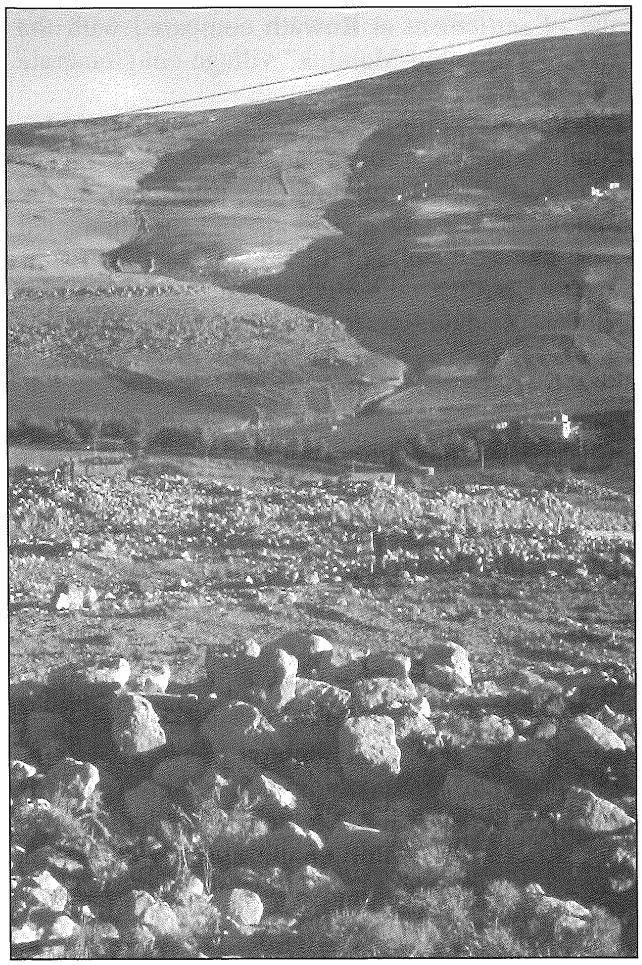
The Season and the Team

The Survey Season at Ruwāth lasted from 28 October to 16 November 2000 (DoA Excavation Permit No. 55 for 2000). Although a relatively short three-week season, the weather was very pleasant and conducive to work in the field, and the team showed absolute dedication in reaching the season objectives of recording in the greatest detail possible the standing remains of Ruwāth. The team consisted of: Alan Walmsley (ARC Research Fellow and Project Director, University of Western Australia), Jihad Darwish (Representative, Department of Antiquities), Hugh Barnes (Surveyor, Berlin), Norman Ricklefs (Surveyor's Assistant, Macquarie University Sydney), Charlotte Schriwer (Field Assistant, CBRL 'Ammān), Tony Grey (Ceramicist, Museum of London), Judith Sellers (Illustrator, Canberra). In addition to the intensive survey work at Ruwāth, two of the team members (Grey and Sellers) concentrated on processing by cataloguing and drawing the many boxes of backlog pottery from the 1998 season of excavations at Gharandal. Emphasis was placed on the predominantly middle Islamic ceramics recovered in square B/11 during the course of excavations by Phillip Karsgaard.

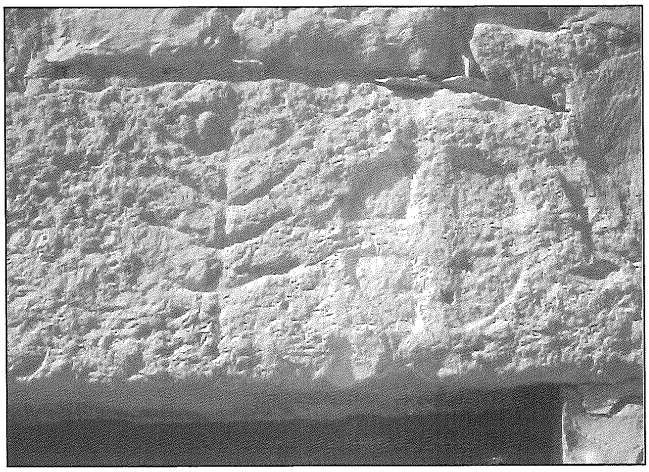
The Survey of Ruwāth

Ruwāth is situated along a prominent spur on the south side of the Sayl Rī'ah (سيل ريعة), the major down-cutting valley between Gharandal and Buṣayra (بصيرة) (Biblical Bozra) to the west (**Fig. 2**). Progressively deep secondary valleys delineate the west and the east sides of the spur. A small perennial spring is located at the higher northern end of the site, where the spur flattens out to a gently sloping plateau before gradually rising further towards ar-Rashādiya (الرشادية). The Wādī Ruwāth, to the west, is the natural drainage channel for the Ruwāth spring although early on, perhaps in the Roman period but certainly by Byzantine–Islamic times, the water was diverted by way of a channel to the wadi to the east. This broad wadi, having a more gradual gradient, would have been less denuded of soil and, with terracing, allowed a considerably larger area to be cultivated. A channel leading to terraced fields clearly appears in the aerial photograph of 1953 (courtesy of David Kennedy, University of Western Australia), at which time no permanent settlement existed at Ruwāth. Today the spring water is still conducted northwards via the channel (by way of modern black plastic piping) to the terraced fields east of the ancient site.

Modern settlement is represented initially by a stone-built compound of six rooms on three sides of a courtyard. The stone lintel of the doorway into the northwest room is reused, and carries its original decoration of a Maltese cross and palm leaf (**Fig. 3**). Well-built stone arches support flat roofs



2. General view over Ruwāth, looking northwards.



3. Lintel with Christian symbols reused in a recent stone-built house at Ruwāth.

of wood, reed and mud. This solidly built domestic unit cannot be very old for no housing is visible at Ruwāth in the aerial photograph of 1953. Like at Gharandal the stone house at Ruwāth represents the last of traditional stone construction before the widespread adoption of reinforced cement and breezeblocks.

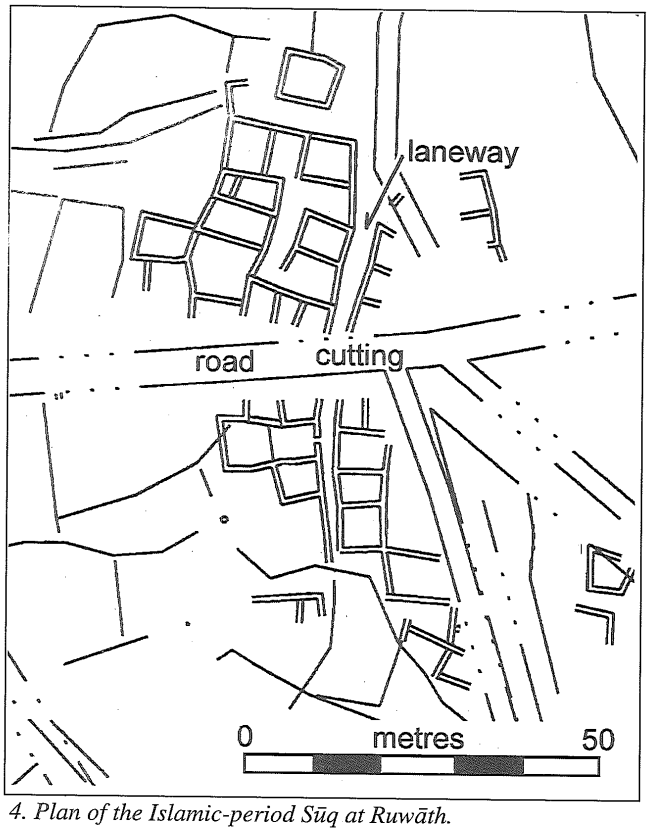
In recent years the stone built house has been abandoned in favour of more modern ones constructed from cement and breezeblock. This growing settlement has encroached seriously on the highest point of the site, including over a major structure identified by well-dressed masonry and thick walls, and continues to do so. In the months before the 2000 survey season, a school had been built next to the new houses, and a large area levelled for this purpose. Additionally a swath (ostensibly a road) was cut through the upper half of the site by a bulldozer, deeply in parts, exposing considerable masonry and occupational levels dating back as early as the Early Bronze Age.

The ground features of Ruwāth, at first appearance, presented an extensive spread of collapsed piles of stone, some identifiable as wall lines, and field terrace walls roughly constructed from the available surface stone. A closer look revealed a considerably more complicated and recognisable sequence of settlement at the site. From the site plan produced by the survey, the style of stone wall construction, and the amount of reused cut masonry, the extent of settlement during different periods can be discerned. Ruwāth consists of a Nabataean–Roman settlement on the top of the ridge and a subsequent and larger Byzantine and Islamic settlement stretching from the brow down the east slope towards — but not reaching — the tower. Quite different in construction techniques were several structures on the west slope of the site, constructed of very large, unbonded, fieldstone blocks. These were of a completely different style than the Nabataean–Roman and Islamic remains, and could be identified in areas that were unterraced by the later settlement. A closer look at the north and west slopes indicated the presence of a much earlier settlement at least on these slopes, which extended further under the later settlement as evidenced by finds recovered from the bulldozed section of the recently cut road (below).

The Sūq (السوق)

A major discovery during the survey was well-planned laneway running north–south down the ridge of the spur. Either side (east and west) of this centrally placed lane were adjoining rooms with common walls, sometimes built two deep (**Figs. 4, 5**). One unit has a clearly identifiable doorway, made up of two standing stones, opening onto the lane. The complex is bisected by the recent road cutting, termed the Lower Bulldozer Cut (of which the south section was cleaned back and planned), and in which the lane and flanking walls are very clear. The lane descends northwards along the

ridgeline before abruptly turning west. It would seem we have here the outline of an Islamic *sūq* (market) at Ruwāth, the date of which is anything but clear. However, it is not impossible that it dates as early as the tenth or eleventh century, but it may be later (Ayyubid, Mamluk) or possibly Crusader. Excavation is required to resolve this important issue in the Islamic occupation of south Jordan.



4. Plan of the Islamic-period Sūq at Ruwāth.

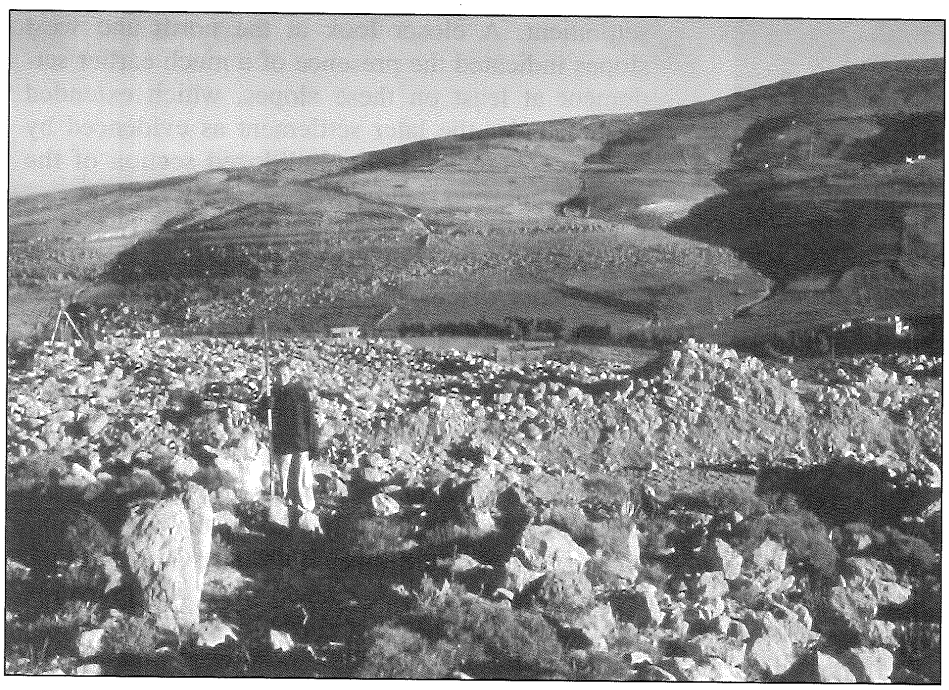
Whatever, it is apparent we have a very different order of settlement at Ruwāth compared with the standard "Ayyubid-Mamluk" village conglomerate in Jordan.

The remains of other houses, probably also Middle Islamic in date, are located on higher ground to the south and down the ridge slope to the east towards the terraced fields and the channeled water. The west slope of the ridge is devoid of similar later housing, which is fortunate as in this area considerable evidence for Early Bronze settlement was recovered, as noted above.

The Tower

A second major architectural feature at Ruwāth is the large stone tower-like construction at the northernmost (and lowest) point of the site **(Fig. 6)**. Its precise position is:
Location: 30 degrees 42.93 minutes N, 035 degrees 38.25 minutes E.
Elevation (highest point of standing structure): 1301m (Magellan hand held GPS reading).

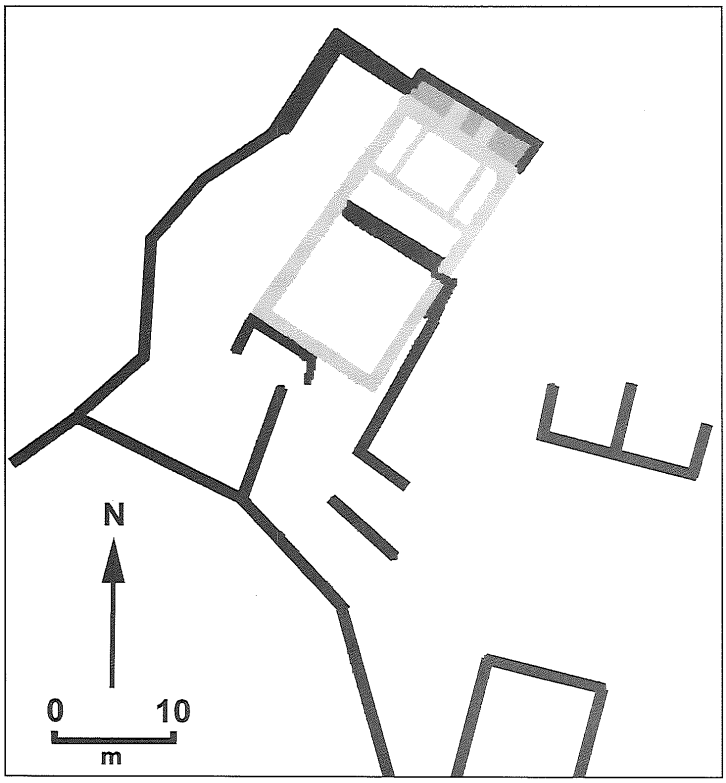
The tower is an 11 x 11m walled enclosure built around an open court and strengthened with a 2.5m wide sloping addition (glacis) built against its north wall **(Figs. 7, 8)**. It has a mound of collapsed masonry against the inside of the north wall, which rises 1.5m above the surviving level of the sloping addition. While it is possible that the "glacis" against the northern wall is original to the building, completely different material was used in its construction. The "glacis" is made from large field boulders built into a sloping rubble core. This may have been built with internal buttresses against the



5. View northwards along the Islamic-period Sūq at Ruwāth.



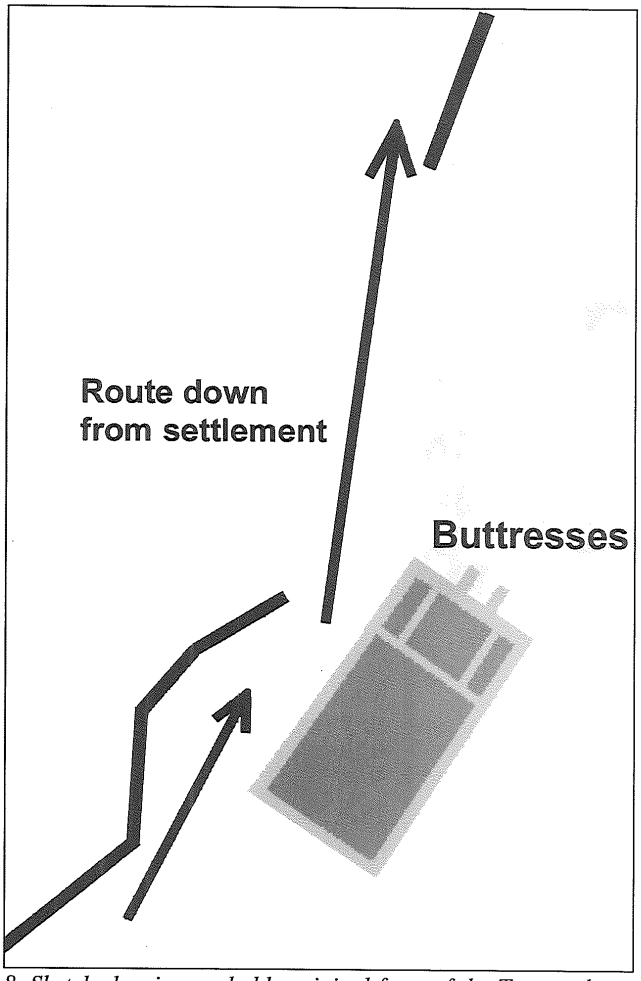
6. View of the north façade of the Tower of Ruwāth.



7. Plan of the Ruwāth Tower (grey lines = original structure).

north wall of the original structure, or it may just have been an addition to earlier buttresses on the outer face of the north wall. The latter suggestion has some credibility, as the buttresses are constructed of well-chosen fieldstones and reused blocks, neatly coursed, as is the north wall of the tower against which they rest.

The south half of the enclosure is relatively free of masonry. The west wall to the court appears to be partly original, being constructed of large, well-cut white limestone blocks. Three of these blocks are incorporated in the south wall but here appear reused for they are associated with the more typical inner and outer fieldstone-faced construction with a rubble core and no mortar bonding. Accordingly, the south wall would seem to be a later addition to act as a delineating wall for the square to its north. The position of the well cut, reused blocks in the west wall and the presence of bedrock at exactly twice the length of the present remains in line with the western wall would suggest that there was an original structure with twice the size of the present enclosed space. Due to its solid construction at the northern end, this original structure, perhaps Naba-



8. Sketch showing probable original form of the Tower, showing adjacent path (not to scale).

taean or Roman, was suitable for later use as, or conversion to, a tower, perhaps in the Byzantine period.

An extensive area of architectural remains is present on lower ground to the east of the tower. There is, however, a great deal of spoil from bulldozer activity lying over these remains, making it difficult to assess the relationship between them and the tower. Nevertheless an entrance to the tower court from the southeast suggests that these structures relate to it in some way, perhaps as housing. In spite of the bulldozer activity, the structures to the east of the tower appear relatively intact except for on one side, which is cut by a track.

The location of the tower at the lowest point of the site may appear mysterious, but is almost certainly explained by the passage of the important connecting road between the *Via Nova Traiana* to the east and the "King's Highway" to the west. This route surely passed north of and immediately below the tower, along or close to the modern access road to Gharandal. Furthermore, the tower was within easy eyesight of a prominent observation post discovered on top of the highest point in the area, Jabal al-Ḥikr (جبل الحكر) (1501m asl), on the opposite (north) side of the valley. Large and well-dressed masonry was also observed at the highest point of Ruwāth, but this lies under a modern house and hence is not accessible. It perhaps belongs to a small fort. Still unresolved is the precise date of the tower and the contemporary upper structure, with painted Nabataean, Roman and late antique (Byzantine–early Islamic) wares all being identified in both locations.

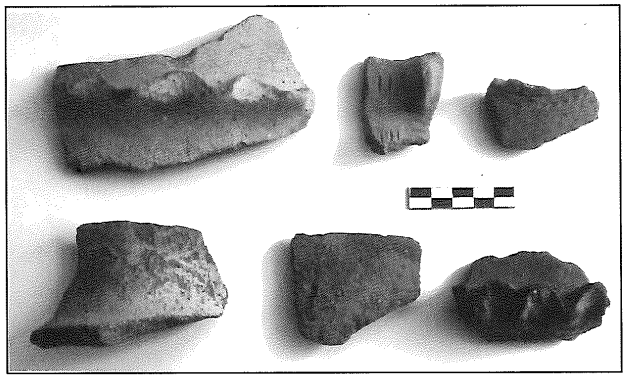
An Early Bronze Settlement

On ground above (south of) the Islamic *sūq*, the newly cut "road" had chopped through a mound of two metres, and this area was termed the Middle Bulldozer Cut. The south baulk of the cut was cleaned back, photographed and drawn. Three major phases were apparent. The upper phase consisted of rough walls and a deep ash bowl, and would seem to be Islamic (later, probably Mamluk) in date. Below this phase, three courses of a well-built wall were observed, linked by a thick, hard plaster surface to another, less well preserved, wall. The date of this middle phase architecture was not established, but early handmade wares (eleventh to twelfth centuries?) seem present. Below this level two stones — perhaps belonging to a rough wall — were identified and associated with two thickish ash layers. From the lower burnt red layer a complete dipper juglet and jar rim-spout sherd in Red Burnished ware of EBII date were recovered. Further inspection of the sloping ground to the north and northwest of the ridge identified an extensive spread of EB pottery, including wavy ledge handles, and possible associated architecture, consisting of very large fieldstones built into walls. It would seem Ruwāth is also a major Early Bronze Age site, in addition to the Nabataean-Roman, Byzantine and Islamic remains.

Conclusion

The survey of Ruwāth has clearly demonstrated the great historical and cultural importance of the site, identifying it as a multi-period settlement of unquestionably major significance. Surface artefacts include:

1. Neolithic flints on the upper part of site (closest to the spring);
2. EBII wares including Red Burnished (**Figs. 9–11**: selection of EB pottery);
3. Iron Age cookers (occasional rims);
4. Nabataean painted thin wares, especially near the tower;
5. Late Roman red glossy surface fine ware (imitation?);



9. EB surface pottery from the northern slopes of Ruwāth.



10. Red Burnished spouted jar.



11. EB dipper juglet.

6. "Byzantine Fine Ware" – cups, one with fine external rouletting below rim;
7. Late Antique–Early Islamic combed and plain wares with orange, red-orange and black surfaces (common everywhere);
8. Early Hand Made ware (tenth–eleventh centuries AD) in the Middle Bulldozer Cut;
9. Ayyubid-Mamluk painted (monochrome and polychrome) and plain Hand Made wares (ubiquitous around the village), including cookers (pig-ear handles).

The recent bulldozing of a totally unnecessary "road" through the core of the archaeological remains, completely bisecting the unusual Islamic *sūq,* exposes the considerable dangers facing Ruwāth. The survey of 2000 clearly demonstrated the major archaeological importance of this site, if not its uniqueness, and when the historical significance of Ruwāth is also recalled — Roman and Islamic — it is greatly hoped that determined moves will be made to acquire and protect this essential part of Jordan's cultural heritage.

Acknowledgments

The Year 2000 Survey Season of the Gharandal Archaeological Project was funded by a University of Western Australia ARC Small Research Grant and the Research Support Grant attached to Walmsley's ARC Fellowship. The success of the season is fully attributable to the active support of Dr. Fawwaz al-Khraysheh, Director-General of the Department of Antiquities, and the (then) regional inspector of the aṭ-Ṭafīla District, Mr. Jihad Darwish. To both go my fullest thanks. Many thanks are also due to the staff of the CBRL in 'Ammān for their assistance, especially Alex Wasse, Nadja Qaisi and Charlotte Schriwer. Greatly appreciated was the ongoing interest of Alison McQuitty and Rami Khouri in the project. Thanks to Rami for publishing a two-part report on the accomplishments of the GAP project in the English-language *Jordan Times.* Finally, my deepest thanks must go to the GAP team members who, once again, worked hard and diligently.

A. Walmsley
Classics and Ancient History
University of Western Australia

H. Barnes
Berlin, Germany

Bibliography

Ibn Ḥawqal, edited by J.H. Kramers
1938 *Kitāb Ṣūrat al-Arḍ. Leiden.*
Al-Iṣṭakhrī, edited by M. De Goeje
1927 *Kitāb al-Masālik wa'l-Mamālik.* Bibliotheca Geographicorum Arabicorum 1. Leiden.
Seeck, O. (ed.)
1962 [1879] *Notitia Dignitatum.* Frankfort: Minerva Reprint.
Walmsley, A.
2001 Fatimid, Ayyubid and Mamluk Jordan and the Crusader Interlude. Pp. 515–559 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan.* Levantine Archaeology, 1. Sheffield: Sheffield Academic Press.
Walmsley, A.G., Karsgaard, P. and Grey, A.
1999 Town and Village: Site Transformations in South Jordan (The Gharandal Archaeological Project, Second Season Report). *ADAJ* 43:459–478.

PRELIMINARY REPORT ON THE FIRST SURVEY CAMPAIGN AT ANCIENT AR-RABBA (RABBATHMOAB/AEROPOLIS)

Jacqueline Calzini Gysens

Introduction

The first survey campaign at the ancient monumental site of ar-Rabba الربّه (Karak district) started in October 1999 as part of the Rabbathmoab Regional Project, that started in 1997 with a first survey followed by a first excavation campaign at Qaṣr Rabba. The project was conducted under the auspices of the Department of Antiquities of Jordan, and funded by the Italian Ministry for Foreign Affairs, the National Research Council of Italy and the Italian Institute for Africa and the Orient (Is.I.A.O./former Is.M.E.O.), Rome. This writer and Prof. Luigi Marino of the Department of History of Architecture and Restoration of Florence University acted as co-directors. The staff was composed of architects Giovanna Battista, Ombretta Dinelli, Francesco Ciampinelli, Mohammad 'Ali al-Khatib, Francesca Malesani, Rita and Roberto Sabelli, all from Florence University, and archaeologist Gianluca Grassigli and student Anna Heymann from Perugia University. Raffaele Calzini was video-operator.

The following primary objectives were achieved:

1. drawing a ground plan of the surface remains of the monumental ancient center (8.147m^2);
2. gathering data for the last occupational period;
3. assessing the site's potential for future investigation and excavation;
4. starting a survey in the territory of modern ar-Rabba, and documenting all ancient surviving structures
5. preparing for future collaboration with the local authorities;
6. starting a collaboration with the Department of Antiquities and the local authorities for the enhancement of the archaeological sites, in view of the creation of a protected area or an archaeological park.

Recording System

Computer-assisted analysis and elaboration of data was greatly facilitated by the use of Nikon instruments.

Brief Comments on a First Ground Plan (Fig. 1)

Ar-Rabba, on the central Jordanian plateau at 15km to the north of al-Karak, is generally associated with the ancient site of Rabbathmoab, a capital of the Moabite kingdom. It was known as Arabatha by Flavius Josephus (*Ant.* 14.1.18) and listed by Ptolemy (*Geogr.* 5.16.4) as Rabathmoba among the cities and villages of Arabia Petraea. Rabatora on the Peutinger Map has been the object of much scholarly discussion regarding its connection with Betthora, generally identified with the legionary camp at al-Lajjūn. For the Byzantine period, Eusebius attests the use of both names: Rabbath Môab and Areopolis (*Onom.* 10:17; 36:24; 124:15-17). In the Arab sources, the site is identified as Ma'āb.[1]

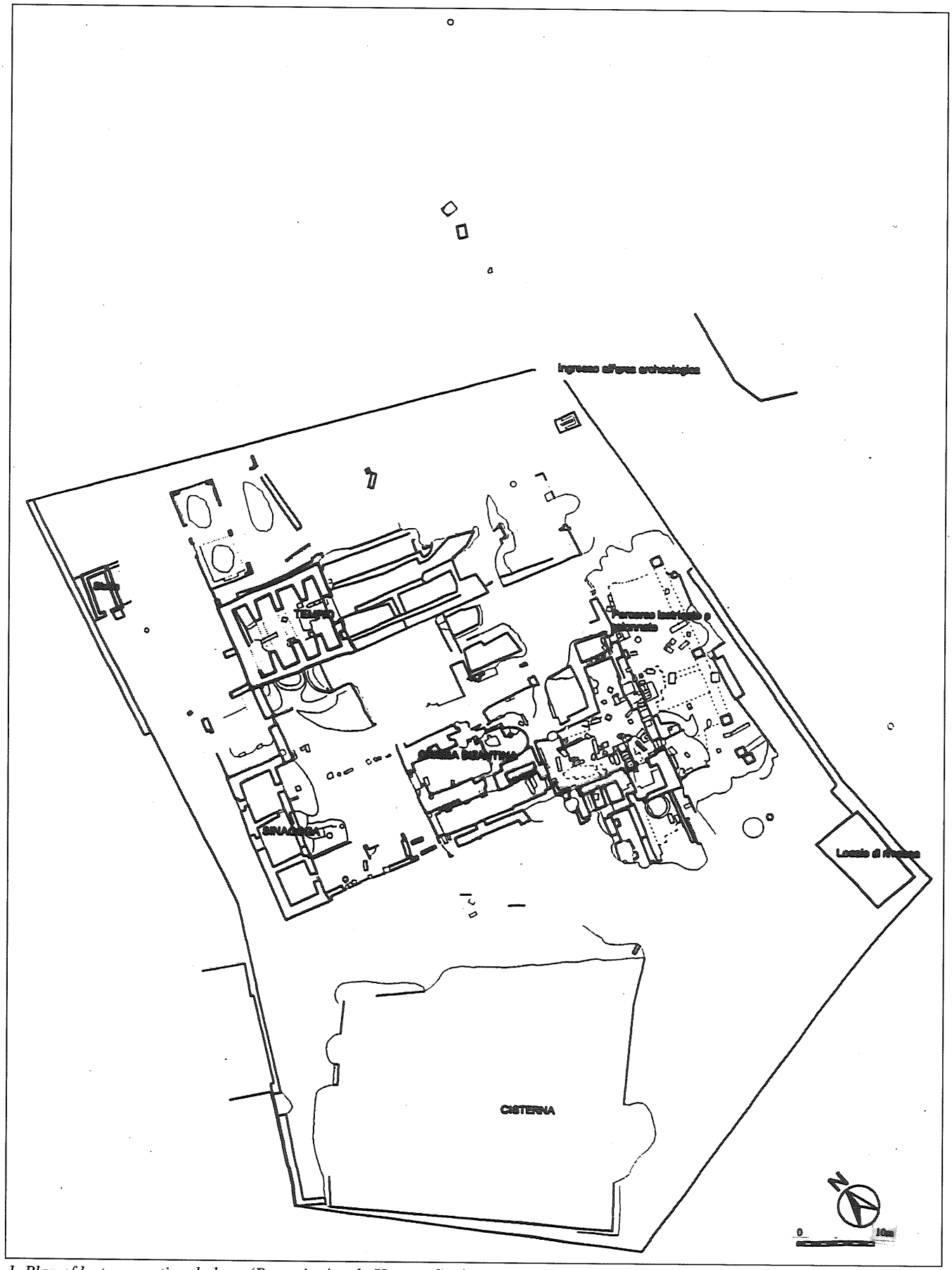
The surface survey confirmed a last occupational sequence on the Byzantine period, with the inclusion of major Roman period constructions such as the temple of the Diocletianic era, the great reservoir or *birka,* and the Colonnaded Street.

The central sector to the west of the Colonnaded Street was cleared of its debris by the Department of Antiquities in the early 1960's. On that occasion, the central part of a Byzantine church was also exposed.

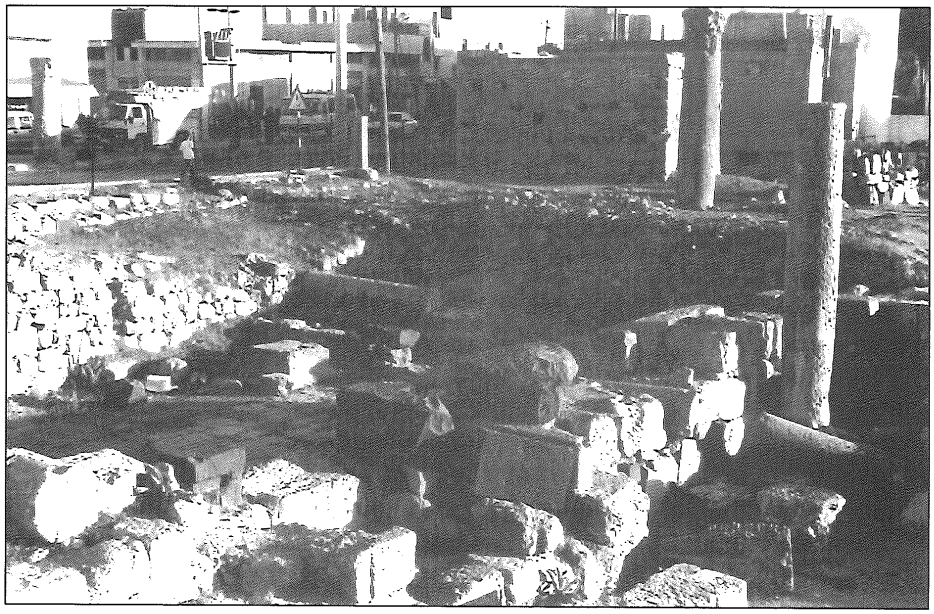
There is no evidence of medieval or late Islamic constructions in the monumental center, although it should be stressed that the latest epigraphic building inscriptions found until now refer to a Christian monument dated to the Early Umayyad period (cf. Canova 1954: 198ff; Zayadine 1971: 75, building dedication to AD 687).

The Roman Temple was the only monument still standing and visible at the end of the 19th century, along with the two columns of the Roman Street (**Fig. 2**). During the same century, when modern sedentarization started in the region, the temple was re-constructed and utilized as a dwelling. The remains of this transformation certainly helped to conserve the ancient monument, which is of great interest in itself due to the high standard of local traditional construction techniques utilized. The ground plan and elevation of the temple have

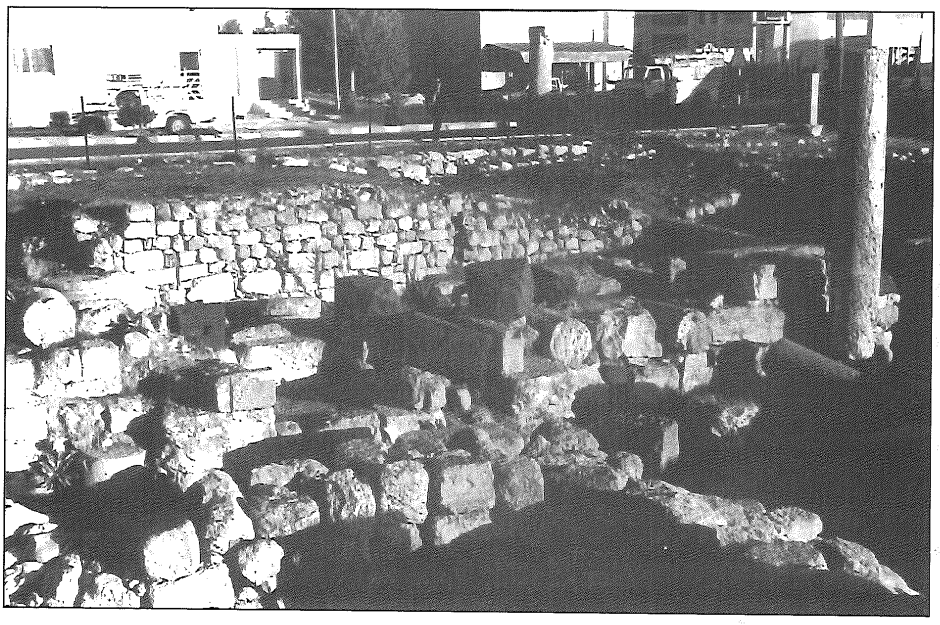
1. A more complete list of sources will be annexed to a paper presented at the ARAM Conference on Palestinian Christianity, July 2001 (forthcoming).



1. Plan of last occupational phase (Byzantine/ early Umayyad) of ancient ar-Rabba.



2. View of the Colonnaded Street, ar-Rabba.



3. View of the area between the street and the church, ar-Rabba.

already been the object of study.

The Roman Temple, which according to dedications to the Emperors Diocletian and Maximinian copied by Brünnow and von Domascewsky may be dated to the beginning of the fourth century, covers an area of 175m^2. Its width is 12.60m, its length 14.30m, and its orientation is 107°E. The original facade presents a central opening (3.50m) and two niches on both sides, 70cm deep and 230cm high. The monument stands at +1.18m above the Colonnaded Street (the basis/level of our measurements).

The Roman Temple Precinct: The existing floor level is 1.2m above the original courtyard level. Two parallel 12m long arched constructions built of stone, run towards the entrance of the ancient temple. Their function is unknown. They should be dated to the Byzantine period.

The Byzantine Church: The only partially excavated construction of the monoapsidal type. It measures 16m length and ca. 5m in width. The area covered by the nave is ca. 45m^2, while the area of the apse is ca. 24m^2. Apparently, the church was built on a public space paved with the same type and color pattern as the Colonnaded Street. The orientation is 107°E.

Paved Area between the Church and the Colonnaded Street **(Figs. 2, 3)**

This area presents a complex occupational level with the superposition of constructions of different periods. One remarks the general re-use of archi-

tectural fragments of previous buildings. The pavement consists mainly of basalt slabs.

The So-Called Synagogue: The area southwest of the Roman Temple and west of the Byzantine Church, is attributed to have been occupied by a west-oriented monument that was later transformed to a church, if our localization is correct. The synagogue has been connected with Barsaumas' destruction in the beginning of the fifth century. According to the plan sketch published when the area was cleared, the building was of a tripartite type and would have covered an area of 130m^2.

The Paved and Colonnaded Street

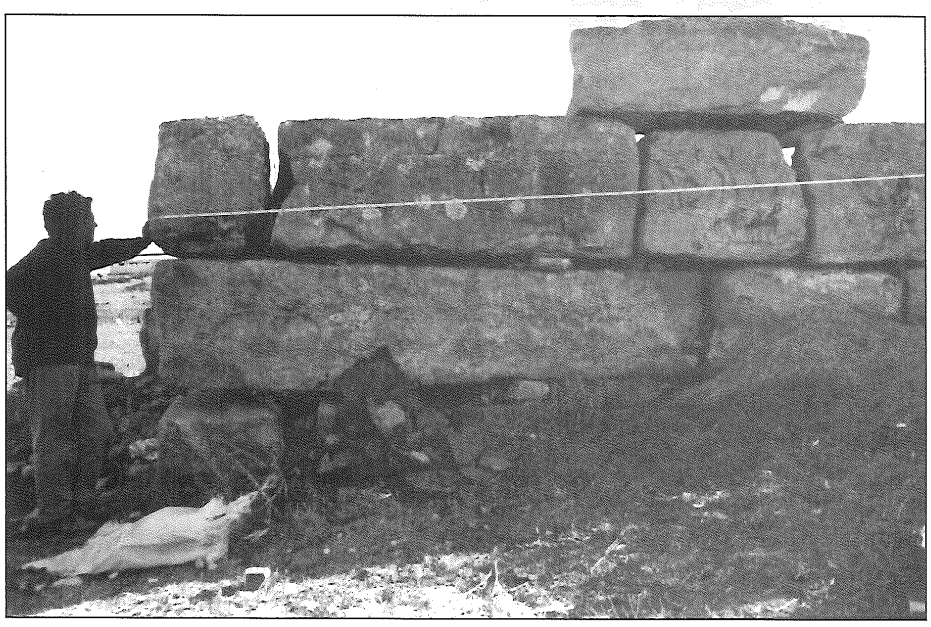
The now visible sector of 30m length with a width of 10m, has been cleared of its debris by the Department of Antiquities. This important feature of the Roman urban landscape was probably the *cardo* of Rabbathmoba. Five square column basis are still *in situ*, the diameter of the columns measuring ca. 1m, the interaxes 4.80m. The pavement of calcareous and basalt slabs shows a sophisticated striped color pattern created by the juxtaposition of 130cm wide black color strips to the basic white grey stone slabs. The Colonnaded Street was still in function during the Byzantine/Early Islamic period.

The Water Reservoir or Birka

One of three water reservoirs still existing at ar-Rabba, this was certainly a Roman period construction, and is situated at the extreme southwest sector



4. View of the tower (ar-Rabba).

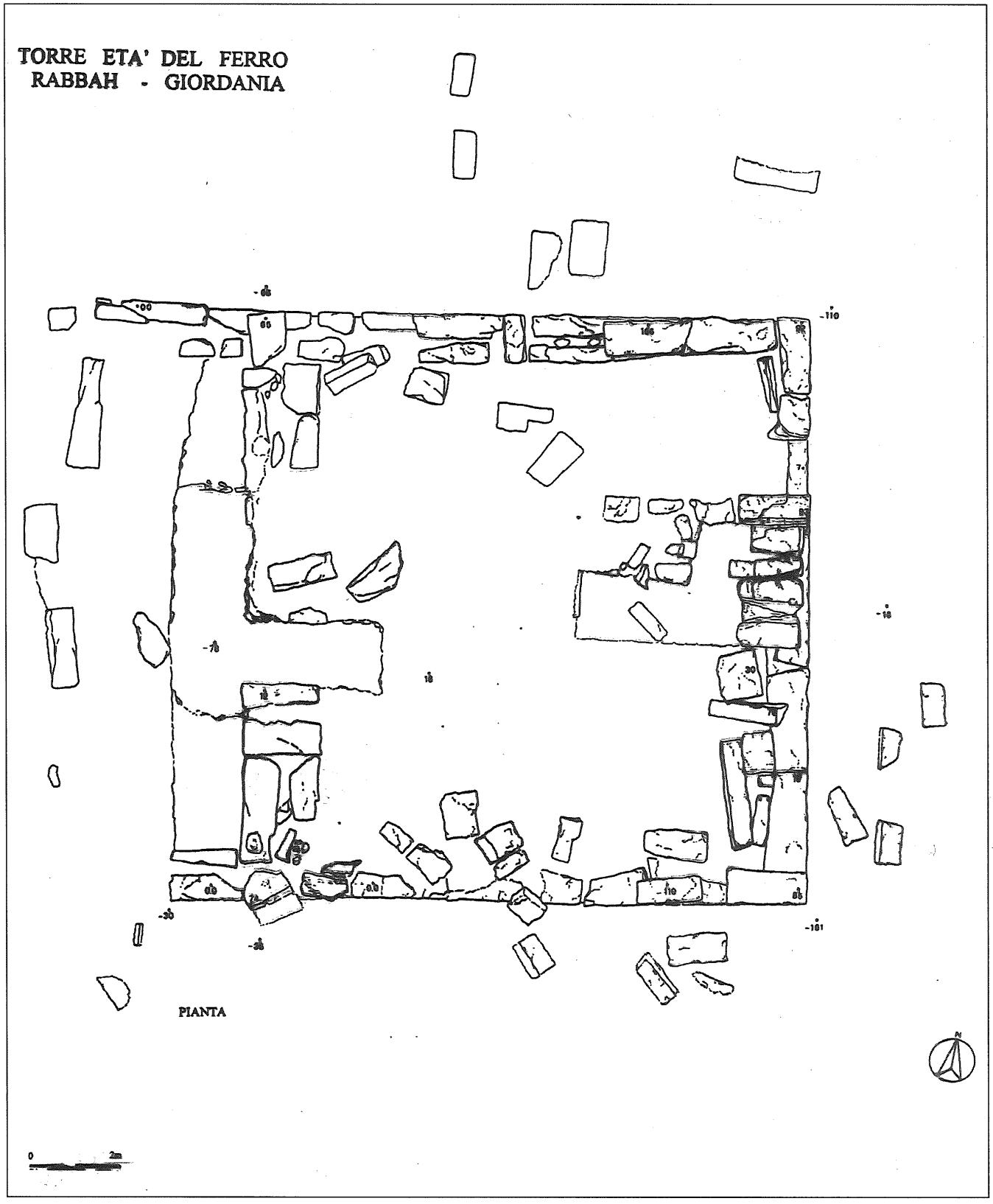


5. Measuring the southern curtain wall of the tower.

of the monumental center. It has a trapezoidal shape and occupies an area of 1200m^2, with a perimeter wall of ca. 140m (around 33 x 36m). It is in good shape.

Conclusions

This first ground plan of the last occupational phase (Byzantine/Umayyad transitional period) remains of the monumental center of ancient ar-



6. Plan of the tower (Iron Age II?).

Rabba/Areopolis/Ma'āb still shows some indication of orthogonal planning. Not all Roman monumental architecture seems to have fallen into disuse during the period. No domestic architecture in this area has been recognized until now. The next season of IsIAO's research at ar-Rabba will be dedicated to the completion of the ground plan and to trial soundings.

A Tower of the pre-Roman Period at ar-Rabba

We report on the ruins of a small watchtower situated on the eastern edge of the modern village of ar-Rabba, near where the plateau descends in direction of al-Lajjūn (**Fig. 4**).

This most impressive, nearly square (13 x 13m) construction, is conserved at a ca. 2.50m height. It was built of huge calcareous stone blocks laid in the header-stretcher fashion. The average length of the blocks is 200cm and their width is 50cm (**Fig. 5**). Entrance to the tower is gained through the center of the south curtain wall. The ruins received our first attention during our 1999 survey. A plan is now provided preliminary to its excavation (**Fig. 6**). No surface pottery shards were found. The internal space shows the remains of two transverse walls. The most interesting architectural feature is the presence of casemate structures exposed on the east and west sides, which could open the option for a date within the period extending from the Iron II to the Persian period. Among the variety of surface ruins yet to be investigated and excavated on the site of ancient ar-Rabba (Rabbathmoab/ Areopolis), this monument will receive all our attention in our forthcoming October 2001 season.

J. Calzini Gysens
Istituto Italiano per l'Africa e l'Oriente
16, via U. Aldovrandi
00197 Roma - Italy

References Cited

Canova, R.
1954 *Inscrizioni e monumenti protocristiani del Paese di Moab*. Roma.
Zayadine, F.
1971 Deux inscriptions grecques de Rabbat Moab (Areopolis). *ADAJ* 16: 71-76.

A BYZANTINE GREEK INSCRIPTION FROM QAṢR AR-RABBA (KARAK DISTRICT)

Tommaso Gnoli

The text of this unpublished inscription was submitted to me by Dr. Jacqueline Gysens-Calzini, director of the Italian archaeological campaign (University of Perugia and Istituto Italiano per l'Africa e l'Oriente) on the site of ar-Rabba (الربة), in Jordan, the Roman Aeropolis, the ancient Rabbathmoab, capital of Moab and therefore an administrative centre of the Province of Arabia, seat of the conventus of that same province's governor, as testified by some recent and important papyri (Yadin and Greenfield 1989).

The *tabula ansata* with Greek text arranged on five lines is currently placed above an architrave of a ruined dwelling in a village, 5km to the north of the centre of the town (**Fig. 1**). The stone stands in a vertical position with its right side down. It is most probable that the abrasion affecting the whole left side of the epigraphic field, making it almost unreadable, is due to atmospheric conditions, particularly to the washing away produced by rainwater (**Fig. 2**). No signs appear, neither from the mould nor from the photographs, proving intentional damage to the stone itself.

The inscription is clearly a late text, whose date may be approximately placed in the fifth-sixth century AD, as confirmed by the shape of the letters and the interpretation of the last three letters of line 5, which I consider certain.

My reading of the text, which is almost exclusively based on the pictures — as no useful indication could be deduced from the mould — runs as follows:

1 ṬǪϒTOTǪ
2 [± 5]ÇǪONEΠO
3 [- - - - -] ẠỊǪṬ
4 [- - - - - - - - -] Ạ [± 1]
5 [- - -] ỊϒΠ [.] C [.]ϒMΓ

Line 1: this line's text certainly renders the character of the inscription. It is surely a memorial text of some building, whose type is absolutely undefinable. Expressions like τοῦτο τὸ τόπον or μνημ(ε)ῖον are extremely conventional in the epigraphy from the Ḥawrān and more generally from the Syrian area; but on the basis of what results from line 5, I would incline to accept the second hypothesis: cf. line 2.

Line 2: the beginning of this line should have reported the type of the commemorated building, if 'a (sacred) site', τόπον, or a tomb, μνημ(ε)ῖον It is sure on the contrary, that the last three letters repre-



1. Current location of the inscription.



2. The inscription.

sent the beginning of the verb ποιέω, usually in aortist tense, third person singular: ἐποί[ησεν and followed by the name of the dedicating person. Very attracting appears the hypothesis to read the term εὐχαρι]σ‹τ›ὸν (= εὐχαριστῶν, 'in gratitude') in the middle of the line on the basis of *IGLS* 1857, from Ma'arrat ash-Shūr, southeast of the Jabal 'Alā's area. In the latter case the type of the commemorated building would be indicated in the following line. Before the *omikron* some traces of a square have been checked, which would make the reading of the word almost impossible, if we were to consider it like a *theta*. However it is possible to maintain, that it actually does not represent a single letter, but — for instance — a group EI, where the central stroke of E has disappeared during the centuries. If so, I would not be able to risk any reconstructing hypothesis of the text.

Line 3: almost unreadable. All letters are extremely uncertain, but a small *omikron* in ligature between two vertical strokes and before a cross stroke, maybe the right side of an *alpha*, appears. In this line the name of the dedicating person was certainly written.

Line 4: completely unreadable.

Line 5: the last three letters are certain and they permit us to determine, in an univocal way, the character of the whole text.

The letters' succession ΥΜΓ at the end of the line can only be interpreted as a figure or an abbreviation. There is no way to consider it a date, because the figure resulting from it, i.e. 443, is too early for the appearance of the inscription: in that area the adoption of the era of Bostra (AD 106), the only one giving a plausible result matching the palaeographic data, must be excluded.

Indeed in this case we are certainly in the presence of Christian symbols. The well-known Christian cryptogram ΧΜΓ is very diffused in all Syria and it is to be found at the end of ecclesiastical inscriptions from the period we are dealing with. This is so true that Leclercq (1907: col. 182) was able to affirm that "Le sigle ΥΜΓ paraît avoir été d'un usage général en Syrie du IIIe au VIIe siècle". There is no identity either in the interpretation of the nature (abbreviation or cryptogram?) or on the explanation of this series of letters. Leclercq (1907: 180-182) supposed this formula was an abbreviation for Χ(ριστὸς) Μ(αρίας) γ(ενηθείς), against the other interpretation proposed by de Vogüé and de Rossi, which considered it as an acrostic of the name of Christ and of the archangels, Χ(ριστός) Μ(ιχαήλ) Γ(αβριήλ). Even if Perdrizet (1904: 357-358) accepted this reading, he added an isopsephical value to it: ΧΜΓ = 643 = 1 (α′) + 3 (γ′) + 5 (ε′) + 10 (ι′) + 70 (ο′) + 200 (σ′) + 70 (ο′) + 9 (θ′) + 5 (ε′) + 70 (ο′) + 200 (σ′) = Ἅγιος ὁ Θεός, 'Holy (is) God': the beginning of the trisagion. Tjäder (1970) came back to the subject always agreeing with Leclercq with a clear analysis of all the interpretations given so far. We read on p. 163: "Χ(ριστόν) Μ(αρία) γ(εννᾷ) renders the original meaning of ΧΜΓ. All the three words included in the interpretation have been reliably certified in an adequate context", as the explanation of a strange abbreviation discovered only in eleven Latin graffiti by the *Paedagogium* on Palatino, *VDN*, seems to

confirm. On the contrary, Solin (1966) had read it before as an abbreviation for *vestiarius domini nostri, veteranus domini nostri, verna domini nostri.* Nevertheless Tjäder proposes at p. 164 the equivalence between *VDN* and ΧΜΓ: *v(irgine) d(ominus) n(atus)*. Following Tjäder's hypothesis, Blanchard (1975) believed he could bring to perfection the reading of some sixth century Egyptian papyri. Tjäder's position is very feeble, however, at least where it induces to maintain the two formulas *VDN* and ΧΜΓ as equivalent, because it is evident that the order of the terms appears as twisted, without any reason why. Moreover, there is no criterion for the dating of these graffiti, thus it seems much better to distinguish the two problems. In the end, Gostoli (1983) also came back to the topic, proposing, on the basis of *POxy.* VIII 116, to consider the formula as abbreviations of the *nomen sacrum* Χριστὸς, of the substantive μάρτυς and of a part of the verb γίγνομαι. As far as the meaning of the formulae is concerned, Gostoli is uncertain among 1) may Christ be the witness for the truthfulness of what I wrote or anyway for my feelings towards the addressee; 2) may Christ be the witness for the truthfulness of my profession of the Christian faith (in these cases the explanation would be Χριστὸς μάρτυς γένηται (or γένοιτο); 3) I am witness to God (in this case Χριστοῦ μάρτυς γέγονα).

Just on the basis of our inscription and of another one about which I will report later, it seems to me that the isopsephical significance of this sequence of symbols should be preferred. I do not mean that one interpretation excludes the other one, i.e. that a numerical value did not recall — and was not interpreted — also as initials; nevertheless the example in *IGLS* 1403, in many ways similar to it, seems convincing.

In our inscription the reading of an *ypsilon* before the group ΜΓ connecting this text to the cases treated above, is absolutely certain. The sequence ΥΜΓ is to be found in a well-known inscription coming from Shnān, Jabal Zāwya, in the area of Apamea: *IGLS* 1403. This inscription has been the object of discussion just in relation to the evident affinity with those, where the formula ΧΜΓ is to be found. At the end of each of the first eight lines the inscription actually shows the formula ΒΥΜΓ. Described and annotated for the first time by Prentice (1902: 95 nr. 15; 1908: 12 e p. 215 nr. 215), and at last in Prentice 1906: 148, the inscription was thus interpreted by Leclercq (1907b: col. c): "“Β (ou Θ) ΥΜΓ . Les quatres lettres qui se lisent à la fin de chaque ligne ne nous paraissent laisser que peu de place à l'hésitation entre Β et Θ [but Prentice had no hesitation!]. Outre la confusion facile à faire entre deux caractères si peu différents lorsqu'on les relève sur une pierre qui a eu à subir l'action de quinze siècles, l'interprétation des sigle ΘΥΜΓ se trouve si aisée et si naturelle en Syrie, où une partie de cette formule était acclimatée, qu'elle ne semble pas donner lieu d'admettre une autre leçon que celle-là et son développement se trouve être: Θ(εοῦ) υ(ἱός) Μ(αρίας) γ(ενηθείς), 'le Fils de Dieu, engendré de Marie'. Formule apparentée au ΧΜΓ". The remark by Leclercq was supinely accepted by Perdrizet, who does not mention the chance to read Β instead Θ (Perdrizet 1904: 358). Yet Prentice had read the stone not only in a different and univocal way, but he had given it a well-defined significance: Prentice (1906: 148): "ΒΥΜΓ = 2443 = 10 (ι′) + 8 (η′) + 200 (σ′) + 70 (ο′) + 400 (υ′) + 200 (σ′) + 70 (ο′) + 600 (χ′) + 100 (ρ′) + 5 (ε′) + 10 (ι′) + 200 (σ′) + 300 (τ′) + 70 (ο′) + 200 (σ′) = Ἰησοῦς ὁ Χρειστός" an explanation perfectly matching to the context of this inscription, where the expression Ἰησοῦς ὁ Χρειστός is obsessively repeated four times, every other line. Thus it is obvious, that in 1955 when the inscription was included in vol. IV of *Inscriptions grecques et latines de la Syrie* by L. Jalabert, R. Mouterde and C. Mondésert, the reading doubt expressed by Leclercq was abandoned with certainty: *IGLS* IV: 116: "A dr. dans une seconde colonne, en face des huit premières li., le groupe /βυμγ′, qui suivant sa valeur numérique 2443 est isopséphique au refrain Ἰησοῦς ὁ Χρειστός. Ce groupe peut avoir, outre sa valeur numérale, un sens cryptographique, v. g. β(οήθι), Υ(ἱὲ) (ἐκ) Μ(αρίας) γ(εννηθείς), 'Aide(-nous), Fils (de Dieu), né de Marie'". Once ascertained that *IGLS* 1403 surely comes from a funerary monument, it seems to me that the explanation of Β with the imperative of the verb βοηθέω has to be particularly recommended (on the frequency of the verb, cf. Prentice (1906: 145): "On my first visit there (in Syria) I found βοήθει or βοήθησον some twenty times, and almost always on lintels, generally of houses".

It is in consideration of *IGLS* 1403 that the completely abraded letter preceding the group ΥΜΓ shall be interpreted as a Β here as well. This inscription would therefore enrich the rare epigraphic evidences of this cryptoformula belonging to the Syrian Christianity in the late antiquity.

The obviously very hypothetical restoration and the sense of this short text will thus be:
τοῦτο τὸ τόπον (ο μνημεῖον αυτ σιμιλια) CΘON ἐποίησε [ὁ δεῖνος τοῦ δείνου] — traces of letters on two lines — β]υμγ′
"[Mr. So and So, son of So and So] built this tomb (?) 2443 (= Jesus Christ, and after its cryptographi-

cal meaning 'help us Son (of God), born of Mary')."

T. Gnoli
Dipartimento di Storie e Metodi
per la Conservazione dei Beni Culturali
Università di Bologna
Sede di Ravenna
via degli Ariani 1
48100 Ravenna ITALY
e-mail: gnolito@alma.unibo.it

Bibliography

Blanchard, A.
1975 Sur quelques interprétations de ΧΜΓ. Pp. 19-24 in *Proceedings of the XIV International Congress of Papyrologists*, Oxford 24-31 July 1974. Graeco-Roman Memoirs 61. London.

Gostoli, A.
1983 Una nuova ipotesi interpretativa della sigla cristiana ΧΜΓ. *Studia Papyrologica* 22: 9-14.

IGLS
1955 *Inscriptions grecques et latines de la Syrie,* par L. Jalabert, R. Mouterde and C. Mondésert, Tome IV: Laodicée. Apamène. IFA-Beyrouth — BAH 61. Paris.

Leclercq, H.
1907a F. Cabrol, H. Leclercq, *Dictionnaire d'Archéolologie chrétienne et de Liturgie I*, 1, s.v. Abréviations.
1907b F. Cabrol, H. Leclercq, *Dictionnaire d'Archéolologie chrétienne et de Liturgie* I, 2, s.v. Antioche (archéologie).

Perdrizet, P.
1904 Isopséphie. *REG* 17: 350-360.

Prentice, W.K.
1902 Fragments of an Early Christian Liturgy in Syrian Inscriptions. *TAPhA* 23.
1906 Magical Formulae on Lintels of the Christian Period in Syria. *AJA* 10: 137-150.
1908 Part III of the *Publications of the American Archaeological Expedition to Syria in 1899-1900.* Greek and Latin Inscriptions. Princeton.

Solin, H.
1966 *Graffiti del Palatino*, raccolti ed editi sotto la direzione di V. Väänänen. I. *Paedagogium* a cura di Heikki Solin e M. Itkonen-Kaila, Acta Instituti Romani Finlandiae III. Helsinki.

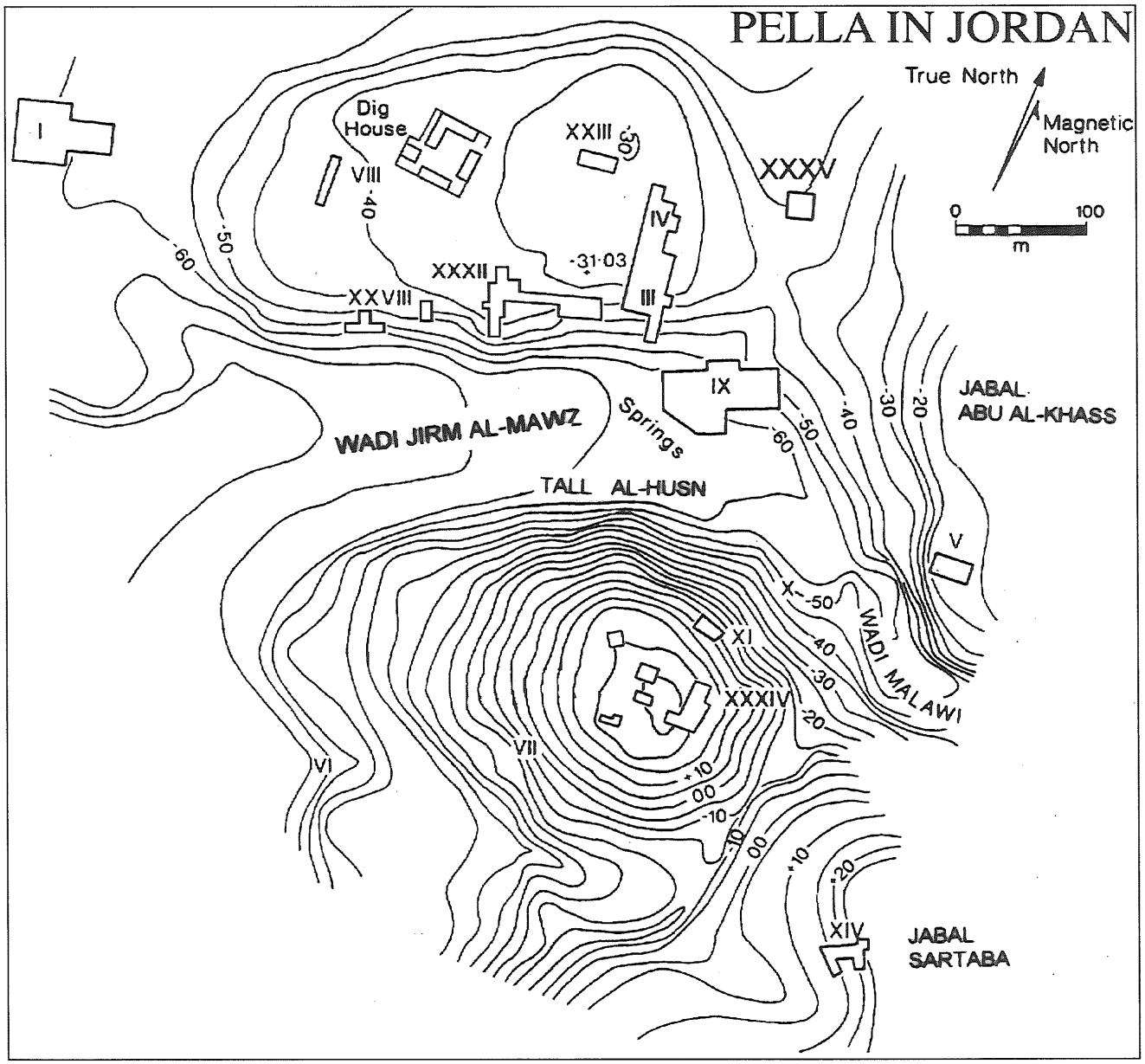
Tjäder, J.-O.
1970 Christ, Our Lord, Born of the Virgin Mary (ΧΜΓ and *VDN*). *Eranos* 68: 148-190.

Yadin, Y. and Greenfield, J.C.
1989 The Documents from the Bar Kokhba Period in the Cave of Letters: Greek Papyri. Ed. N. Lewis, *Aramaic and Nabatean Signatures and Subscriptions.* Ed. Y. Yadin, J.C. Greenfield, Judean Desert Studies II. Jerusalem.

NEW LIGHT ON LATE ANTIQUE PELLA: SYDNEY UNIVERSITY EXCAVATIONS IN AREA XXXV, 1997[1]

Kate da Costa, Margaret O'Hea, Lachlan Mairs, Rachel Sparks and Pat Boland

In January to February 1997, six trenches were laid out in a new area of excavations at Pella, Area XXXV, in the saddle between the main *tall* and Jabal Abū al-Khass (جبل أبو الخس) (**Fig. 1**). The four main trenches were grouped just inside the Department of Antiquities site fence, at the curve of the modern road, astride an old track down to the springs in the wadi. Surface wall lines appeared to



1. Plan of Pella showing Area XXXV, Trenches A-D.

1. This work formed part of the Nineteenth Season (1997) season at Pella, the main part of which is reported by the Director, Dr. Stephen Bourke. This report would not have been possible without the skilled work of the trench supervisors: XXXVA - Natalie Franklin and Greg Beattie, B - Amanda Parrish, C - Anna Parker, D & F - Liza Hopkins, E - Bruce McLaren. They were ably assisted by a number of volunteers and the local workmen. Ms. da Costa would also like to thank Dr. Stephen Bourke for giving her the opportunity to join him as a Co-Director of excavations at Pella.

confirm Robert H. Smith's suggestion that a Roman period road had run from the Parvis, north in the saddle, towards the modern road (Smith and Day 1989: 6). The extant walls, and three apparent street paving blocks, suggested a bi- or tri-partite gate, in the manner, though certainly not as grand, as the South Gate at Jarash.

In the main trenches (A-D) excavation soon revealed that the extant wall lines were mainly those of a courtyard house dating to the Byzantine and early Umayyad periods (**Fig. 2**, phase 3), the three paving stones forming the top steps up from the courtyard to the street. Two other earlier phases and an episode of substantial filling were discovered elsewhere in the area. It is these earlier sequences which form the bulk of the description in this report.

The entire area was affected by years of modern foot and herding traffic, as this was the major accessway for the local Bedouin shepherds to the springs of Wādī Jirm al-Mawz (وادي جرم الموز/ وادي الجرم). It is also partly the track used by motor vehicles to access the *tall*. The natural topography of the area encourages erosion during rainy periods. However, drawing on experience with excavating historical sites in Australia, where the total depth of deposit can be as little as 20cm and also heavily contaminated, we endeavoured to isolate those areas which had been somehow protected from contamination and were consequently able to recover clean sequences of artefacts to associate with the architectural phases. The solidly built walls of phases 1b and 3 seemed to have protected the interiors of the rooms from traffic, and it was mainly the south part of trench C which was the most cut-about.

Filling Episode (Phase 1a)

A sondage in Trench D, measuring roughly 2m x 2m was begun in order to date the deposits below the warehouse room (see below, Phase 1b). Although excavation proceeded to a depth of 4.6m below topsoil (**Fig. 3**), only a handful of worn ceramic sherds were recovered each day, and no architecture was encountered. Excavation of the sondage was halted due to safety reasons. The actual depth of the fill deposit therefore is still unknown. Almost all the ceramic sherds were Middle Bronze Age in date (S. Bourke, pers. comm.) and no sherd post-dated the early Roman period. The soil was loose loam with one significant band of large rocks, too large to have floated along, but perhaps tumbled down from the slope to the east. The largely uniform nature of the soil and the lack of artefacts suggested a single episode of substantial in-filling in order to create a flatter area for building purposes, using material from an uninhabited area in the vicinity of the *tall*. Another possibility is that the deposit was created over a much longer time by natural forces and is composed of eroded soil from the slope of Jabal Abū al-Khass, which therefore could not have been occupied before the fourth century AD. In this case, though, we would have expected an increase in later period ceramics closer to the surface, as the rain water would have washed material down from the slopes in the west as well. Whichever the correct explanation, the area between the main *tall* and Jabal Abū al-Khass was probably a steep gully until the fourth century AD and it seems unlikely that a road ever led north from the Civic Centre in the Roman period as proposed by Smith. The gully would have formed a natural defense for the east flank of the *tall*, though how deep and steep it was before the filling episode has not been determined. Presumably either increasing population, decreasing habitation density or increasing building size (or all three) led to the need to create a new quarter for the city.

Warehouse Room, Phase 1b

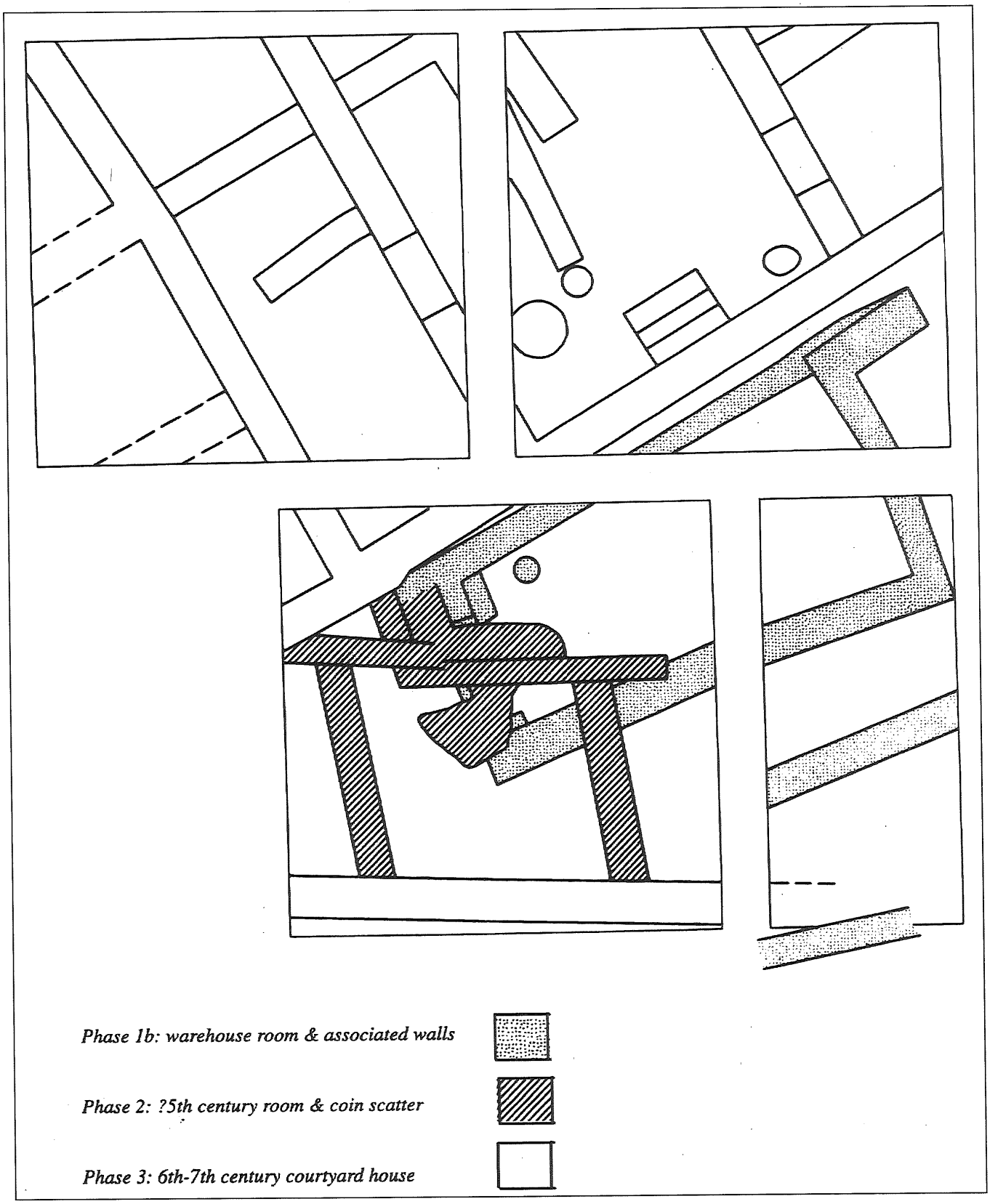
A single large rectangular room was exposed in three of the trenches, built on top of the sterile fill (**Fig. 4**). In the last day of digging the small area to the east of the room in trench B seemed to show another threshold, and the walls to the south of the room, in trench D, together indicate that there were a complex of rooms in this area.

The complete room (internal dimensions: 8m E-W, 3-4.5m N-S) had substantial stone walls at least 1.3m high and the room itself was filled with considerable mudbrick debris. No access to an upper storey was noted. There was a substantial and well-worked stone threshold for double doors in the short western wall. The room was stone paved, with small stone benches in the NW and SW corners and a column drum reused as a bench some 1.5m along the north wall. No other architectural features were present, noticeably no trace of windows in the south or east walls that were preserved to a height of 1.3m. Similarly, few complete objects were found in the room, though it was full of mudbrick collapse, suggesting that the room had been largely cleared before the upper walls fell in.

Although on the face of it this room is of little archaeological interest, it is the first substantial area of architecture and associated deposits from the fourth century AD at Pella, and there are significant numbers of coins to confirm the ceramic dating.

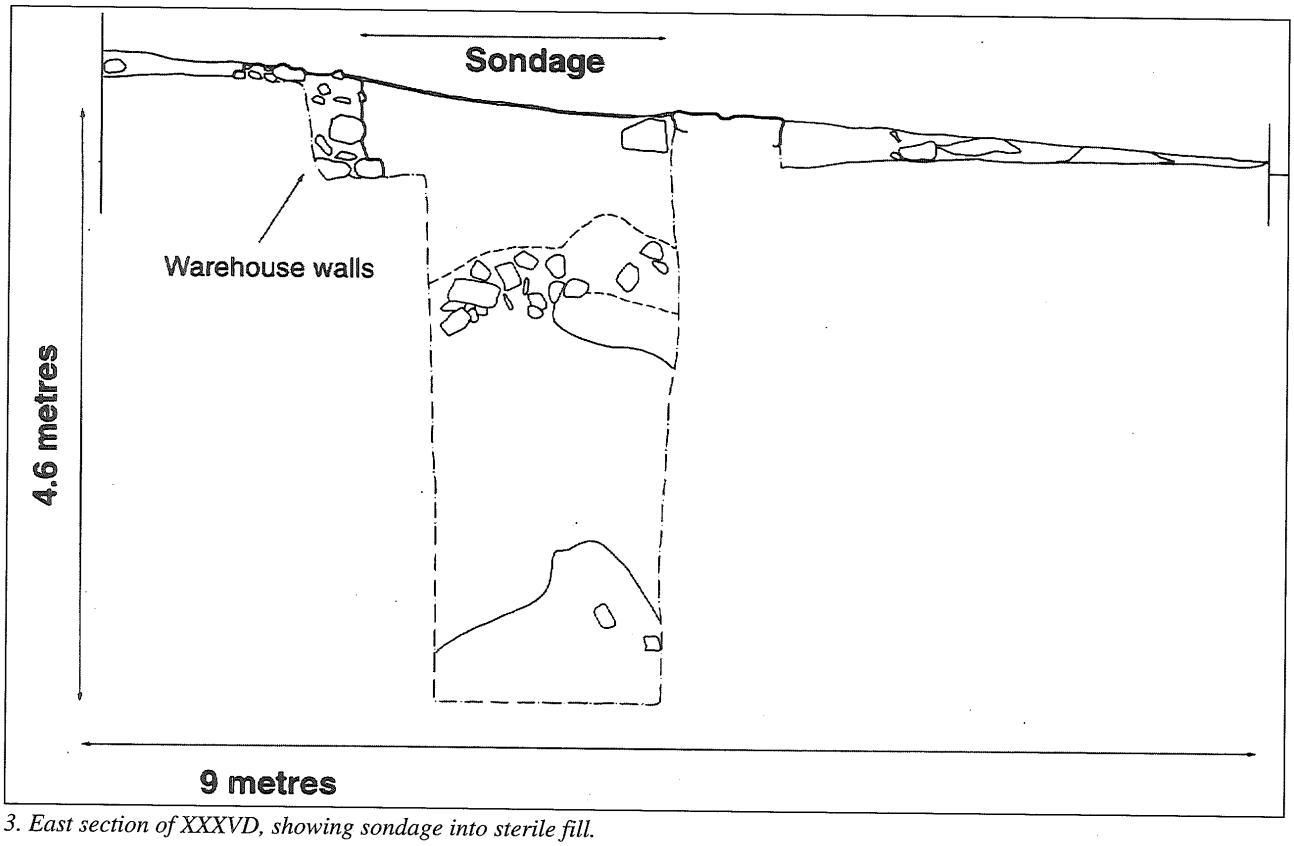
Ceramics

The ceramic material from trench D, which was

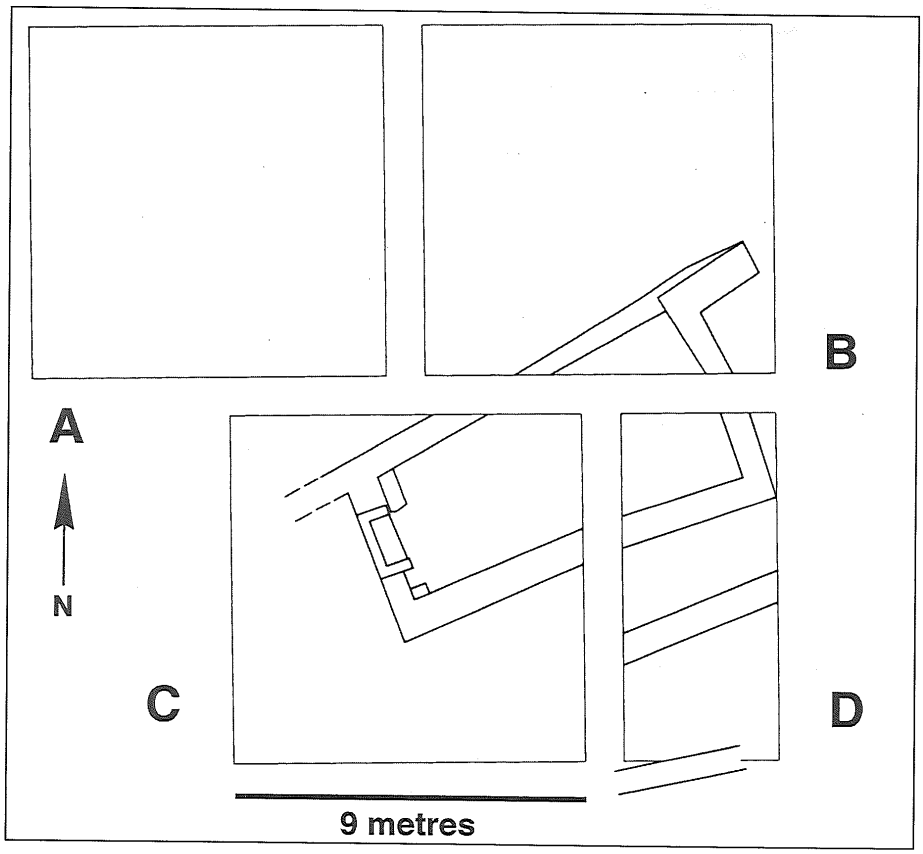


2. Schematic Plan of Area XXXVA-D.

the only sequence which included construction, use and destruction material, is presented here as typical of the material from the room. **Fig. 5** shows the deposit sequence in Locus 3, which is the warehouse room. Approximately 1.2m of collapsed mudbrick (which of course, although forming the destruction level, dates to the construction phase) lay above a thin layer of soft dark soil on a hard clay surface.

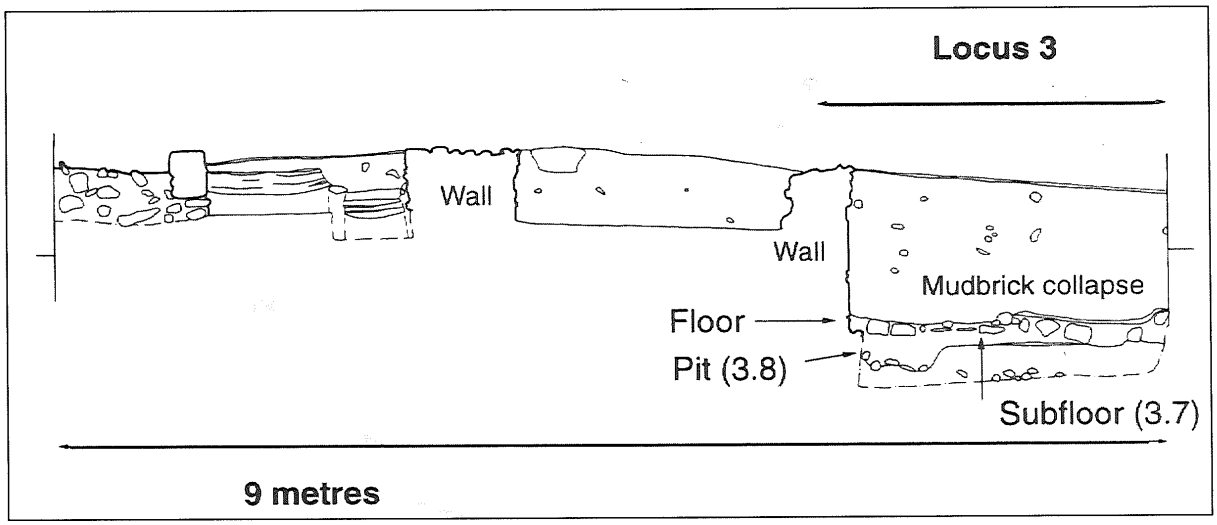


3. East section of XXXVD, showing sondage into sterile fill.



4. Schematic plan of phase 1b, the fourth century warehouse room and contemporary walls.

Stone pavers underneath were irregular and had been evened out by the clay surface. About 0.2m of pottery-rich underfloor deposit was recovered, with a strange 'pit' like depression in one area, full of pottery sherds. It seems as if this pre-construction deposit was another levelling or perhaps stabilising



5. West section of XXXVD, showing deposits in warehouse room.

fill, above the sterile fill of the gully.

The ceramic material is presented chronologically in **Figs. 6-10**, with the material from the subfloor construction phase first. The material from the collapse context is sherds which have fallen out of the mudbricks and so also predate the use of the room. Finally the pottery which was lying on the floor is shown. It can clearly be seen that the material is dated to the third to fourth century AD at Pella or other sites, with the exception of one sherd from the floor deposit (**Fig. 10.6**) which will be discussed below. Following the ceramic material, the evidence of the coins and the few objects recovered from within the destruction will be reviewed to demonstrate, with the ceramic material, that the room was constructed and destroyed in the fourth century AD, and was probably in existence from only 350 to 400.

Ware abbreviations follow Pella standard wares where possible, but some new wares and variants were identified:

CTC: Coarse Terracotta

MTC: Metallic Terracotta (= Galilean cooking pot ware)

TC: Terracotta

CR: Coarse Red

GBuff: Green Buff (prob. equivalent to Metallic Buff)

Speckled TC: Terracotta with marked amounts of white inclusions (probably lime)

PBA: Pale Brown, fine (A) levigation (probably a variant of TC)

DensePBA: The Pale Brown fabric seemed sometimes to be so finely levigated that the fabric had the appearance of caramel

PBB: Pale Brown, medium (B) levigation

BGS: Brown with Grey Spots. This fabric is used for certain groups of *Bowshaped nozzle* lamps (which date from the third to the fifth centuries) and related early forms of *Broad nozzle* lamps (da Costa 2001). A very coarse version may be used for vessels of the same shape as the Coarse Red ware basins

BSP: Brown Slipped, Painted

In the catalogue, the preservation amount refers to the extant amount of rim. Ware descriptions are based on examination of fresh breaks through a 10x hand-lens.

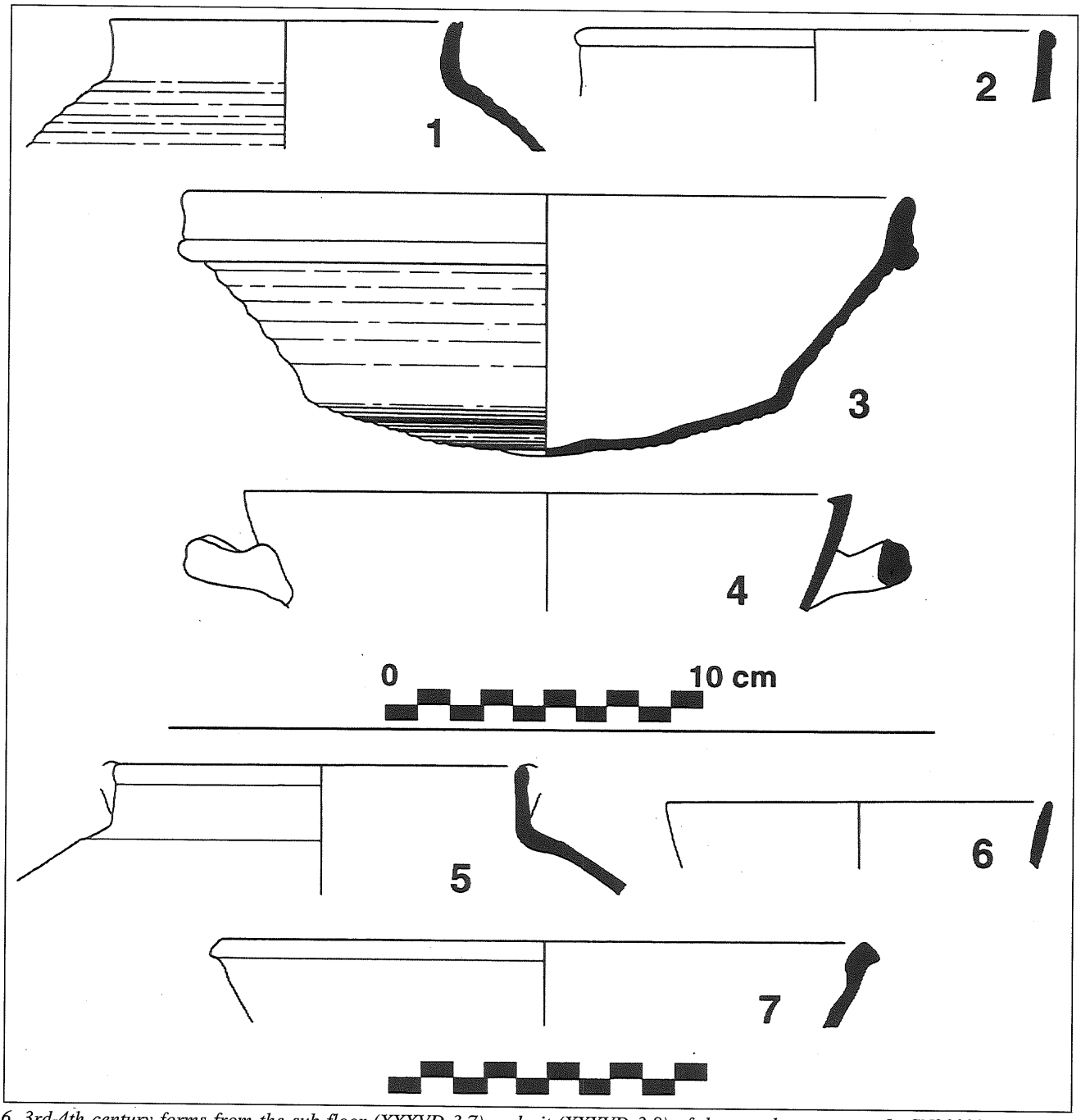
Construction Deposits (**Figs. 6-9**): The cooking pot, CN20101 (**Fig. 6.3**) has been dated to the mid-fifth century Phase I at Pella (Watson 1992a: 172). Watson noted that the cooking pots (her plate 109.9, 10) "appear at this time and seem to have a more restricted life span", meaning they did not appear in the late third/early fourth century or in the late fifth century phases. However, the XXXVD evidence strongly suggests that the form begins in the later fourth century, continuing into the fifth century, providing a more normal life span for a form at Pella.[2]

The jar in **Fig. 8.8** (CN20115) may be an unusual example of a separately thrown rim, in a second fabric, attached to the main body of the vessel.

Fig. 6: Cooking wares from the subfloor area of XXXVD:

1. CN20093, Jar, Pale CTC, XXXVD 3.7: Globu-

2. In this context, it should be noted that Watson's Byzantine Phase I is not certainly dated to the mid-fifth century, but is placed somewhere between the Late Roman phase, from which is it clearly distinguished, but before Phase II (Watson 1992a: 173). Only two datable coins and one ARS sherd, plus an AE4 of fourth/fifth century date were available to support the dating, and thus Phase I might be earlier in the fifth century than Watson had suggested.



6. 3rd-4th century forms from the sub-floor (XXXVD 3.7) and pit (XXXVD 3.8) of the warehouse room: 1. CN20093 Jar, Pale CTC, XXXVD 3.7; 2. CN20119, Jar, CTC, XXXVD 3.8; 3. CN20101, Bowl, CTC, XXXVD 3.7; 4. CN20090, Bowl/Casserole, CTC, XXXVD 3.7; 5. CN20092, Jar, MTC, XXXVD 3.7; 6. CN20120, Jar, MTC variant, XXXVD 3.8; 7. CN20121, Bowl, MTC, XXXVD 3.8.

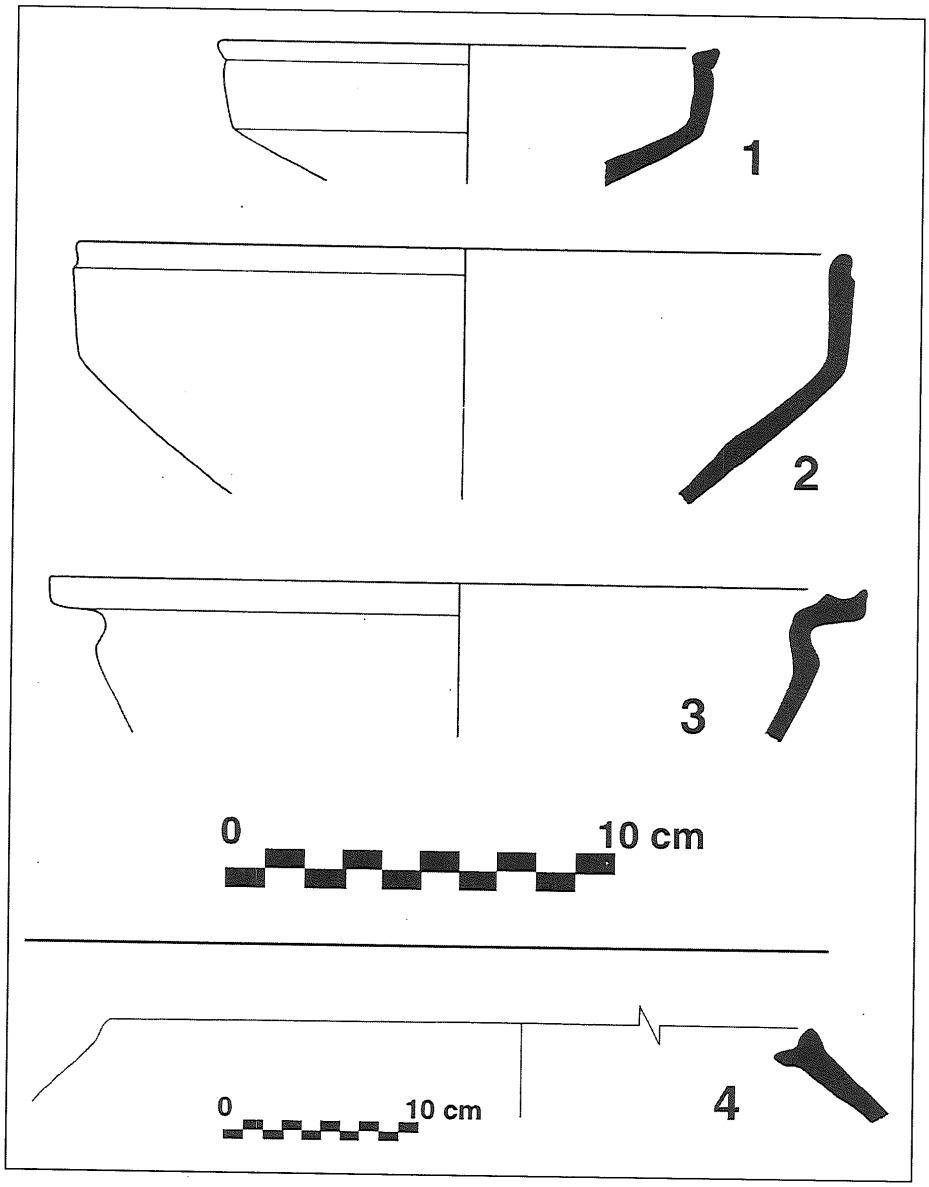
lar body walls, 3mm thick, with shallow, close-set, rounded ribbing. Short, plain, basically upright neck, 5-6mm thick. Simple rim, slightly thickened externally, with cut groove on top. External surface slipped or fired brown; burning on rim; Diam: 11cm, 25% preserved; Ware: medium fine levigation, many tiny-large voids, lime, subangular and round quartz, red/brown stone, orange and pink grog, lime spalls on exterior surface; Fabric: ca. 7.5YR 7/4, int. surface 5YR 7/6, ext. surface 5YR 6/6.

2. CN20119, Jar, CTC, XXXVD 3.8: Slightly undulating, plain neck wall, 4mm thick, straight up to rim. Simple rim, thickened externally, top inner edge slightly pointy, outer face rounded; Diam: ca. 15cm, <5% preserved; Ware: fine levigation, but cracking, very many tiny-medium rounded and subangular quartz, rare shell and small-medium red-brown stone; Fabric from ca. 2.5YR 5/8 to 5YR brown; ext. surface/slip (?): 5YR 5/2.

3. CN20101, Bowl, CTC, XXXVD 3.7: Full profile extant: Slightly concave base, 3-4mm thick with close-set, shallow, rounded ribbing. Rounded carination just up from base, where ribbing changes to wide-set, wide, round ribs all the way to rim. Body walls, 4-5mm, flare out from carination to rim. Slight ribbing on interior. Rim thickened and flattened externally, top rounded, thickened and flattened outer edge of rim, outer face has two thin grooves, 1 each side of rib in middle of 2.1cm deep rim; Diam: 22cm, 17% preserved, base complete; Ware: fine levigation, many elongated voids but fabric not cracking, many small-medium subangular quartz, occasional small red-brown stones and small-large yellowish lime; 2.5YR 5/6-8; fire blackened exterior, and interior base; *Parallels:* Watson (1992a: plate 109.10 and ?109.9), Pella: diam. 21.5, Coarse Terracotta, Byzantine Phase 1 (mid 5th) but see discussion above.
4. CN20090, Bowl/Casserole, CTC, XXXVD 3.7: Plain walls, 3-4mm thick, flares up to rim. Knife cut rim, projecting internally. Small horizontal handle with centre band; Diam: 20cm, 14% preserved; Ware: medium levigation, many elongated voids, much tiny-medium quartz, some tiny-medium red-brown stone; 5YR 7/6; fire blacked interior and exterior.
5. CN20092, Jar, MTC, XXXVD 3.7: Plain globular body walls, 4mm thick, curve into neck with slight ridge on shoulder. Short plain neck, 4mm thick, leans into rim. Simple rim, thickened externally; Handle stub on rim; Diam: 13mm, 12% preserved; Ware: medium fine levigation, very few inclusions, occasional elongated voids and medium lime; int & ext: 2.5-5YR 6/8, 30% dark brown core; ext surface 2.5YR 5/6; Mohs: 3.5; *Parallels:* Adan-Bayewitz 1993: Form 4D: late 3rd-early 5th.
6. CN20120, Jar, MTC variant, XXXVD 3.8: Plain walls, 3-4mm thick, lean in to simple rim. Rim thins to point, in line with exterior; Diam: 12cm, 5% preserved; Ware: medium levigation, some small lime, occasional small-medium red-brown stone (seems like standard MTC/Galilean ware with extra lime and surface is grittier, perhaps the Golan variant); 2.5YR 5/8, surfaces: 2.5YR-10R 4/6; Mohs: 4-4.5; *Parallels*: none in Adan-Bayewitz 1993.
7. CN20121, Bowl, MTC, XXXVD 3.8: Plain walls, 3-4mm thick, curve out to rim. Offset and everted rim, thickened externally to small triangular angle with offset line clear on interior, outer face fairly flat with a slight groove near upper edge; Slipped; Diam: 24cm, 5% preserved; Ware: medium levigation, occasional small black stone, elongated voids, rare very large quartz; Fabric: 2.5YR 5/8, slip: 2.5YR 5/6; *Parallels*: Adan-Bayewitz 1993: Form 1E.10: mid 3rd-early 5th.

***Fig. 7:** Presentation and storage vessels from the subfloor of XXXVD:*

1. CN20125, Bowl, Pale GBuff, XXXVD3.9: Plain body walls, 4-6mm thick, carinated about mid-point. Simple rim, thickened slightly exterior, flattened on top with slight groove on interior. Outer face flat to concave. Deep and V-shaped groove on exterior just under rim; Self-slipped; Diam: 13cm, 12% preserved; Ware: medium fine levigation, many specks of red-brown (?grog), quartz, grey and black stones, and voids; Paler than 10YR; Mohs: 2.5.
2. CN20105, Bowl, TC, XXXVD3.7: Plain body walls, 5mm thick, with carination slightly above mid-point. Possible groove around tondo. Simple rounded rim with groove on exterior 6mm below top; Self-slipped with thin band of cream paint on exterior, below carination; Diam: 20cm, 7% preserved; Ware: borderline to Speckled TC - medium fine levigation, many irregular voids, small-large red-brown stone and lime, occasional small black inclusions, rare black organic (?) inclusions; ext.: 2.5YR 6/8, int. (70%) 7.5YR 7/4, int. surface 7.5YR 8/4, ext. surface pale 2.5YR; Mohs: 2-2.5; *Parallels:* Falkner (1984), Jarash: no. 80, red to reddish brown, pinkish slip on ext., diam: 14cm, mid 3rd-early 4th; less good is no. 74, buff to brown, lime inclusions, crumbly fracture, light red, diam 23cm, 3rd century.
3. CN20107, Bowl, Dense TC, XXXVD 3.7: Plain, outflaring body walls, 5mm thick, carinated just under rim. Everted ledge rim with flattened to slightly convex outer face, two grooves separated by sharp ridge on upper face/rim top; Diam at outer point of rim: 20cm, inner diameter 16.5cm, 11% preserved; Ware: borderline fabric - could be Dense Speckled TC or Dense PBA. Very sharp division between int., ext. and 40% core. Very fine levigation, some small lime, red-brown and black stones and quartz. Rare very large quartz; Surfaces, int. & ext.: 2.5YR 6/6-8, core: 7.5YR 7/4; Mohs: 3.5: *Parallels*: Watson (1992a: 170-171, plate 108.11), Pella: diam 30cm, MetBuff, creamy buff throughout, late 3rd/early 4th century; Rasson-Seigne (1993: 107), Tall Fayṣal, Jarash: T.F.19, fig. 11.5, diam 25/30cm, dated to mid-3rd century AD (p. 99); Falkner (1984), Jarash: no. 20, buff, grey core, diam 44cm, occurs only in 5th century contexts but due to similarity with nos. 19 & 21 (both 3rd-5th) must start earlier than 5th.

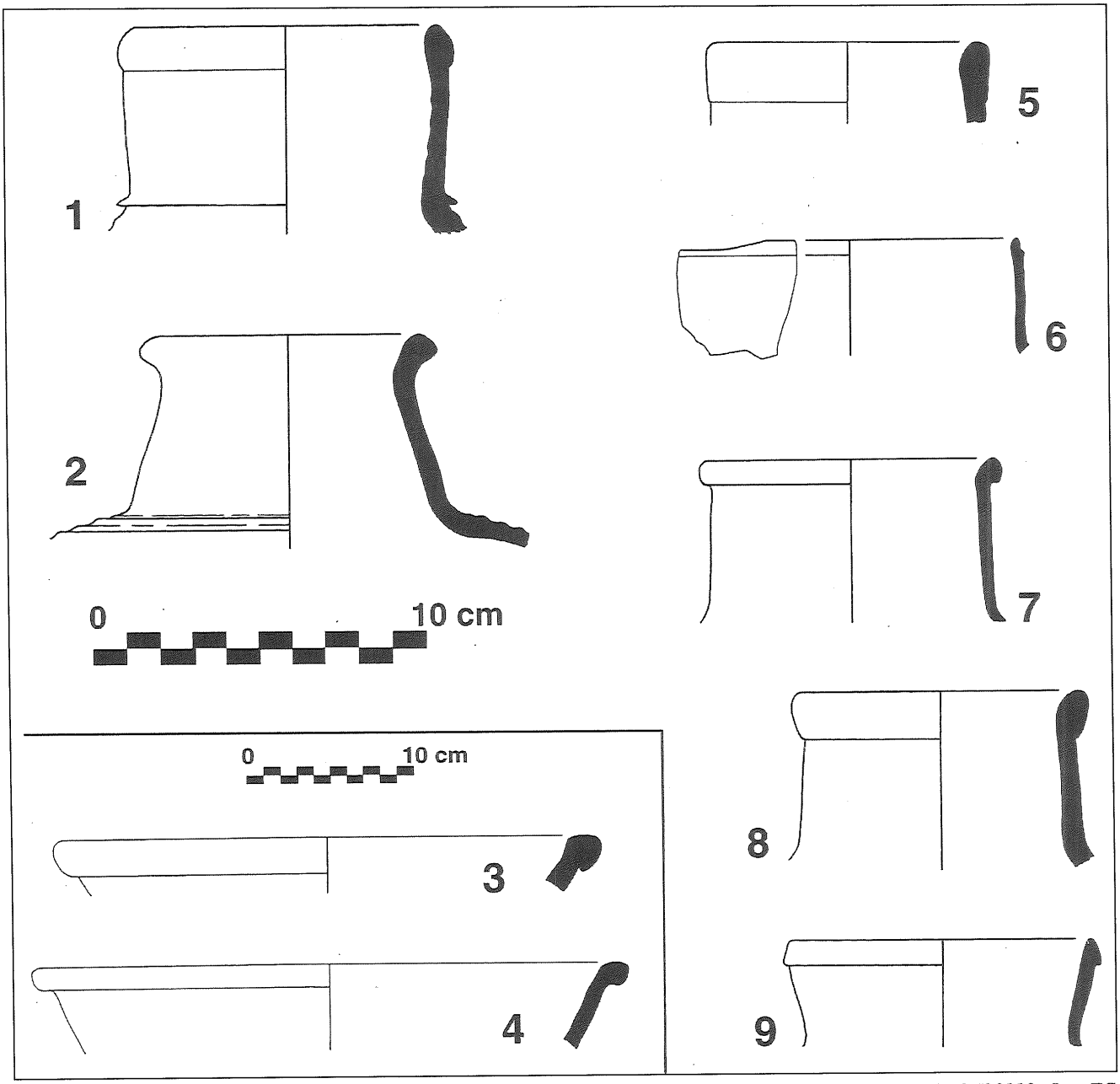


7. 3rd-4th century forms from the sub-floor (XXXVD 3.7 & 3.9) and pit (XXXVD 3.8) of the warehouse room: 1. CN20125, Bowl, TC ; 2. CN20105, Bowl, TC ; 3. CN20107, Bowl, TC ; 4. CN20118, Storage Jar, CR, XXXVD 3.8.

4. CN20118, Storage Jar, CR, XXXVD 3.8: Wholemouth jar; Plain, globular body walls, 10mm thick, curve in to rim. Rim thickened externally and more internally with broad groove along top to form ledge. Inner edge of rim comes to a sharper point than outer edge; Diam very difficult as rim damaged and uneven, ca. 42cm, 7% preserved; Ware: fine levigation, many chaff temper voids, large chert, grey stone, ?basalt, shell, pale brown stone and grey grog; 5YR 5/6; Mohs: 3.5

Fig. 8: *Storage jars and large bowls/basins from the sub-floor deposits:*

1. CN20111, Jar TC, XXXVD3.7: Globular body walls, 9-10mm thick, with shallow ribbing. Pronounced ridge at neck base. Plain neck walls, 6-8mm thick, curved into rim, ridging on interior. Simple rim, thickened exterior, shaped to point on top; Diam: 9-10cm, 5% preserved; Ware: very thin dense core, fine levigation, some elongated voids, small gray stone, red/brown grog, occasional medium lime, large brown stone, red/brown grog, rare shell; 5YR 7/6; Mohs: 3.5; *Parallels:* Watson (1992a: 170-171), Pella: generally, jars with folded out rim and collar at base of neck, e.g. plate 108.1,2,3 (all Metallic Buff) late 3rd/4th century; Smith and McNicoll (1992: 139), Pella: RN82034/CN10012, complete bag shaped jar, "Terracotta ware, numerous lime grits, 10R5/8 throughout. Buff mottle on neck", from T64 2.1 (PO 36), which is dated to the late 3rd/early 4th, though RN82034 has "a more general Late Roman horizon".
2. CN20110, Jar, TC, XXXVD3.7+3.8: Globular body walls, 5-7mm thick, with rounded overlapping ribs. Plain neck walls, 5mm thick, curve into rim. Everted rim, thickened on exterior;



8. 3rd-4th century forms from the sub-floor (XXXVD 3.7) and pit (XXXVD 3.8) of the warehouse room: 1. CN20110, Jar, TC, XXXVD 3.7; 2. CN20111, Jar, TC, XXXVD 3.7; 3. CN20103, Bowl, TC, XXXVD 3.7; 4. CN20104, Bowl, TC, XXXVD 3.7; 5. CN20117, Jar, GBuff, XXXVD 3.8; 6. CN20102, Jar, Speckled TC, XXXVD 3.7; 7. CN20109, Jar, PBB, XXXVD 3.7; 8. CN20115, Jar, PBA, XXXVD 3.7; 9. CN20113, Jar, Dense PBA, XXXVD 3.7.

Diam: sherd from XXXVD3.8 - 8.5cm, 50% preserved (cf. sherd from XXXVD3.7 diameter apparently 9cm, from 16% preserved); Ware: fine levigation, many elongated voids, tiny-small lime, occasional small-large red/brown stone, grey stone, lime spalls (borderline to Speckled TC), ?self-slipped; Ext.: 5YR 7/6, int.: 7.5YR 7/4; Mohs: 3.5.

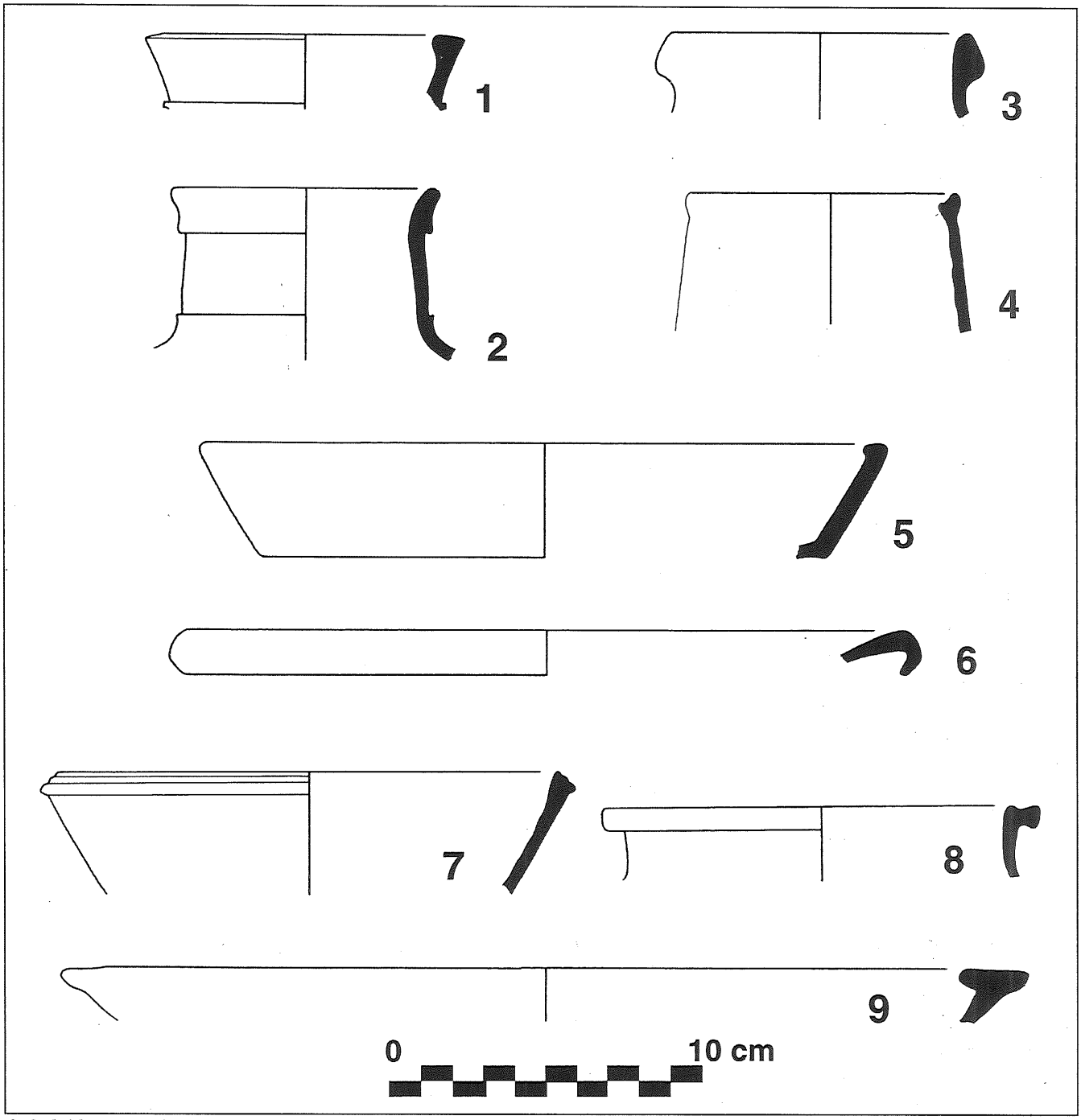
3. CN20103, Bowl, TC, XXXVD3.7: Plain walls, 13mm thick, curving slightly, flaring outwards to rim. Large rim, flattened on top and thickened externally; Diam: 33cm, 7% preserved; Ware: probably not really TC but burnt/overfired so difficult to decide: Medium levigation, many tiny-huge irregular voids, some tiny-medium subangular and round quartz, occasional small-medium red/brown and grey stone and lime; Surfaces, esp. interior are self-slipped; Fabric: 7.5YR 5/2, int. surface: 7.5YR 6/4-5YR 6/6; Mohs: 2.5.
4. CN20104, Basin, TC, XXXVD3.7: Plain straight walls, 11mm thick, flare out to rim. Simple rim, thickened externally, rounded on top and outer face; Diam: 36cm, 8% preserved; Ware: fine lev-

igation, many small-medium slightly elongated voids, occasional small-medium rounded quartz, grey stone, lime, rare large lime (this is very close to the lamp ware PLW1/4); 7.5YR 7/4; Mohs: 2.5.

5. CN20117, Jar, GBuff, XXXVD3.8: Plain neck walls, 5mm thick, straight up to rim. Simple rim, rounded but poorly finished top, thickened externally with 19mm deep outer face, very flat (similar shape to CN20112); Diam: 8cm, 15%; Ware: medium levigation, many tiny voids, black and red specks, some elongated voids, small-medium red/brown stone and grog, pink core; Ext. and ext. surface: paler than 5Y, core: ca. 5YR 8/4, not possible to Munsell interior; Mohs: 3.5.
6. CN20102, Jar, Speckled TC, XXXVD3.7: Slight kick out at bottom of fragment is the basis for the vessel description. Plain neck walls, 3mm thick, poorly finished, straight up to rim. Simple rim, flattened slightly internally to form sharp point on outer edge, uneven groove on outside of rim forms slight lip 3-5mm below rim top; Diam: ca. 12cm, 10% preserved, but very uneven; Ware: fine levigation, very much tiny-medium lime, occasional small red/brown and grey stone and yellow stone/lime; Ext. and ext. surface: 2.5YR 5-6/6, int.: (80% wall thickness) 5/0.
7. CN20109, Jar, PBB, XXXVD3.7. Plain neck walls, 4mm thick, leaning into rim. Simple rim, slightly everted, thickened exterior, rounded top; Diam: 9cm, 20% preserved; Ware: fine levigation, many small-medium grey stones, occasional medium lime, occasional small-very large red/brown stone, lime spalls on surface; Int. & ext: 5YR 6/6, core (30%): grey, ext. surface: pale 5YR; Mohs: 4.
8. CN20115, Jar, PBA, XXXVD3.7. Globular body walls, 6mm thick. Plain neck walls, 5-6mm, straight up to rim. Simple rim, rounded on top, thickened externally; Diam: 9cm, 65% preserved; Ware: ?two wares - rim seems like GBuff, body is PBA:- Rim: medium levigation, much tiny-medium orange-brown and brown grog, some tiny black, white and grey stones, tiny-large lime, spalls on surface but many from grog not lime?; Paler than 10YR 8/2, surfaces white; Mohs: 2.5; Neck: medium fine levigation, few inclusions, occasional tiny-medium red/brown stone, lime, rare small-tiny white, grey, black stone and red/brown ?grog and shell; tiny-small lime spalls; ca. 7.5YR 8/2; Mohs: 1.5.
9. CN20113, Jar, Dense PBA, XXXVD3.7. Plain neck walls, 5mm thick, straight up to rim. Simple triangular rim, thickened on exterior, with rounded top; Diam: 9cm, 15% preserved; Ware: very fine levigation, some irregular voids, occasional tiny-medium lime, medium quartz, grey and red/brown stone, lime spalls on surface; ?cream coloured slip, fabric: 7.5YR 6-7/4, ext. surface: 10YR 8/2; Mohs: 4.5.

***Fig. 9**: A selection of 3rd-4th century forms from the collapsed mudbrick of the warehouse:*

1. CN20072; Jar, TC, XXXVD3.3. Neck only preserved, broken at ridge. Walls, 5-6mm thick, flare slightly out to rim. Simple flat rim, thickened slightly on interior; Diam: 10cm, 15% preserved; Ware: medium levigation, occasional small round and elongated voids, many tiny-small, some medium inclusions, similar amounts of quartz, grey stone and ?grog; Surfaces 10YR 7-8/4, fabric: 5YR 6/6; Mohs: 4.5.
2. CN20056, Jar, Speckled TC, XXXVD3.3: Globular walls, too little preserved to show ribbing, 4mm thick, curve into sharp collar at join with neck. Slightly ribbed neck walls, 5mm thick, lean into rim. Slightly everted rim, thickened on exterior with outer face, 1.6cm deep, smoothed to convex shape, inner face flattened; Diam: 9cm, 16% preserved; Ware: medium levigation, much tiny lime, many tiny round and long, thin voids, tiny-occasionally large pale grey stone and some tiny-small quartz; Int. & ext.: 2.5YR 6/8; core: 7.5YR 6/6; Mohs: 2.5.
3. CN20074, Jar, PBA, XXXVD3.4. Plain walls, 4mm thick, curve into rim. Simple rim, thickened externally, top shaped to point, outer bottom edge of rim grades into neck walls; Diam: 10cm, 28% preserved; Ware: overfired or burnt PBA: medium levigation, occasional small-medium pale grey, rare small bright red stone, no lime in section but some voids, with large voids and some large lime on surfaces; 5YR 6/4 with occasional trace of grey core, surface: 7.5YR 7/2; Mohs: 2.5.
4. CN20055, Jar, BGS, XXXVD3.3: Neck wall slightly undulating but not enough to be called ribbed, 4mm thick, straight up to rim. Simple rim, thickened interior and exterior, groove on tip so that outer edge is higher; Diam: 10cm, 9%; Ware: appears to be very pale version of lamp ware PLW2, also known as BGS, although exterior surface very abraded, medium levigation, some tiny-large grey, irregularly shaped grog, occasional large subangular red/brown stone; 7.5YR 8/4; Mohs: 2.5; *Parallel*: Smith and McNicoll (1992: 135), Pella: RN82014/CN10004, pl. 92.5: jug, T64 2.1, PO 20, Ware: TC (?) "many small to medium dark grits: 2.5YR 5/8" dated to 3rd century.
5. CN20071, Bowl, FTC, XXXVD3.3: Flat base,



9. 3rd-4th century forms contained in the collapsed mudbrick of the warehouse: 1. CN20072, Jar, TC, XXXVD 3.3; 2. CN20056, Jar, Speckled TC, XXXVD 3.3, 3. CN20074, Jar, PBA, XXXVD 3.4; 4. CN20055, Jar, BGS, XXXVD 3.3; 5. CN20071, Bowl/Deep plate, Fine TC, XXXVD 3.3; 6. CN20060, Plate, Fine TC/ETS?, XXXVD 3.3; 7. CN20070, Bowl, MTC, XXXVD 3.3; 8. CN20058, Jar, CTC, XXXVD 3.3; 9. CN20059, Bowl (or Lid?), CTC, XXXVD 3.3.

5mm thick. Diagonally leaning plain walls, 5-6mm thick. Simple rim, rounded on top, thickened on interior. Interior surface smoothed but not slipped and nearly shiny (?burnished), exterior surface less smooth, matt and mottled to dark grey; Diam: 22cm, 7% preserved; Ware: medium levigation, some small-large irregular voids, quartz and small lime; Int. & ext.: dark 2.5YR, perhaps 2.5YR 6/10, core (40%): grey/brown; Mohs: 4.5; *Parallel*: Watson (1992a: 171), Pella: flat base and general ware: CN544 (pl. 108.10): late 3rd/early 4th centuries.

6. CN20060, Plate, FTC/ETS, XXXVD3.3. Plain wall, 3-7mm thick, thickening up to rim. Everted hook rim, outer edge bevelled flat; Diam: 24cm, 5% preserved; Ware: medium levigation, some long thin voids, small rounded quartz, small red/brown stone, rare medium lime and pale yellow

?grog (or lime); Red/brown matt slip abrading off; 7.5YR-10YR 8/4, slip mottled 2.5YR, ca. 5-6/6-8+.

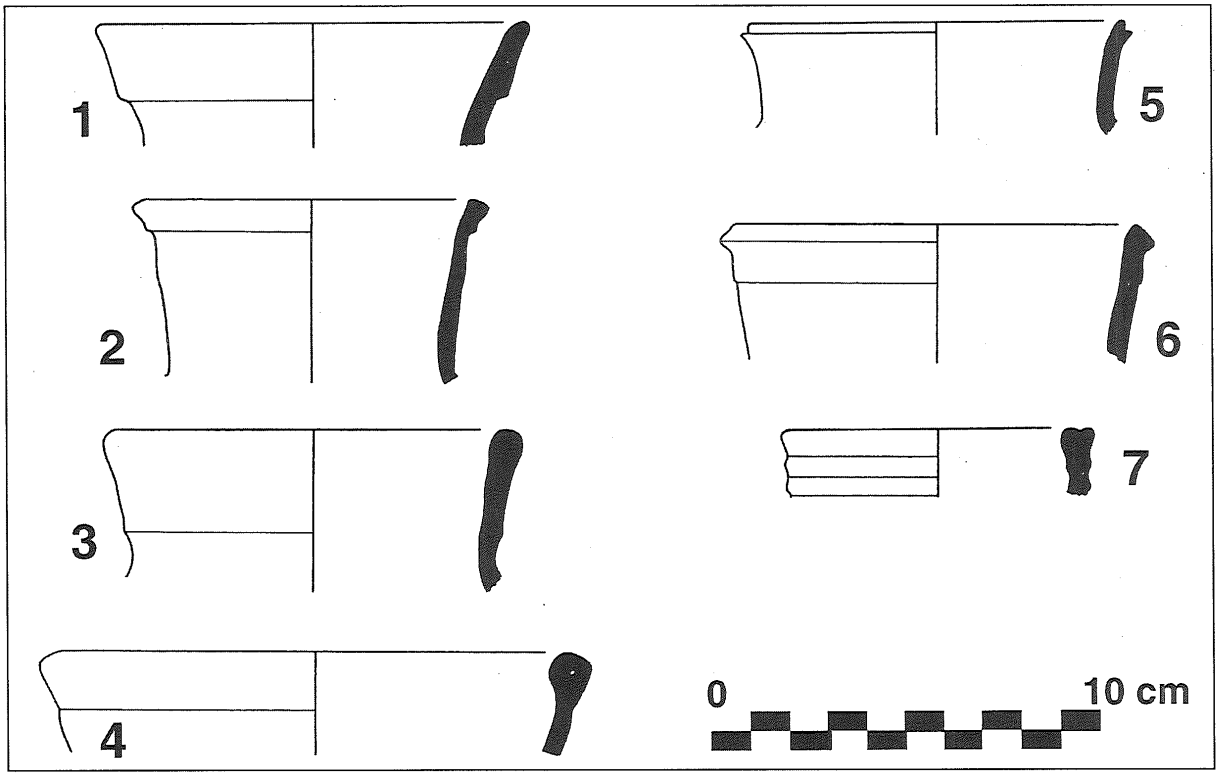
7. CN20070, Bowl, MTC, XXXVD3.3. Plain walls, 2-3mm thick, curve slightly up to rim, slight undulation on inner surface. Simple triangular rim, thickened externally, with 2 grooves on outer face; Diam: 19cm, 9% preserved; Ware: medium fine levigation, occasional tiny-large quartz, medium black stone, tiny-large lime; 2.5YR 5/8 (ext. surface abraded); Mohs: 4.5; *Parallels*: Adan-Bayewitz (1993): Form 1B.9: late 1st/beg. 2nd-mid 4th century.
8. CN20058, Cooking Jar, CTC, XXXVD3.3. No body walls extant. Short neck, plain straight wall, 4mm thick. Everted rim, thickened on exterior, outer face smoothed flat, top of rim has single deep groove with 2-3 tiny grooves within it from shaping tool. Outer upper edge of rim comes to sharp angle; Diam: 14cm, 5% preserved; Ware: core in rim & upper neck, standard ware, fine levigation, no cracking; 2.5YR 6/8, surfaces 5-2.5YR 5/4; core: pale grey; Mohs: not possible due to amount of quartz.
9. CN20059, Bowl or Lid, CTC, XXXVD3.3. Plain wall, 5mm thick, curves out to rim. Simple ledge rim thickened very much on interior and exterior, interior edge rounded, exterior edge merges into body wall, top of rim very flat and wide; Diam: 31cm, 8%; Ware: standard coarse version of ware (nearly more quartz than matrix) with significant cracking; 2.5YR 5/8, slightly browner core in parts; Mohs: not possible due to amount of quartz.

Room Use **(Fig. 10)**: The jar CN20088 **(Fig. 10.2)** most clearly shows the relationship between the GreenBuff and third/fourth century Terracotta (TC) wares. The section of the vessel fired pink would normally be described as TC, the greenish section, with fewer visible inclusions, as GBuff. Not enough is yet known about these wares to combine the two, as fired colour may have been a deliberate feature. Margaret O'Hea and Pam Watson's work on the material from the kiln dump discovered by the Pella Hinterland Survey will help elucidate these issues (Watson pers. comm.)

The most important sherd presented here is the neck fragment CN20082 **(Fig. 10.6)**. This is the earliest diagnostic sherd of this ware, Brown Slipped Painted, known at Pella (McNicoll, Smith and Hennessy 1982: plate 139, 5-7, plate 146.3, plate 148.4, 6). The ware is associated with a large bag-shaped storage jar (Riley 1975: 217, Amphora Type 3; Landgraf 1980: 67-80). Body sherds, but only a handful in total, were found in the subfloor deposits of XXXVD, which would date them even earlier than the late fourth century. Normally the ware is dated to a long-life span at Pella: fifth century to the Abbasid period (Watson 1992a: 172-172, pl. 109.7; 1992b: 238-239, Ware G, nos. 62-74; Walmsley 1995: 664, Ware 12, figs. 7.8-10). There are numerous variations, and this sherd **(Fig. 10.6)** is an early form of this very common storage jar. As with the cooking bowl in **Fig. 6.3**, the excavation of the warehouse room offers an opportunity to extend the date of the form, rather than assume on the basis of this one sherd that the whole context must be dated close to a century later. There is an urgent need for a full study of the class, including the fabrics used to make the various forms. On the basis of CN20082 and other sherds from the Late Byzantine deposits in Area XXXV, at least two fabrics can be distinguished, which, given the lifespan and distribution of the form, is not unexpected.

***Fig. 10**: A selection of forms from the floor of the warehouse, probably dating to the period of use, i.e. late 4th century AD:*

1. CN20087, Jar, TC, XXXVD3.6. Probably very short neck. Plain walls, 5mm thick, from a globular body (not extant, but bottom of sherd kicks out). Rim slightly everted, thickened externally but flattened down, 2.1cm deep, rounded top; Diam: 13cm, 7% preserved; Ware: fine levigation, very few visible inclusions, occasional small red/black stone and lime, rare large voids, occasional small elongated voids, rare lime spalls on surface; Smoothed or self-slipped surface; 2.5-5YR 6/8, core (90%): 7.5YR 6/1.
2. CN20088, Jar, GBuff (to TC), XXXVD3.6. Probably globular body (but no walls extant). Straight plain neck walls, 5mm thick. Rim slightly everted, flattened on top, thickened on interior to form small rounded lip, thickened on exterior, outer face convex, smoothing tool has left shallow marks; Surfaces smoothed; Diam: 9cm, 16% preserved; Ware: medium levigation, many tiny-small black, red/black, red/brown stones and pink inclusions, thin elongated voids and occasional medium lime; Int. surface and ext.: 5Y 8/3; ext. surface: 2.5Y8/2; int.: 5YR 7/4; Mohs: 2.5.
3. CN20086, Jar, TC, XXXVD3.6. Probably globular body (but no walls extant). Neck, 6mm thick, straight with 2 wide, very shallow ribs. Simple rim, rounded on top and very slightly thickened on each side; Diam: 11cm, 16% preserved; Ware: medium levigation, very few inclusions, rare small lime, red/brown stone, grey stone; Soft



10. 3rd-4th century forms from the floor of the warehouse: 1. CN20087, Jar, TC, XXXVD 3.6; 2. CN20088, Jar, GBuff, XXXVD 3.6; 3. CN20086, Jar, TC, XXXVD 3.6; 4. CN20081, Jar, TC, XXXVD 3.6; 5. CN20084, Jar, Pale CTC, XXXVD 3.6; 6. CN20082, Jar, Coarse BSP, XXXVD 3.6; 7. CN20078, Jar, BGS, XXXVD 3.5.

gritty texture and more lime visible on surface than in break; 2.5YR 6/6; Mohs: 1.5.

4. CN20081, Jar, TC, XXXVD3.6. No body walls extant (unless this is a very small bowl?). Plain neck wall, 4mm thick, curves into rim. Clearly rolled rim, thickened slightly internally, rounded but carelessly finished top, slightly concave outer face and moulded into neck wall; Diam: 14cm, 7% preserved; Ware: medium levigation, some small voids, quartz, yellow grog, grey stone, red/brown stone and lime; small lime spalls on surface; 2.5YR 6/8, surface darker than 2.5YR 6/6; Mohs: 3.5.
5. CN20084, Jar, PaleCTC, XXXVD3.6. Plain neck wall, 4mm thick, curves slightly into rim. Simple rim, shaped to rounded point on top, thickened externally, with groove cut into upper part of outer face; Brown slip on exterior surface; Diam: 12cm, 7% preserved; Ware: medium levigation, many oval voids, much tiny-large subangular quartz, occasional tiny or large red/brown stone; 5YR 7-8/4, slip: 2.5YR 6/4; Mohs: 7.5; *Parallels*: Falkner (1984), Jarash: no. 339, 3rd century, but is a different ware.
6. CN20082, Jar, Coarse BSP, XXXVD3.6. Neck wall slightly curving, 6mm thick. Simple rim thickened externally and flattened, up to 1.6cm deep, inner face and rim top smoothed flat to form point at top; Diam: 10-13cm, <5% preserved; Ware: very fine levigation with many long thin voids, the distinctive inclusion is a small-large 'greasy' yellow stone, also occasional small red/brown and brown stone and quartz; Whole section has 'shiny' appearance; 5YR 5/6, surfaces (?slipped): ca. 5YR 5/1; Mohs: 7.5 (suggests more quartz than visible); parallels and dating discussed above.
7. CN20078, Jar, ?BGS, XXXVD3.5: Neck walls, 5mm, ribbed with sharp points, straight up to rim. Simple rim, thickened both sides, with single groove on top, closer to outer edge; Diam: ?8cm, <5% preserved; Ware: fine levigation, many tiny-small grey inclusions, too small to check if grog or chert; 5YR 4/6; Mohs: 3.5.

Coinage

The 1996/1997 season coins were examined by Mr. P. Boland, Hon. Curator of Numismatics at the Powerhouse Museum, Sydney, including the important material from XXXV. The full listing is not yet available, as many coins have not been cleaned sufficiently for proper identification.

There were no coins in the section of stone paved floor that was removed, nor in the floor packing, nor in the pit beneath the subfloor. A short section of the south wall of the warehouse

room was dismantled for safety reasons and there were no coins in the wall or its foundation trench. Surprisingly few coins came out of the collapsed mudbrick. However, lying in a soft deposit immediately above the floor in XXXVC were five coins, spread over the room **(Table 1)**.

Given the absence of fifth century ceramics in the room's assemblage — for the implications of the few sherds of Brown Slipped, Painted ware, see above — a date for the use of the room in the second half of the fourth century seems reasonable. It may even also have been in use in the first half of that century, though that is less likely.

Coins in the robber trench (levels 3.17, 3.27, 3.29) created when the northern wall of the warehouse room was robbed out (see **Fig. 11**) were more numerous **(Table 2)**.

Judging how to interpret the tiny Late Roman coins, which were certainly used from the later fourth, throughout the fifth century, and possibly even after the reform (Magness 1993: 164-165; Bijovski 1998), is a vexed question.[3] Often they are the only coinage in deposits, and it may be that in some situations, the ceramics date the coins. In this case, where there is a sequence of identifiably fourth century coins and the preliminary cataloguing of the pottery reveals very few clearly fifth

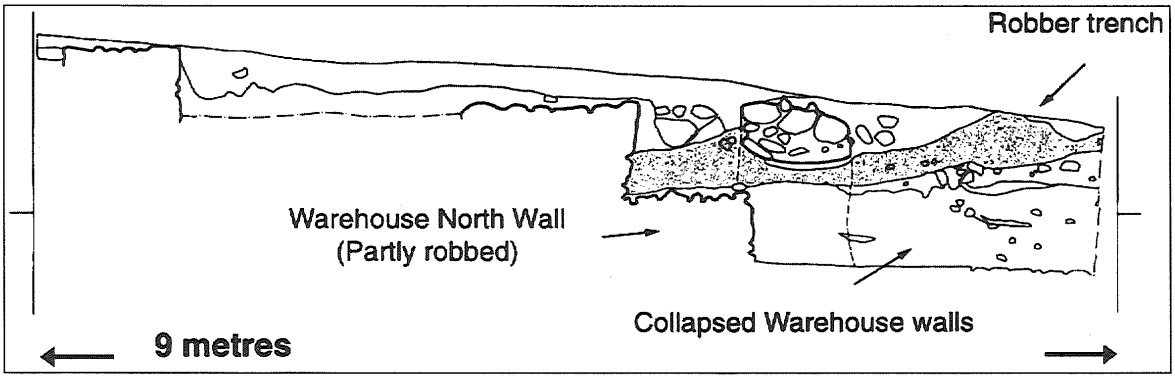
Table 1: Coin identifications and attributions.

Issuing authority	RN no.	Date
Parthian	RN 200076	2nd c BC
Maximinus	RN 200172	305-308 AD
Galerius	RN 200074	305-311 AD
Gallus	RN 200077	351-354? AD
Gallus	RN 200078	351-354 AD

Table 2: Coin identifications and attributions.

Issuing authority	RN no.	Date	Comments
Unidentified	RN200152	?	
Hellenistic city ?	RN200367	$2^{nd}/1^{st}$ c BC	Tyche (could be Late Roman $4^{th}/5^{th}$ as very difficult to read)
Hellenistic copy ?	RN200373	$2^{nd}/1^{st}$ c BC ?	Herakles?, casting lugs
Constantine I	RN200069	309-323	
Constantius II	RN200173	341-346	
Constantius II & Vetranio	RN200055	350	Siscia
Constantinian ?	RN200370	337-361 ?	fragment, Fallen Horseman (FH) type ?
Roman Imperial	RN200345	350-400	Victories with shield
Theodosius I ?	RN200352	379-395	
Late Roman	RN200371	350-400+	FH elements
Late Roman	RN200372	$4^{th}/5^{th}$	fragment
Late Roman ?	RN200153	$4^{th}/5^{th}$?	broken
Late Roman	RN200130	$4^{th}/5^{th}$	small disc

3. Gabriella Bijovsky's study of further implications of fifth century coinage (forthcoming) will be a significant contribution to improving our understanding of this issue.



11. North section of XXXVC, showing location of robber trench above collapse debris of warehouse.

century ceramics, it seems reasonable to suggest that the robber trench was created and filled in, in the early part of the fifth century. This would help confirm the destruction of the warehouse room to the very end of the fourth century AD.

Lamps

Corroborating this dating are the two complete ceramic lamps found in the collapse (**Fig. 12**). Along with the bronze bowl RN200079 (see below in the small finds section; **Fig. 21.7**), they were the only intact objects found in the debris of the room. All three objects seem to have been in use at the time of the destruction and were probably on shelves or in niches along the wall. A section of decayed wood was found next to the bronze bowl.

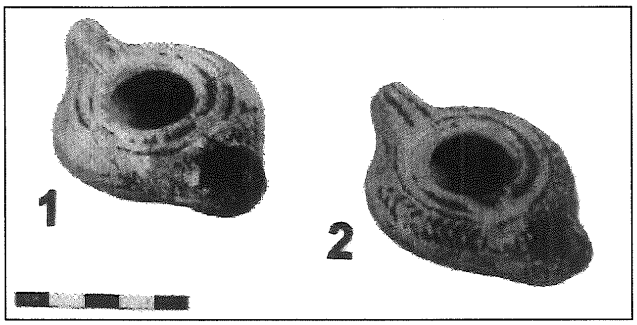
The two lamps were made from the same mould, and in addition have an unusual potter's mark on the base, consisting of a series of rosettes. Only one of the lamps has a decoration of impressed chevrons on the shoulders, which implies that these chevrons, so common as decoration on a related type, the *'Bilanceolate'* lamp, were created using a rouletting tool (Levy 1985), rather than in the mould.

The pair belong to the *'Round bodied, no discus'* type. This is a version of the *'Gerasan round with impressed shoulder decoration'* of Lapp's (1997: 49-52 and fig. 29) and one of the three related types discussed by Hadad from Baysān: *'Late Roman Type 2'* (probably 'Gerasan round'), *'Late Roman Type 3'* (also called by her *'Jebel Jofeh'* lamps) and *'Late Roman Type 4'* (1997: 151-152, figs. 2-4). The two lamps from Pella are quite clearly transitional in form and decoration from the 'Gerasan round lamp', discussed by Lapp,[4] to 'Bilanceolate' lamps. The standard date for the 'Round bodied, no discus' type is the second to fourth centuries AD. Numerous examples are known from Jarash in third century deposits (e.g. Rasson 1986: fig. 17.10). They are never found in fifth century contexts except as fragmentary rubbish survival. Since the derived 'Bilanceolate' lamps are dated third to fourth centuries AD, this too indicates that the fourth century is as late as it is possible to date our two lamps.

Both lamps are quite sturdy and might have been contained within mudbricks, thus predating the room. That coincidence would be extreme, and it is much more reasonable to suppose, since they were made in the same mould, and both show soot marks, that they were obtained at the same time for contemporary use.

***Fig. 12**: The lamps from the warehouse room:*

1. RN192002 XXXVD 3.4: Round bodied, no discus, complete: 2 thick rings around filler hole; plain shoulder, stamped flower, made of 7 impressed dots around a centre dot, each side of handle on shoulder; large lug handle lying completely flat with 2 thick grooves on upper face; 8 tiny dashes behind the wick hole; no ridge or border around wick hole in snub nozzle; stamped flower, of 7 dots around a centre dot, under handle, in centre of otherwise plain base and under nozzle; red brown slip, largely worn off; used; L: 8.7cm, W: 6.5cm, H: 2.7cm, Diam filler: 2.4cm; surface mottled from 10YR 10/4 to 7.5YR 8/8, slip: 2.5YR 5-6/6; ware: fine levigation, tiny-small black, gray and red/brown stone and quartz



12. Two lamps found within the collapse of the warehouse: 1. RN192002, XXXVD3.4 ; 2. RN192003, XXXVC 3.21.

4. Incidently the example used by Lapp is a lamp from Pella: RN82005, VIT64 1.2.

inclusions and occasional irregular voids; cannot tell from surface if fired with pinkish core as is often the case with this ware.

2. RN192003 XXXVC 3.21 PO 173: Round bodied, no discus, complete: same mould as RN192002; variations in decoration are: chevrons pointing to handle on each shoulder, though they are misaligned at handle end; stamped flower does not appear under nozzle; Used; L: 8.3cm, W: 6.3cm, H: 2.6cm; Diam filler: 2.4cm; ware ca. 5YR 7/6, slip 2.5YR 5/6; Mohs: 2.5; Ware: Standard Bilanceolate ware, as RN192002.

Summary

Some diagnostic glass forms are discussed below by Dr. O'Hea. She points out that previously at Pella the forms in question have been associated with later pottery and thus dated to the fifth century. However, since the types are also known from late fourth century contexts elsewhere, they fit well within the proposed date range for the XXXV warehouse room.

The combined evidence of the ceramic sherds from the construction phase, the coins from the use phase of the room, the subsequent robbing phase of the already destroyed room, and the evidence from the ceramic lamps in use in the room all point to a short time span for the warehouse room: the fourth century generally, probably the second half only. There is no evidence for what caused the destruction of the room, though since it was almost completely empty, perhaps it was purposely demolished rather than destroyed by a natural catastrophe.

Late Byzantine to Umayyad Courtyard House (Phase 3)

Trenches A and B contained in the upper levels a large courtyard and parts of surrounding ground floor rooms, all part of a single complex. Finds from this phase have not been fully catalogued, so all statements here are preliminary. It appears that the house was built in the late fifth or early sixth century AD. The street or lane off which the house opened rose in height compared with the house, necessitating the building of a short flight of steps. Similar stairs are known from houses in Area III/IV at Pella. Collapsed mud brick and some stone tumble in the 'kitchen' (locus 7) of the house suggests destruction in an earthquake and the preliminary assessment of the ceramics indicates that the 660 earthquake, which definitely substantially affected the houses in Area III/IV, is likely to be the cause. However, the courtyard of the house seems to have remained fairly clear, or was cleared, perhaps in the same episode that saw the tumble in the 'kitchen' cleared from the doorway, and a hole punched through the wall to reach a bench on the inside of the room — actions presumably made by people who were very familiar with the interior layout, most probably the owners or occupiers. However, unlike the houses in Area III/IV, the XXXV house was never rebuilt. Although based on the evidence of half a house, and thus needing confirmation from further excavation, the remains suggest a date for the change in size of the city. It appears that after the 660 earthquake, along with the incorporation of former streets into private house areas and other significant urban reconfigurations (Walmsley 1982: 152-153; Watson 1992a: 168; Walmsley 1996), the outlying suburbs of Pella were abandoned. One can imagine a settlement which, over the course of a century or more before 660, had increasingly become less densely occupied. However, the inhabitants may not have felt the need to change house or town plans until a massive destruction necessitated substantial rebuilding anyway.

The 'Pig Pit'

Overlying the yellowish surface of the original house courtyard was a layer of dark mudbrick collapse, containing considerable quantities of artefact debris. A depression in this layer, some 3m by 4m, but no more than 0.8m deep, contained vast quantities of large pieces of broken pottery, animal bone and glass, all within a dark mudbrick collapse matrix. Since the depression was not a constructed pit, initial digging (8.2) found it difficult to establish the extent of the context and thus some contamination with the underlying, almost contemporary, level occurred. A small Abbasid pit was also dug into the southwest corner of the depression (8.4). Topsoil lay almost immediately above the depression and rubbish levels in the courtyard, so that dating depends entirely on internal evidence. The importance of the context lies in the animal bone profile.

Initially, the depression was thought to contain rubbish from the clean-up of a single catastrophic event, such as the 660 earthquake. However, discussion with Dr. Lachlan Mairs suggests that the courtyard acted as a convenient rubbish dump, especially for the discarded body portions of butchered animals (see Archaeozoological report below).

The coins recovered from the 'pit' were in very poor condition, although if RN200154 is indeed a coin of Constans II, this helps with the dating (**Table 3**). As preliminary assessments of the ceramics indicate no certain eighth century material, the depression context (and the similar rubbish level be-

Table 3: Coin identifications and attributions (by Mr. Pat Boland).

Issuing authority	RN no.	Date	Comments
Unidentifiable	RN200156		
Parthian, ?Vologases V	RN200057	?191-208 BC	
?Roman	RN200155	?mid 4th	fragmentary coin, attribution very tentative
Roman	RN200157	?early-mid 4th	coin + two fragments
Roman	RN200056	mid-late 4th	
?Constans II	RN200154	?641-668	fragmentary

neath it) are considered to date between AD 660 and 700.

Other artefacts are described below in specialist reports, including the boar-shaped stopper/pestle which was found in the layer immediately above the 'pit'. The discarding of this intact object in the immediate vicinity of high levels of pig bones is intriguing, but little can be said of the association due to the disturbances in the context in which the stopper was found. Discussion of the glass types in the 'Pig Pit' is in the Glass report. The author and Dr. O'Hea diverge in their interpretations of the evidence for the dating of the deposit. On the one hand the single solid-stemmed glass lamp fragment is definitely mid-eighth century, but as such is so far the only object that can be definitely dated after AD 700 in the 'Pit'. On the other hand, the numerous hollow-stemmed goblets occur, as Dr. O'Hea points out, from deposits of the 660 earthquake through to the late Umayyad period, and may well therefore date to the period suggested here for the 'Pig Pit'. Until final definitive publication of the ceramics has been made, the date of the 'Pig Pit' should be considered provisional.

(K. da Costa)

Glass from 1996-1997 Excavations at Pella[5]

Byzantine Period

Purely late fourth or early fifth century glassware was retrieved from XXXVB loci 3 and 4, including wheel-incised or grooved beakers and particularly carinated and tubular-ringed bowl types which at Jalame in the Galilee were dated to the second half of the fourth century (Weinberg 1988: 46, figs. 4-6 No 51; figs. 4-15 Nos 111-112 respectively). Comparable examples of both types of bowls from XXXIIA at Pella have been attributed to a fifth century rather than late fourth century context on the basis of associated pottery. Since there is no reason to believe that these bowls ceased to be made when Jalame ceased to be occupied, it is likely that their production did indeed continue from the fourth well into the fifth century (cfs to GN 11646, 14134).

Likewise, there is no good stratigraphic evidence yet produced anywhere in the Levant against the continuation of lightly grooved and faintly hued or decolourised bowls and beakers into the fifth century AD (GN 13001-2). Although the lower body is missing from bowl GN 13001, it is likely to belong to a series of hemispherical, footless bowls, many variants of which have been identified from a variety of contexts at Pella and elsewhere; another upcast from XXXVB loc. 8 is probably close in date (GN 13011). None exhibit any indications of use as a bowl-lamp at Pella — no suspension holes, or abrasion around the rim from a metal lamp holder — despite the use of at least some of the figured, wheel-incised bowls of the same period as lamps (O'Hea 2001: 373-374). It must be assumed, therefore, that these bowls may have served as drinking vessels, along with the tall and often flat-based beakers also found in the same contexts at Pella.

A late version (GN 13003) of the trailed saggy beakers which were a feature of mid-late Roman glassware in the Eastern Mediterranean also came from Area XXXVB; it resembles one with higher kicked base from Hanita which is fourth century (Barag 1978: 26-28, fig. 14, No 65). A grooved saggy beaker rim upcast in XXXVB loc. 8 is also typologically fourth-early fifth century (GN 13010). Also present were body fragments of a prunted beaker, probably from a semi-conical or bowl-shaped vessel (GN 14110). These blue-prunted beakers, usually also wheel-polished or grooved (Weinberg 1988: 87-93 with ample bibliography) were produced in fairly large numbers

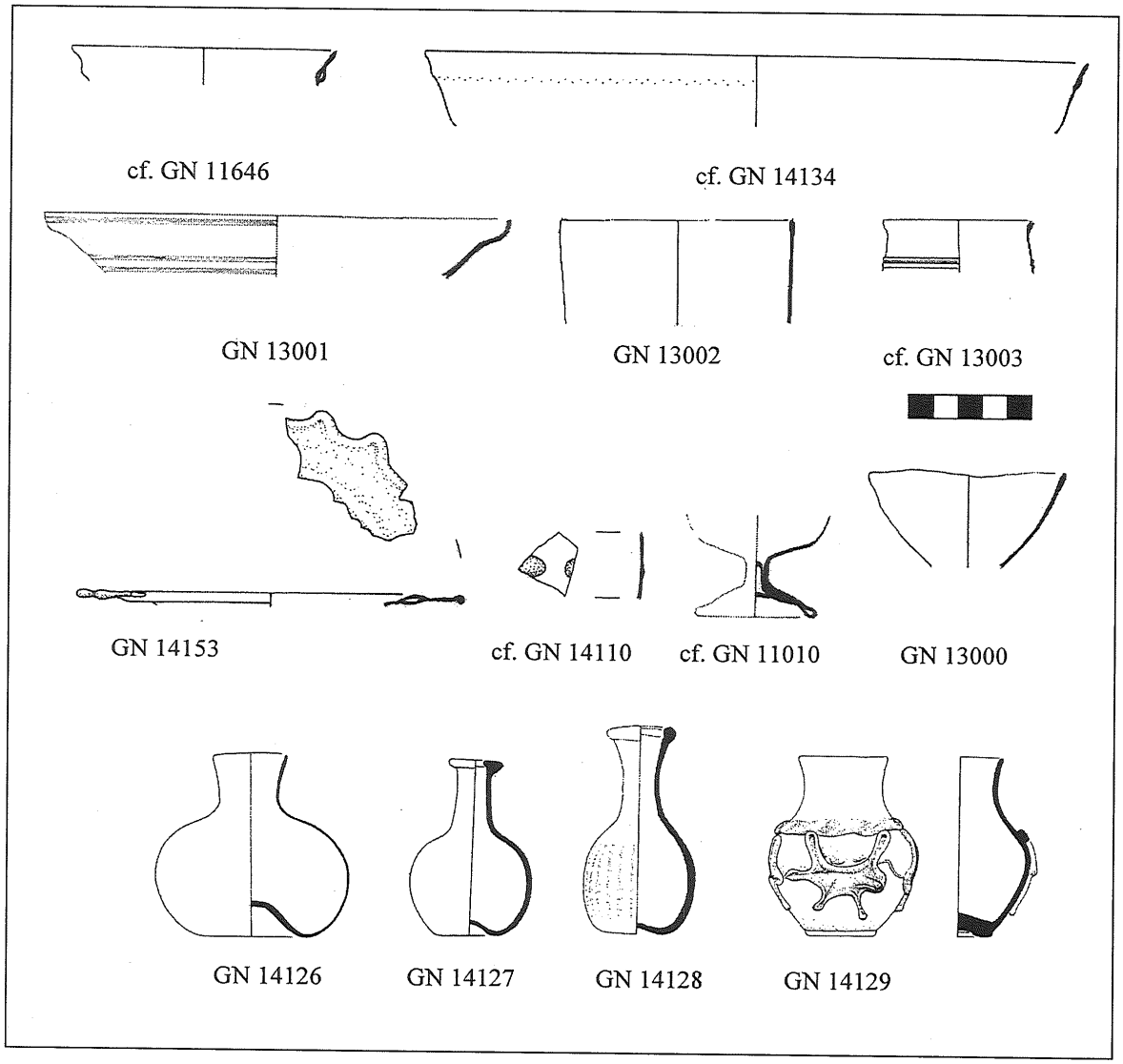
5. Dr. O'Hea would like to thank Dr. S.J. Bourke and Ms. K. da Costa for making this material available for study. All drawings are by the author, except for GN 14126-9, which were drawn by Mr. P. Donnelly.

throughout the empire in the fourth-fifth centuries. At Pella, only three of these prunted beakers been found. All have only a single line of prunts rather than triangles of three or lozenges of four prunts around the mid-body, and this seems to be typical of the thicker-walled sub-group (von Saldern *et al.* 1974: 251 No 728). There is as yet no apparent regional pattern for any sub-group in Syro-Palestine — compare the Balkans/Black Sea distribution in Sazanov (1995: fig. 2).

A bowl rim with added scallop-handle from XXXIIG is so far unique at Pella (GN 14153) and may be a rare form, unlike the much more common early-late Imperial bowls with crimped trail-handles. It belongs to a series of bowls which imitate metal-prototypes and which began in the late first-second century AD (Simoni 1981-83: 41-42, fig. 3). The lack of Early Roman occupation in or near this trench, makes it possible that this is also an early Byzantine type.

Selected Byzantine types **(Fig. 13)**

- Cf. GN 11646 (XXXVB 8.17) Tubular-ringed bowl rim. Rd 10cm. Simple flaring rim, curving in to deep, almost upright wall; rest missing. Wall folded to hollow tube below rim. Medium-thin walled. Faintly bluish.
- Cf. GN 14134 (XXXVB 4.6-9) Tooled bowl rim. Rd 25cm. Simple rim on straight wall sloping in; rest missing. Thickened tooling below rim. Thin walled. Faintly blue-greenish.
- GN 13001 (XXXVB 3.1) Wheel-incised bowl rim. Rd 19cm. Upright cupped rim, curving in above very shallow slightly convex wall; lower body missing. Narrow, lightly wheel-incised band below rim exterior, and pair of narrow lightly-incised bands around upper body. Thick walled. Yellowish with greenish tinge; no bub-



13. Fourth-fifth century glassware and Umayyad glassware from Areas XXXII and XXXV.

bles. Four fragments, three rejoining; some iridescent patches.
- GN 14153 (XXXIIG 108.5) Bowl rim with scallop-handle. Rd 12cm. Flat rim, folded to exterior and folded again, then edge pulled out to form flat scalloped handle. Thin wall, curving in to missing body. Greenish, bubbly, with iridescent patches.
- GN 13002 (XXXVB 3.1) Wheel-incised beaker rim. Rd 10cm. Simple, upright rounded rim on almost vertical wall. Wheel-polished on interior and lightly incised bands around exterior below rim. Medium-thick walled, thinning towards base. Strongly blue-greenish, no bubbles; some iridescent patches.
- Cf. GN 13003 (XXXVC 3.12) Trailed saggy beaker rim. Rd 6cm. Flaring rim, slightly thickened, above straight, slightly sagging wall, with two embedded trails on upper body. Faintly greenish.
- GN 14110 (XXXVB 8.18/19) Prunted beaker fragment. Body fragments; medium-thick walled. Blue-greenish, each with single extant mid-bluish prunt on exterior. Two fragments, non-joining; iridescent patches.

Umayyad Period

Umayyad Glass from Area XXXV: The 'kitchen' area in XXXVB loc. 7 yielded fairly nondescript terminal Byzantine/Umayyad glassware, including a single fragment of window pane, perhaps from the same period, and an unusually large flask or carafe, of typically late Byzantine and early Umayyad unevenness. It might be made from recycled glass, as indicated by the grittiness of the fabric (GN 13000), and could be early seventh century.

A pit in XXXVB loc. 8 which yielded copious amounts of pig bones also contained a large number of very badly hydrated, typically late Umayyad glassware, including many flasks, at least twelve goblets (all hollow-stemmed, see cf. 11010 for type), two hollow-stemmed lamps and a single solid-stemmed lamp. Only one glass fragment showed clear heat-distortion from within the pit, but heat-distorted Umayyad glassware also came from debris elsewhere within this feature, indicating a widespread but incomplete cleanup after a fire. The hollow-stemmed goblet form first appears at Pella in collapse of ca. AD 630/660 (Watson 1993: 204) but the form seems to have persisted to the mid-eighth century catastrophe. However, the solid-stemmed glass lamp form also occurs elsewhere at Pella in houses which collapsed in the AD 749/750 earthquake, but not in much earlier contexts, suggesting that the 'pig pit' was largely filled by material at some point within the early to mid-eighth century.

Umayyad Glass from Area XXXII: Remarkably complete was a Late Umayyad small globular flask from XXXIIJ, which is dated to the late Umayyad period (GN 14127), and a group of three flasks all of which follow conservative Byzantine-Umayyad forms (GN 14126, 14128-9). The most decorated is a small tall-mouthed flask with trailed open four-pointed stars or crosses, which is found from the Lebanon to Mesopotamia and across to the Mediterranean coast. Exact parallels elsewhere are uniformly Umayyad, including one from Jabal ad-Drūz (al-'Ush 1964: 58, fig. 48) and another from a grave at Mesopotamian Umm Kashm (al-Haditti 1995: 228, fig. 22). The decoration might well be intended to be Christian. The type appears common in Palestinian collections; the star or cross-like trails occur on variant but clearly contemporary forms (Hasson 1979: 7, fig. 6). Variant decorations on the same form reached a tomb near Xi'an in China, which was sealed in AD 741 reinforcing an Umayyad *floruit* for Pella's type (Moore 1998: 81, fig. 19.5), but the form itself may have continued into the ninth century, as at Susa (Lamm 1931: 358-367; Lacam 1961: 26-27, illustrated 19).

Selected Umayyad types **(Fig. 13)**
- Cf. 11010 (XXXVB 8.2) Goblet base. Bd 4.5-5cm. Probably wide bowl (missing) on short, thick walled hollow stem, splaying to low folded foot with tubular edge. Concave plug at top of stem and partially plugged by folded foot at base. Medium walled; indeterminate fabrics. Minimum number estimate (MNE): 6 (illustration is of type).
- GN 13000 (XXXVB 7.2) Large funnel-mouthed flask rim. Rd 8cm. Uneven, rounded rim, curving convex in to wide cup mouth; rest missing. Thick walled. Bubbly with occasional grits. Strongly blue-greenish; slight iridescence.
- GN 14126 (XXXIIJ 8.1) Squat tall-mouthed flask. Ht 7 Rd 2.7cm. Simple rounded rim on short tall mouth, on wide globular body; simple base. Medium-thick walled. Light olive greenish; black on iridescent patches.
- GN 14127 (XXXIIJ 2.7) Small globular flask. Ht 7 Rd 2cm. Small everted rim, folded flat on top, on long neck, swelling to globular body, tapering slightly to sharp heel; base highly domed. Very thin walled. Greenish; iridescent patches.
- GN 14128 (XXXIIJ 8.1) Ribbed flask. Ht 8.5 Rd 2.5cm. Everted rim, rolled in, on slightly flaring mouth, tapering to short neck, swelling to slop-

ing shoulders on tall body, tapering to rounded heel; kicked base. Light vertical ribbing on body below shoulders. Strongly mid-bluish; gritty fabric; unweathered.
- GN 14129 (XXXIIJ 8.1) Trail-decorated squat tall-mouthed flask. Ht 8 Rd 3.7cm. Simple, slightly flaring rounded rim, on upright tall and wide mouth, tooled and slightly sunken into rounded shoulders on pomiform body. Irregular short trailed crosses added around upper body. Medium walled. Faintly olive greenish, almost brownish; black on iridescent patches.

Abbasid Period

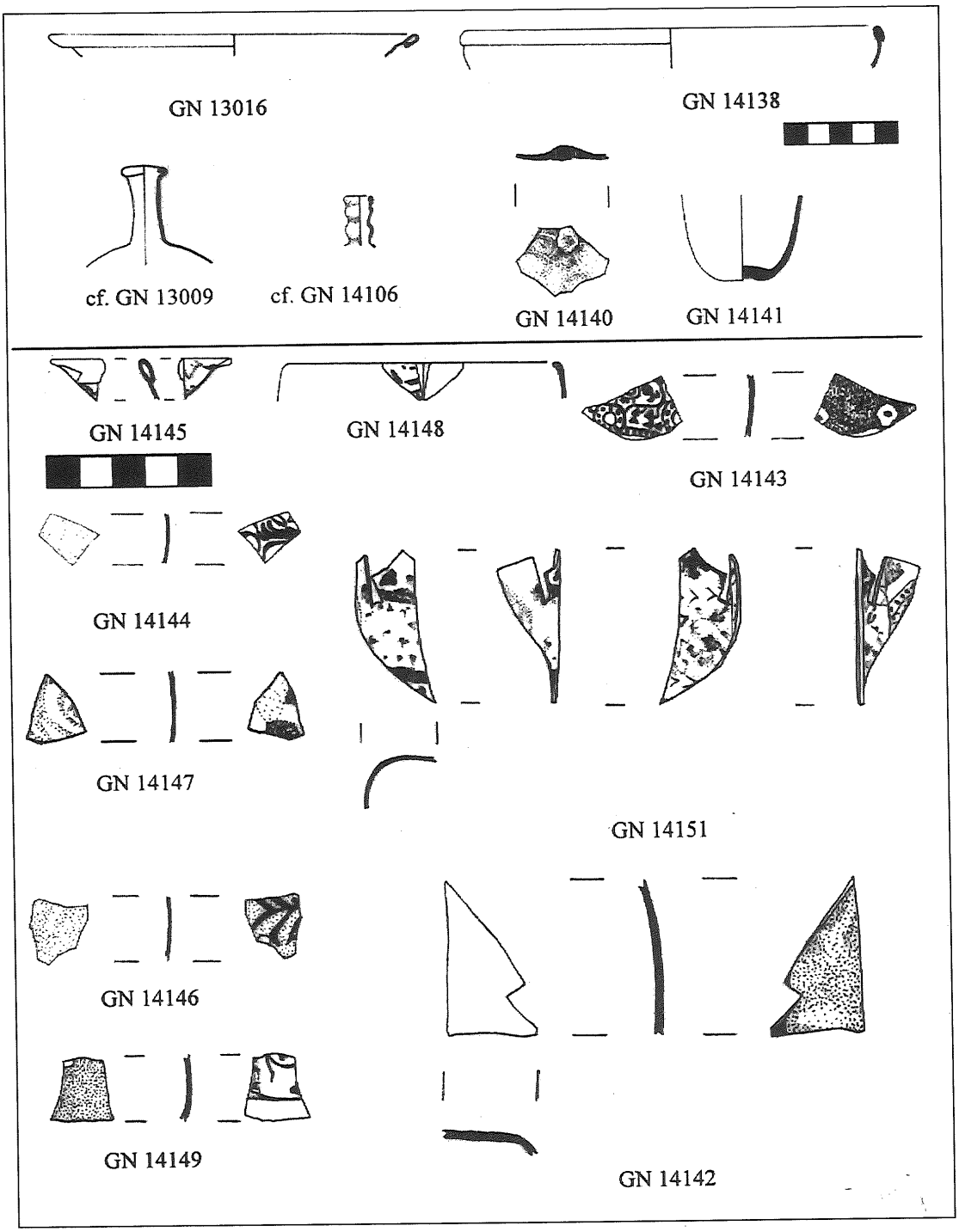
Abbasid Glass from Area XXXV: A distinct and unweathered small group of mature Abbasid glassware also came from XXXVB. Pincer-decorated beaker fragments parallel those already published from Area XXIX (O'Hea 1993: 227, fig. 25) but a saggy-bodied bowl/large beaker rim with vertical combed lines above a row of relief "pomegranates" is in a brightly emerald greenish fabric not previously known at Pella (GN 13008). Plain tall-mouthed flask fragments likewise repeat Abbasid types from Area XXIX. However, the absence of nipped beakers or flasks — which in Area XXIX seem to be very early Abbasid in date — suggests a ninth century date for this discrete but small corpus of domestic tableware in XXXVB.

This group also includes types not previously recorded at Pella. Fragments of a mould-blown blue-greenish large beaker or bowl (GN 13005) with abstract, flowing swirling pattern in very light relief on the exterior may be either Umayyad or Abbasid by context, but most closely resembles Abbasid and Fatimid vessels found elsewhere (Lamm 1935: 11, pls. 25-26). Another, small bowl rim (GN 13004) with light but regular tool marks below the rim has an Abbasid parallel from 'Ana (Bamber 1988: fig. 52, No 1); the unusual tooling is repeated on a fragmented funnel-mouthed flask with large mouth (Rd 8cm) and of unusual decolourised and bubble-free fabric — perhaps an import — from the same trench (GN 13006/7).

Abbasid Glass from Area XXXII: In XXXIIH loc. 2, immediately below topsoil with washed-in Mamluk glass, was yet another pit yielding purely Abbasid glassware. Thirteen glass vessels from the same context are diagnostically Abbasid, including nipped beaker body fragments and tall-mouthed flasks with spike-handles; six examples of tall-mouthed flasks from here parallel one from the 'pig-pit' of Area XXXVB (GN 13009), and another from Abbasid Area XXIXH. The absence of any pincer-decorated glass from this pit, however, suggests an early rather than late Abbasid dating, following the dating suggested for the glass from Area XXIXH. The cobalt blue amphoriskos (GN 13015) has the distinctive spike-handle of the very late Umayyad and Abbasid periods; only the absence of its mid-body makes it impossible to tell if it belonged to the form of nipped flask found, again, in early Abbasid Area XXIXH. It is likely to have been a local, or at least, regional, product. Also close to examples from the Abbasid complex in Area XXIX were small tall-mouthed flasks and flasks with beaded rims (cf. GN 14106).

Two honeycombed mould-blown flask bases (of type GN 14140) of typically Abbasid and later form came from contexts of mostly Fatimid-Ayyubid date. A long cylindrical flask base (GN 14141) of the same typological dating also came from a context containing lustre-painted glass, as does an incurved bowl rim (GN 14138) and an undecorated polygonal or lentoid flask base (GN 14150).

Selected Abbasid types **(Fig. 14)**
- GN 13016 (XXXIIH 2.5) Flaring bowl rim. Rd 17cm. Flaring, almost flat rim, folded to exterior; curving in to deep, sagging convex bowl, mostly missing. Medium-thin walled. Blue-greenish; unweathered. MNE: 3, others with rim diameters 20cm.
- GN 14138 (XXXIIL 1.5) Folded bowl rim. Rd 18cm. Incurved rim, folded out, on very convex wall bulging above steep body; rest missing. Medium-thick walled. Strongly blue-greenish, almost bluish.
- Cf. GN 13009 (XXXIIH 2.6) Flask rim. Rd 1.5cm. Everted rim, rolled unevenly in, on narrow long neck, swelling towards wide, rounded shoulders on large body, mostly missing. Medium-thin walled. Strongly blue-greenish and very bubbly; unweathered.
- Cf. GN 14106 (XXXIIH 2.2) Beaded flask rim. Rd 1cm. Thickened, rounded rim on narrow tall neck, lightly tooled to three ridges, carinated sharply to narrow high shoulder; rest missing. Strongly blue-greenish, unweathered.
- GN 14140 (XXXIIL 1.5) Mould-blown flask base. Bd <5cm. Centre of base extant; flat, thickened base with solid pontil mark. Light honeycombed pattern over entire base. Dark amber.
- GN 14141 (XXXIIL 1.5) Cylindrical flask base. Bd 2.5cm. Lower body of narrow, cylindrical flask or beaker, with rounded tapering base, thickened. Small solid pontil. Thick walled. Strongly blue-greenish.



14. Abbasid glassware from Areas XXXII and XXXV.

Early Islamic Lustre-Painted Glass from Area XXXII

Excavations in 1996-7 produced Pella's first lustre-painted glass. Indeed, only one other fragment from the entire Decapolis has been recorded, in desultory fashion, at Jarash (Baur 1938: 515, along with equally scant mention of an enamelled bowl), and so this important material deserves some brief discussion here.

The most distinctive glass from the XXXIIH pit was an amber fragment of a cylindrical bowl/beaker with early lustre-paint of thick applied yellow and dark brown (GN 13014 - not illustrated). This fragment is also discussed more elsewhere (O'Hea 2002: forthcoming). The earliest datable use of dark brown lustre-paint (also called staining) is early Abbasid. Combinations of opaque yellow or orange on dark brown lustre-paint are all, when datable, ninth to tenth centuries (Kröger 1998: 8-9). Ours is, however, very unusual in its amber base fabric, for examples from north-eastern Syria, Persia, Egypt or exports beyond the Near East, are all painted on

greenish or blue-greenish glass. Of published examples so far, the closest parallel to the pattern of slender lanciform leaves on the Pella vessel is on a glass bowl found in China, although the overall pattern must differ, as do both shape and underlying fabric. Since the Chinese bowl has *a terminus ante quem* of AD 874 (Kröger 1998: 9, fig. 19.1), this however supports the general contextual dating of the Pella fragment to the Abbasid period. A similar ninth-tenth century dating was attributed to the more heart-shaped leaves on a footed cup from Ayyubid packing in Jerusalem, again painted on faintly greenish glass (Hasson 1985: 140). The other glass from Pella's XXXIIH pit is purely Abbasid, with good parallels from a rubbish-filled room in Area XXIXH which should post-date AD 750 but predate the appearance of pincer-decorated glass at Pella, and thus is perhaps early rather than late Abbasid (O'Hea 1993: 221-227).

At least nine lustre-painted vessels were retrieved, in fragments, from the one trench (XXXIIL 1.5/13); two were rectangular or square-sectioned flasks (GN GN14142, 14151), the rest small bowl-like beakers or bowls with folded rim. The two flasks were paddled rather than mould-blown, and thus are highly unusual.

These fragments vary from appearing as if mostly dark red-orange — with and without gilding or yellowish overpaint — to having a delicate orange-brown wash design on their natural blue-greenish fabric. Arabic sources discussing contemporary gilding date from the tenth-eleventh centuries; an anecdotal reference to eighth century gilding on a cup might well be anachronistic and cannot be relied upon (Lamm 1941: 30 n. 48 and 16, n. 12). None closely resemble those cited by Lamm as having an Egyptian origin, nor do they resemble those in the Damascus Museum from Abbasid Raqqa (al-'Ush 1964: 60-61). None are truly polychrome, although the use of a dull yellow and of gilding add tonality to some; all are painted on both sides of the vessel walls. None are anything like complete, and the contexts are wash levels, but the co-appearance of these vessel fragments here and nowhere else at Pella suggests at least a rough contemporaneity in their original location. But of what date?

Thirty three percent (33%) of the diagnostic glass from these interrelated wash-levels were new types at Pella [Minimum number estimate (MNE): 47 vessels *in toto,* but only 31 identifiable types]. Whilst the glass assemblage from XXXIIL certainly contained late Umayyad types, the latest datable material is Abbasid. Noteworthy, however, is the absence of either the early Abbasid "nipped" beakers, or any pincer-decorated glass, which is so common elsewhere in ninth/early tenth (?) century contexts at Pella. As it might safely be assumed that pincer-decorated glass was, like lustre-painted ware, an élite item, its absence in this odd group cannot be explained by a socio-economic difference; and both groups are predominately drinking or tableware (bowls/beakers). All of this hints at a chronological difference between the two groups and, if anything, suggests a later Abbasid or perhaps even early Fatimid phase than has previously been identified at Pella.

Carboni reconstructs a decorative development in lustre-painting that starts in the late Umayyad period with double-sided, often monochrome decoration, moving to double-sided, polychrome patterns in the Abbasid/Tulunid period, and then to single-sided, light brown designs in the Fatimid/Ayyubid period (Carboni 2001: 52). Independent contextual evidence at West African Gao (Insoll 1998: 81-82) and at Caesarea Maritima (Pollack 2000: 241) certainly reinforces an eleventh-twelfth century dating for this later monochrome, one-sided patterning. The Pella fragments as a group do not fit exactly into any of these general trends. Neither the outlined and often dotted patterns of the earliest well-dated lustre-painted beaker from al-Fusṭāṭ (AD 779-780) nor a roughly contemporary beaker at Corning are really comparable to the solid arabesques on the Pella fragments (Carboni and Whitehouse 2001: 208, No 102; also cf. al-'Ush 1964: 175). Closer to the complex pattern on polygonal flask GN 14151 is the decoration on a bowl fragment in Kuwait (Carboni 2001: 57, Cat. 11), dated only by parallel to the two above-mentioned beakers, despite a clear stylistic difference. The overall impression is perhaps closer to a tenth-eleventh century fragment in the same collection (Carboni 2001: 68, Cat. 2.4h).

The solid vegetal patterns, solid orange wash on one side and the use of a dull yellow which appear on Pella fragments GN 14147-8 are however found on a group of more contrastingly-decorated vessels, perhaps all from al-Fusṭāṭ. They are dated, admittedly on rather dubious comparative grounds, to the ninth or tenth centuries (Lamm 1941: VI.2, VII.2; Carboni 2001: 60, Cat. 13), as is the appearance on Pella fragments GN 14147-9 of a dark red solid wash on one face (Carboni 2001: 52, 67, Cat. 2.2d, g-h).

It is difficult to see the technique or style of lustre-painting on GN 13014, associated with early Abbasid glass, overlapping in date with those lustre-painted vessels from XXXIIL whose decorative style seems a little removed from those seen in Mesopotamia or Egypt. An admittedly tentative

late Abbasid date is therefore suggested for the latter, whilst further excavation, and fine-tuning of the ceramic phasing, is awaited.

Lustre-Painted types (**Fig. 14**)

- GN 13014 (XXXIIIH 2.2) Lustre-painted bowl. Int.d 12cm. Cylindrical body fragment; external thick painted opaque yellow ground with dark opaque brown horizontal olive wreath below single extant line border; rest missing. Medium walled. Honey-amber fabric; iridescent patches.
- GN GN 14145 (XXXIIIL 1.5/6) Lustre-painted bowl rim. Rd indeterm. Everted rim, folded to exterior on straight wall sloping in. Two fragments; blue-greenish. Fine pattern in washy orange-brown on interior, from rim down, with dotted borders; more dotted pattern on exterior.
- GN 14148 (XXXIIIL 1.5) Lustre-painted beaker rim. Rd 8-10cm. Incurved simple rim; faintly blue-greenish. Internal light wash of translucent dark red-orange lustre paint; external opaque yellow-orange linear pattern.
- GN 14144 (XXXIIIL 1.5) Lustre-painted and gilded bowl/beaker. Medium walled, faintly blue-greenish. Internal solid dark translucent red-orange wash; external gold calligraphic or vegetal design.
- GN 14147 (XXXIIIL 1.5) Lustre-painted and gilded bowl/beaker. Convex body fragment; medium walled, faintly blue-greenish. Internal solid red-orange translucent wash with thick gilded curving lines; external opaque yellow-orange spiral, probably a tendril.
- GN 14143 (XXXIIIL 1.5) Lustre-painted bowl/beaker. Cylindrical body fragment, interior and exterior finely painted in translucent orange-brown: interior design panels of fine arabesques with small lanciform leaves within dotted borders; exterior, solid wash in same, with reserved circular "eyes".
- GN 14146 (XXXIIIL 1.5) Lustre-painted bowl/beaker. As above, but with internal solid wash of translucent orange lustre paint; external yellow-orange opaque frond.
- GN 14149 (XXXIIIL 1.2) Lustre-painted bowl/beaker. As above, but with internal solid wash of translucent dark red-orange lustre paint; external orange-brown arabesque tendril.
- GN 14151 (XXXIIIL 1.5/6) Lustre-painted large polygonal flask. Upright body/rounded corner fragment; square/rectangular-section; medium walled, faintly blue-greenish. Internal and external surfaces equally finely painted in very washy translucent brown lustre-paint; together forming horizontal band with chevron-borders, within which are very fine tendril arabesques with tiny lanciform leaves and buds on one face, and part of medallion with vegetal or dotted border on adjacent face.
- GN 14142 (XXXIIIL 1.5) Lustre-painted and gilded polygonal flask. As above, two non-joining fragments, faintly bluish and very bubbly. Internal solid dark red translucent wash with very worn traces of thick linear gilding, perhaps with opaque white; external surface undecorated.

(M. O'Hea)

Archaeozoology Report for an Umayyad Rubbish Pit in Trench XXXV.B

Introduction

During the 1997 excavation season at Pella, faunal analysis was performed on the Umayyad rubbish 'pit' in Trench XXXVB (locus 8.2 and locus 8.4). The dietary habits of the Pella inhabitants during this early Islamic period is interesting because of the high reliance on pig meat. Since Islamic proscriptions against the pig were enforced from the very beginning, the family or families using this rubbish 'pit' were most likely Christian.

Methodology

Analysis was carried out using techniques previously published (Mairs 1994; 1995).

The bone counts for the individual animal categories and the site as a whole are represented by NISP (number of identified specimens) figures, with the minimum number of individuals (MNI) identified calculated using the maximum distinction method. Meat equivalent ratios (Sheep/Goat Equivalents or SGE) are also presented in **Table 4.**

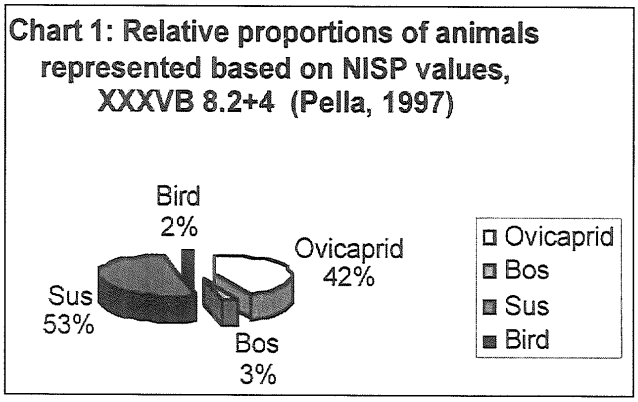
Discussion

Six hundred and twelve (612) elements were analysed with 208 being identifiable to species level (an identification rate of 34%): 53% of the bones were from pigs, 42% from sheep and goats, 3% from cattle and 2% from Galliforme birds (grouse, pheasant, quails, turkeys and chickens) (see **Table 4** and **Fig. 15**).

Leaving the proscription of pig meat by Islamic teaching aside for one moment, the high reliance on this source of protein in this particular context needs to be addressed. Up until recently there have been three main ways of interpreting pig utilisation on a site. Grigson's environmental determinism model (Grigson 1989: 112) (which is based largely on studies of European pig rearing) was one of the first and probably most obvious reasons for finding pigs in greater or lesser numbers on any given site.

Table 4: Relative proportions of species represented in XXXVB 8.2+8.4, Pella (1997 season).

Species	NISP	%NISP	MNI	%MNI	SGE	%SGE
Ovicaprid	88	42.3	11	37.9	11	16.2
Bos	7	3.4	3	10.3	36	52.9
Sus	108	51.9	14	48.3	21	30.9
Bird	5	2.4	1	3.5		
Totals	208	100	29	100	68	100



15. Relative proportions of animals represented based on NISP values.

Later Redding (1991) linked pig utilisation inversely to the degree of agricultural intensification (and to the use of cattle!). Zeder (1995: 307-309) tied pig production with non-nucleated, self-sufficient communities and also with lower status areas within a site. Pigs, according to Zeder, are meant to be less common on a site during times of greater integration within a regional urban economy — they act as a 'bell weather' of social change, a measure of economic and social cohesion. It is likely that combinations of all of these theories, in fact, played varying roles.

I have discussed the use (or more appropriately the relative non-use) of pigs on Near Eastern sites previously (Mairs 1994; Bourke *et al.* 1998; 2000) and the pattern of this use remains somewhat enigmatic. In general the use of pigs at Pella has been relatively low right from Neolithic times (see Bourke *et al.* 1998; forthcoming). No one theory can explain the general paucity of an animal that 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 therefore produce 25 offspring each year, each of which grows 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. The relatively limited use of pigs throughout millennia at Pella is difficult to comprehend from a purely economic point of view, particularly since pig use seems so high during the Umayyad period when proscriptions on pig use were presumably in place. The situation seems counter-intuitive.

Factors such as climate, social and religious strictures, economic strategies and trade all played a role in the determination of animal species use. On sites with low pig use the perceived bad habits of pigs (which often lead to the belief that they are 'unclean') are frequently highlighted by other analysts. However, those habits only arise when they are crowded and stressed in 'modern', intensive piggeries. Under normal circumstances pigs are exceptionally clean and display intelligence in the most surprising ways. Indeed, the ancient Greeks, including Aristotle, referred to the pig as *synanthropeuomenos* [i.e. living together with humans, like the dog] (Isager and Skydsgaard 1995: 93), and it would seem that the material from Trench XXXVB may well represent a microcosm of just this type of scenario: pigs raised and slaughtered in a domestic setting. The majority (82%) of the pig specimens represented were cranial in origin and a large proportion of the non-cranial elements were from the distal limbs. Even allowing for differential survivability this strongly indicates that these deposits represent a primary butchery site.

No wild animals are represented.

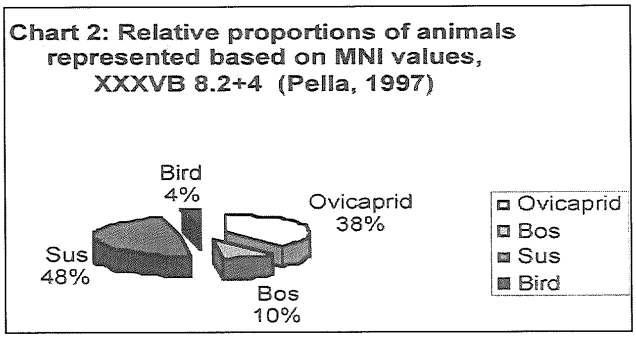
There were only 29 individual animals represented in these deposits and the MNI values are given in **Table 4** and **Fig. 16**. Proportions remain very similar for both NISP and MNI values.

Age-at-Death

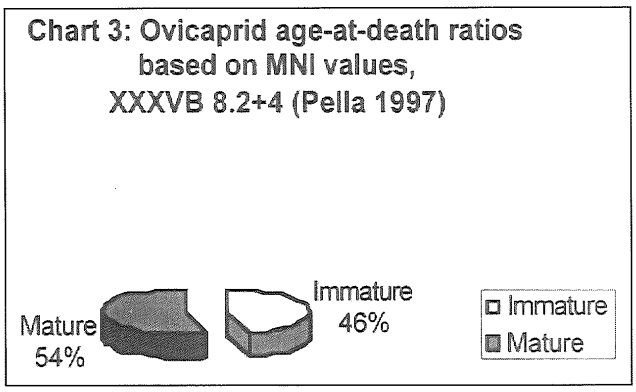
The age-at-death has only been roughly examined, however there were no neonatal or aged individuals represented in the sample. The age-at-death ratios are presented in **Figs. 17-19**. Most of the animals represented in these levels were mature and in the case of pigs over 20 months of age.

Conclusion

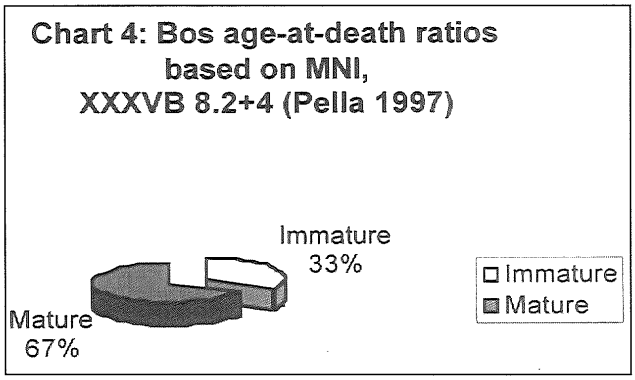
The pit from Trench XXXVB has presented to us a picture of domestic refuse from one or perhaps several domestic households in Pella during the Umayyad period — a picture that is not typically



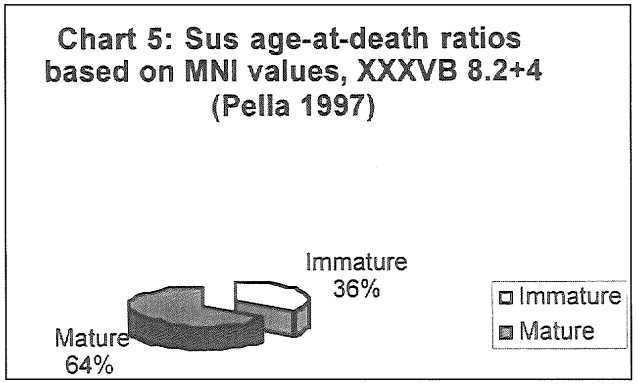
16. Relative proportions of animals represented based on MNI values.



17. Ovicaprid age-at-death ratios based on MNI values.



18. Bos age-at-death ratios based on MNI values.



19. Sus age-at-death ratios based on MNI values.

Islamic. The animals were probably slaughtered close to where the deposits were found. The pigs may well have lived within the proximity of the pits. The meat from mature animals was preferred over that from young animals.

There is also a significant statistical variation between the two deposits within the 'pit' ($p = 9.96E-07$). However, regardless of this there is still a huge amount of pig bone in both deposits (see **Tables 5, 6**).

There has been some discussion concerning the nature of the pit. From the amount of pottery that came out of the pit the excavators considered that it represented a post-calamity clean-up (such as after an earthquake, say in AD 660), which may have taken place over a fair amount of time. The faunal analysis could be interpreted to support this hypothesis. Whilst whole animals were not found in the pits there is an indication that a major shift in husbandry practices occurred at this time. In all other periods from the Late Neolithic on juvenile pigs far outweigh mature pigs at the site (Mairs forthcoming) so that a shift to the consumption of mature pigs during the Umayyad is reasonably significant. Also, as a rule, older, potential breeding pigs are not normally eaten. The most likely explanation is that something occurred at this time that required a radical shift in animal use. A collapse of the normal domestic economic processes seems the most plausible explanation. Whether this happened because of some calamity such as an earthquake, or because of other factors remains to be ascertained. As well as all the broken pottery, glass and bone, a basalt pestle or stopper carved as boar was found immediately above the 'pit' (see Small Finds Report, below). The association of such an unusual object and the large amount of pig bone is highly interesting.

(L. Mairs)

Small Finds from Area XXXV

XXXVA-B Byzantine or Umayyad House Rooms and Courtyard: loci with concentrations of finds were: 8.7. 8.9, 8.12 and 12.2

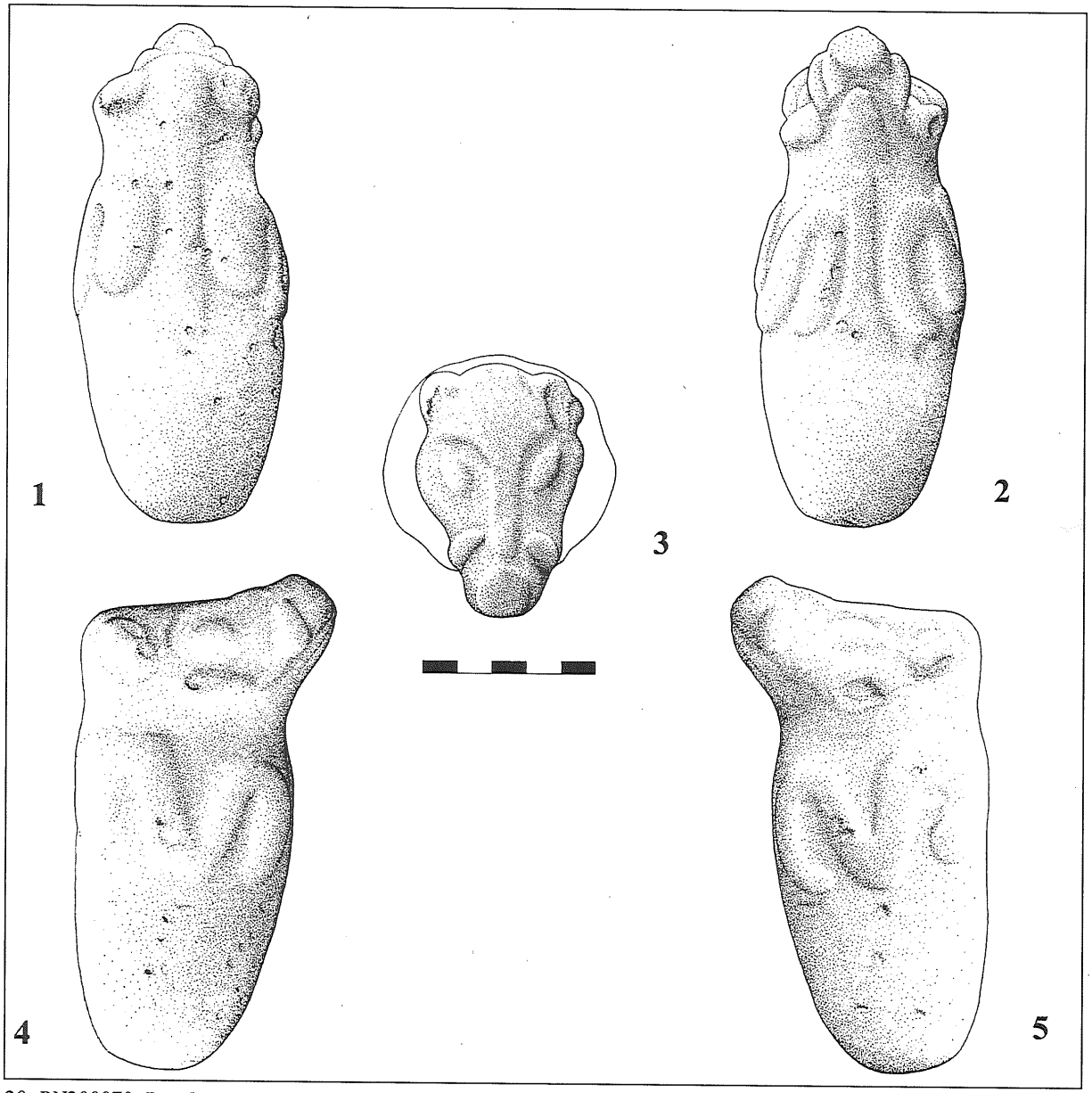
1. **(Fig. 20)** Reg. no.: 200070, book no.: 971127, area XXXVB 6.1, plot object no. 6. Sculpted jar stopper, featuring a boar-shaped head, thick neck and cylindrical body tapering to a rounded stoppered base. The features of the animal are carved in low relief, and include short ears, large eyes, short upcurving tusks and snout, with a slight raised ridge on the back of the neck. Folded front legs are indicated on the upper body. It is suggested that this object is a stopper, rather than a pestle, as there are no signs of use-wear around the base or sides. Fine grained light grey basalt. L. 140, w. 62, th. 60mm. Present location: Jor-

Table 5: *Figures for Trench XXXVB 8.2.*

Species	NISP	%NISP	MNI	%MNI	SGE	%SGE
Ovicaprid	40	31.5	5	27.8	5	11.4
Bos	6	4.7	2	11.1	24	54.5
Sus	76	59.8	10	55.6	15	34.1
Bird	5	3.9	1	5.5		
Totals	**127**	**99.9**	**18**	**100**	**44**	**100**

Table 6: *Figures for Trench XXXVB 8.4.*

Species	NISP	%NISP	MNI	%MNI	SGE	%SGE
Ovicaprid	48	59.3	6	54.5	6	25
Bos	1	1.2	1	9.1	12	50
Sus	32	39.5	4	36.4	6	25
Bird	0					
Totals	**81**	**100**	**11**	**100**	**24**	**100**



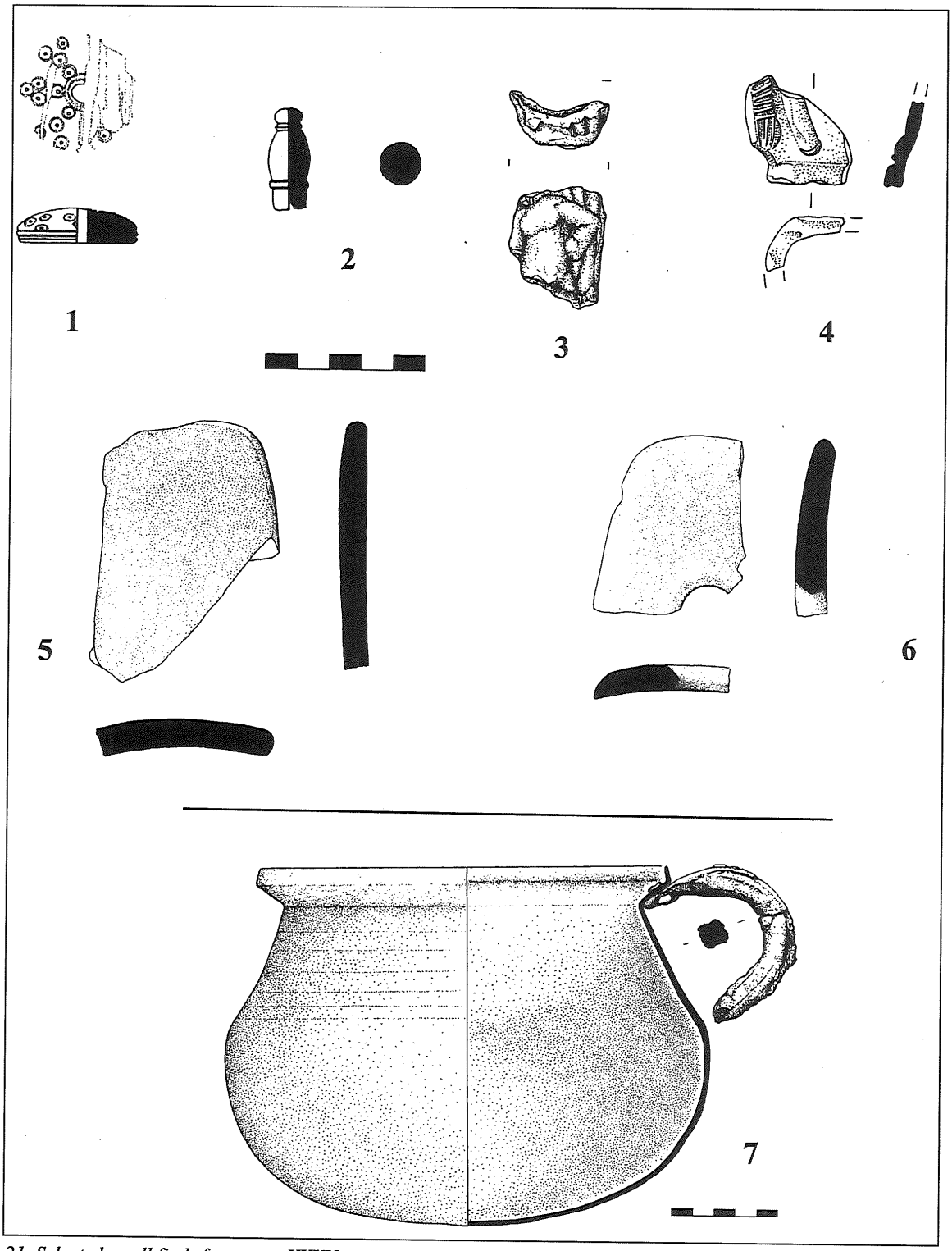
20. RN200070, Basalt jar stopper, XXXVB6.1: 1. Back view; 2. front view; 3. top view and section; 4. right side view; 5. left side view.

dan, Irbid Antiquities Office.

2. **(Fig. 21.1)** Reg. no.: 200019, book no.: 970088, XXXVB 6.1. Circular bone spindle whorl with flat base and convex upper surface, pierced through centre. Upper surface decorated with dot-circle motif in alternating lozenge and Y-shaped pattern around circumference. 2 concentric incised lines around hole, also 2 parallel incised lines around outer edge. Polished ext. Ht 9.5, diam. 37, diam. hole 7, diameter of circle decoration 4mm. Present location: Australia, University of Sydney.

XXXVC-D: Fourth Century AD Room

1. **(Fig. 21.2)** Reg. no.: 200018, book no.: 970086, area XXXVC 2.2, plot object no. 6. Complete



21. Selected small finds from area XXXV.

and intact worked bone piece, either a complete gaming piece, or a small part of a larger composite object. The body is carved into several sections, consisting of a knob-shaped top with raised collar below, elongated segment with convex sides and flat collar, then straight sided, slightly tapered lower portion to a flat underside with shallow depression drilled in the centre. Polished surfaces. L. 26, w 10.2, th. 9.7, diameter depression 2.5-3mm. Present location: Jordan, Irbid Antiquities Office.

2. **(Fig. 21.3)** Reg. no.: 200040, book no.: 971401, XXXVC 1.6. Male or female figurine fragment, consisting of slightly bent torso with belly button marked by circular depression. Left arm broken above elbow, upper part straight; right arm bent and resting on hip, possibly holding a circular object such as a ball. Head and legs missing. Concave, rough back surface. Finely levigated orange fabric. L. 37, w 30, th. 10mm. Present location: Jordan, Irbid Antiquities Office.
3. **(Fig. 21.4)** Reg. no.: 200047, book no.: 970277, XXXVC 3.2. Hollow figurine fragment with part of flat base preserved, apparently with a large hole in the centre. The subject is not very clear; there is a thickened collar at the base, then above this an oblique object, moulded, convex, possibly a limb but with no clear foot or hand at the end of it. To the left of this is a vertical object, with one flat outer face, and a side face decorated with vertical moulding then a series of slightly oblique parallel lines. Traces of red pigment ext. Buff, finely levigated fabric, no visible inclusions. W. 30.5, th. 5, ht 33.6mm. Present location: Jordan, Irbid Antiquities Office.
4. **(Fig. 21.5)** Reg. no.: 200071, book no.: 970155, XXXVD 1.2. Modified ceramic sherd, very slightly curved ext., so probably originally from body of a large vessel. Worked at one end to form a rounded, curved working edge, either deliberately smoothed or worn smooth through use; the other two edges are broken, and taper in to a rounded point at the other end. Possibly a potter's tool, such as a scraper or burnisher. Moderately well levigated with medium and small grey and brown stone inclusions, fired buff int. and orangey buff ext. L. 89.4, w 61, th. 7mm. Present location: Australia, University of Sydney.
5. **(Fig. 21.6)** Reg. no.: 200072, book no.: 971400, XXXVC 3.28. ceramic, Orange buff, fired grey at core, with some large white lime and red stone inclusions. potters tool. Modified sherd, slightly convex ext. One corner preserved, with two straight edges joining in a rounded corner. Smoothed at this edge, probably through use-wear, forming a markedly bevelled edge on the long side. Broken on two other edges. Part of large hole through centre preserved, hole bored after the sherd was fired, from both sides. Probably potters tool, or burnisher. L. 58, w 42.7, th. 8, diam. hole 14mm. Present location: Australia, University of Sydney.
6. **(Fig. 21.7)** Reg. no.: 200079, book no.: 971491, XXXVD 3.3, P.O. no.: 6. Bronze bowl made from hammered sheet metal, featuring simple upright and slightly inturned lip, sharply carinated in around 6mm below rim to form a broad inner neck. This has the effect of leaving a downward sloping but flattish inner edge to rim. Upper body then slopes out concavely to slightly carinated shoulder; lower part of vessel hemispherical with convex base. Upper body above shoulder features a series of horizontal grooves or shallow flutes around circumference, fairly irregular, possibly tooling marks or rough decoration. One nonjoining fragment of rim has two circular lumps with iron staining/fragments attached that look like the base attachments for an iron handle; several fragments of iron were found with the object but unable to be attached. This handle would probably have been some kind of loop; it is not clear if the patches represent rivets through the body, although this is likely. This loop would have been attached to the flat inner portion of the rim. Th. 0.8, diam. RD pres 182mm. Present location: Jordan, Irbid Antiquities Office.

(R. Sparks)

K. da Costa
Pella Project
Archaeology A14
University of Sydney 2006
Australia

M. O'Hea
Classics (CESAGL), Humanities and Social Sciences
Adelaide University, SA 5005
Australia

L. Mairs
Archaeology, A14
University of Sydney, 2006
Australia

R. Sparks
Curator, Petrie Palestinian Collection
Institute of Archaeology,
31-34 Gordon Sq.
University College London

WC1H OPY
United Kingdom

P. Boland
Hon. Numismatics Curator
Powerhouse Museum
Sydney, Australia

References

Adan-Bayewitz, D.
1993 *Common Pottery in Roman Galilee: A study of local trade.* Tel-Aviv: Bar-Ilan University Press.

Bamber, A.
1988 Chapter 6 The Glass. Pp. 115-125 in A. Northedge *et al., Excavations at 'Ana.* Warminster: Aris and Philips.

Barag, D.
1978 Hanita Tomb XV. *'Atiqot* ES 12: 1-58.

Baur, P.C.V.
1938 Glassware. Pp. 505-546 in C. Kraeling (ed.), *Gerasa, City of the Decapolis.* New Haven: Yale University.

Bijovsky, G.
1998 The Gush Halav Hoard Reconsidered. *'Atiqot* 35: 77-106.

Bijovsky, G.
forth. The Currency of the Fifth Century CE in Palestine - Some Reflections in Light of the Numismatic Evidence.

Bourke, S.J. *et al.*
1994 Preliminary Report on the University of Sydney's Fourteenth Season of Excavations at Pella (Tabaqat Fahl) in 1992. *ADAJ* 38: 81-126.
1998 Preliminary Report on the University of Sydney's Sixteenth and Seventeenth Seasons of Excavations at Pella (Tabaqat Fahl) in 1994/95. *ADAJ* 42: 179-211.

Bourke, S.J., *et al.*
2000 A Second and Third Season of Renewed Excavation by the University of Sydney at Tulaylat al-Ghassul (1995-1997). *ADAJ* 44:.37-89.
forth. Preliminary Report on the Eighteenth and Nineteenth Seasons of Excavation at Pella (Tabaqat Fahl) by the University of Sydney 1996/7. *ADAJ.*

Carboni, S.
2001 *Glass from Islamic Lands.* New York: Thames and Hudson.

Carboni, S. and Whitehouse, D.
2001 *Glass of the Sultans.* New York: The Metropolitan Museum of Art in association with The Corning Museum of Glass, Benaki Museum, and Yale University Press.

Christie, N. and Loseby, S.T. (eds.)
1996 *Towns in Transition: Urban Evolution in Late Antiquity and the Early Middle Ages.* Aldershot: Scolar Press.

da Costa, K.
2001 More Evidence from Ceramic Lamps for Local Trade Patterns in the Byzantine and Umayyad Periods. Pp. 259-270 in A. Walmsley (ed.), *Australians Uncovering Ancient Jordan.* Sydney: Department of Antiquities, Jordan and RIHSS.

Falkner, R.K.
1984 *The Pottery from the British Excavations at the Jerash North Theatre 1982-1983.* Unpublished manuscript (available CBRL Amman Library).

Grigson, C.
1989 Shiqmim I - Archaeological Aspects. Mitekufat Haeven, *Journal of the Israel Prehistoric Society* 22: 111-114.

Hadad, S.
1997 Oil Lamps from the Third to the Eighth Century C.E. at Scythopolis-Bet Shean. *Dumbarton Oaks Papers* 51: 147-188.

al-Haditti, A.-M.
1995 Umm Keshm. A summary report. *Mesopotamia* 30: 217-237.

Hasson, R.
1979 *Early Islamic Glass.* Jerusalem: L.A. Mayer Memorial Institute for Islamic Glass.

Hasson, R.
1985 Glass. Pp. 140-153 in A. D. Tushingham *et al., Excavations in Jerusalem 1961-1967,* vol. I. Toronto: Royal Ontario Museum.

Insoll, T.
1998 Islamic Glass from Gao, Mali. *JGS* 40: 77-88.

Isager, S. and Skydsgaard, J.E.
1995 *Ancient Greek Agriculture: An Introduction.* London and New York: Routledge.

Kröger, J.
1998 Painting on Glass before the Mamluk Period. Pp. 8-11 in R. Ward (ed.), *Gilded and Enamelled Glass from the Middle East.* London: British Museum Press.

Lacam, J.
1961 Contribution à l'étude de la verrerie musulmane. *Cahiers de la céramique, du verre et des arts du feu* 21: 13-30.

Lamm, C. J.
1931 Les verres trouvées à Suse. *Syria* 12: 358-367.
1935 *Glass from Iran in the National Museum, Stockholm.* Stockholm and London: Paul, Trench Trubner.
1941 *Oriental Glass of Mediaeval Date Found in Sweden and the Early History of Lustre-Painting.* Stockholm: Wahlstrom & Widstrand.

Landgraf, J.
1980 Byzantine Pottery. Pp. 67-80 in J. Briend and J.-B. Humbert, *Tell Keisan.*

Lapp, E.
1997 *The Archaeology of Light: the cultural significance of the oil lamp from Roman Palestine.* Unpublished PhD dissertation, Duke University.

Levy, A.H.
1985 Two Bronze Rouletting Tools. *IEJ* 35: 181-182.

Magness, J.
1993 *Jerusalem Ceramic Chronology circa 200-800 CE.* Sheffield: Sheffield Academic Press.

Mairs, L.D
1994 The Animal Bones. Pp. 121-126 in S.J. Bourke

et al., Preliminary Report on the University of Sydney's Fourteenth Season of Excavations at Pella (Tabaqat Fahl) in 1992. *ADAJ* 38: 81-126.

1995 Jebel Khalid: Preliminary Archaeozoology Report. *MA* 8: 124-127.

2000 The Animal Bones. Pp. 75-79 in S.J. Bourke *et al.*, A Second and Third Season of Renewed Excavation by the University of Sydney at Tulaylat al-Ghassul (1995-1997). *ADAJ* 44.

forth. The Animal Bones. In S.J. Bourke *et al.*, Preliminary Report on the Eighteenth and Nineteenth Seasons of Excavation at Pella (Tabaqat Fahl) by the University of Sydney 1996/7. *ADAJ.*

McNicoll, A. *et al.*

1992 *Pella in Jordan 2.* Sydney: Mediterranean Archaeology Supplement 2.

McNicoll, A.W., Smith, R.H. and Hennessy, J.B.

1982 *Pella in Jordan 1.* Canberra: Australian National Gallery.

Moore, O.

1998 Islamic Glass at Buddhist Sites in Medieval China. Pp. 78-84 in R. Ward (ed.), *Gilded and Enamelled Glass from the Middle East.* London: British Museum Press.

O'Hea, M.

1993 Glass from Areas XXXIV and XXIX Hellenistic-Abbasid. Pp. 221-227 in A. Walmsley *et al.*, The Eleventh and Twelfth Seasons of Excavations at Pella Tabaqat Fahl, *ADAJ* 37.

2001 Glass from the 1992-93 Excavations. Pp. 370-376 in Z. Fiema *et al., The Petra Church,* Amman: American Center for Oriental Research.

forth. One More River to Cross: some problems in early Islamic glassware. *Annales du 15e Congrès de l'AIHV.* New York-Corning: Association Internationale pour l'Histoire du Verre.

Pollack, R.

2000 Glass Vessels of a Fatimid Hoard from Caesarea Maritima. *Annales du 14e Congrès de l'AIHV.* Lochem: Association Internationale pour l'Histoire du Verre: 238-242.

Rasson, M.

1986 Materiel ceramique de la deuxieme moitie du IIIeme siecle ap. J.-C. Pp. 67-69 in F. Zayadine (ed.), *Jerash Archaeological Project 1981-1983.* Amman: Department of Antiquities of Jordan.

Rasson-Seigne, M.

1993 Le materiel ceramique provenant de la fouille du 'Fortin' a Tell Faysal. Pp. 99-110 in Palumbo *et al.*, The Cultural Resources Management Project in Jordan: Salvage Excavations at 'Tell Faysal', Jarash. *ADAJ* 37.

Redding, R.W.

1991 The Role of Pig in the Subsistence Systems of Ancient Egypt: A Parable on the Potential of Faunal Data. In P.J. Crabtree and K. Ryan (eds.), *Animal Use and Culture Change.* Philadelphia: University of Pennsylvania, MASCA Research Papers in Science and Archaeology, Supplement 8.

Riley, J.A.

1975 The Pottery from the First Session of Excavation in the Caesarea Hippodrome. *BASOR* 218: 25-63.

Sazanov, A.

1995 Verres à décor de pastilles bleues provenant des fouilles de la mer noire. Pp. 333-344 in D. Foy (ed.), *Le Verre de l'antiquité tardive et du Haut Moyen Age: typologie-chronologie-diffusion.* Guiry-en-Vexin: Association Française pour l'Archéologie du Verre and Musée Archéologique Departmental du Val d'Oise.

Simoni, P.

1981-3 Gavardo Brescia. *Bulletin de l'Association internationale pour l'histoire du verre* 9: 39-43.

Smith, R.H. and Day, L.P.

1989 *Pella of the Decapolis II: Final Report on the College of Wooster Excavations in Area IX, the Civic Complex, 1979-1985.* Wooster: College of Wooster.

Smith, R.H. and McNicoll, A.

1992 The Roman Period. Pp. 119-144 in A. W. McNicoll *et al., Pella in Jordan 2.*

von Saldern, A. *et al.*

1974 *Gläser der Antike: Sammlung Erwin Oppenländer.* Mainz am Rhein: P. von Zabern.

al-'Ush, A.

1964 Les verres conservés au départment de l'art arabe musulman du Musée Nationale de Damas. *BJIIV* 3: 55-64.

Walmsley, A.

1982 The Umayyad Pottery and its Antecedents. Pp. 143-157 in A. NcNicoll, R. Smith and J.B. Hennessy, *Pella in Jordan 1.*

1995 Tradition, Innovation and Imitation in the Material Culture of Islamic Jordan: the first Four Centuries. Pp. 657-668 in *SHAJ* 5. Amman: Department of Antiquities.

1996 Byzantine Palestine and Arabia: Urban prosperity in Late Antiquity. Pp. 126-158 in N. Christie and S. Loseby (eds.), *Towns in Transition.*

Watson, P.

1992a Byzantine Domestic Occupation in Areas III and IV. Pp. 163-181 in A.W. McNicoll *et al., Pella in Jordan 2.*

Watson, P.

1992b Change in Foreign and Regional Economic Links with Pella in the Seventh Century AD: the ceramic evidence. Pp. 233-248 in P. Canivet et J-P. Rey-Coquais (eds.), *La Syrie de Byzance a l'Islam VIIe-VIIIe siecles: Actes du Colloque international (Lyon - Maison de l'Orient Mediterraneen, Paris - Institut du Monde Arabe) 11-15 Septembre 1990.*

1993 Tell al-Husn Area XXXIV. Pp. 198-210 in A. Walmsley *et al.*, The Eleventh and Twelfth Seasons of Excavations at Pella Tabaqat Fahl, *ADAJ* 37.

Weinberg, G.D.

1988 *Excavations at Jalame.* Columbia: University of Missouri Press.

Zeder, M.A.

1995 The Role of Pigs in Near Eastern Subsistence: A

View from the Southern Levant. Pp. 297-312 in J.D. Seger (ed.), *Retrieving the Past: essays on archaeological research and methodology in honour of Gus W. van Beek.* Winona Lake, Ind.:

THE ECCLESIASTICAL COMPLEX OF SAINT PAUL AT UMM AR-RAṢĀṢ - KASTRON MEFAA

Michele Piccirillo

The continuing research at Umm ar-Raṣāṣ - Kastron Mefaa (أم الرصاص), within the urban sector between the Saint Stephen complex at the northern edge of the ruins to the north and the walls of the Kastrum to the south, has lead to the discovery of yet another two ecclesiastical complexes. The southern complex that rotates around the church of the Lions, and the central complex that is apparently made up of the Church of the Peacocks and the church brought to light during three archaeological campaigns in 1995 to 1997 (**Fig. 1**).

We have called this latest sacred edifice the Church of Saint Paul, the name read in an invocation to the apostle incised on a roof tile picked from the collapse. Unfortunately the name is not confirmed by the inscriptions that accompany the mosaic.

Buried under the high rubble of the collapse, but dominating due to its raised position in the midst of the ruins, the church was easily identifiable by its apsed form. This can be seen from the schematic plan drawn by Fr. Bagatti in which the building is marked with the number "3". In spite of this, a photograph of one of the doors on the south wall was published in the Plates as part of a house (Saller and Bagatti 1949: 246, fig. 16, pl. 41,2).

The area, which was difficult to reach, had not been affected by the modern re-occupation by the families of the Salayṭa tribe, who might have limited themselves to raising, in dry stone courses, the north wall of the courtyard that is a continuation of the sacred edifice to the east (**Fig. 2**).

The ecclesiastical complex is part of a block surrounded on three sides by minor streets. Further excavations will clarify the relationships between the church and the surrounding environs particularly with the Chapel of the Peacocks in the southwest corner. To reach the church from the south side, using mechanized transport equipment to remove the discharge material, we have had to build an artificial platform upon the facade of the Chapel of the Peacocks, temporarily covering the ruins of some rooms. The complex is made up of the church with a service room and porch to the south, a yard to the east with a service room set against the church wall, and a second yard to the north upon which living rooms developed on the west and east sides.

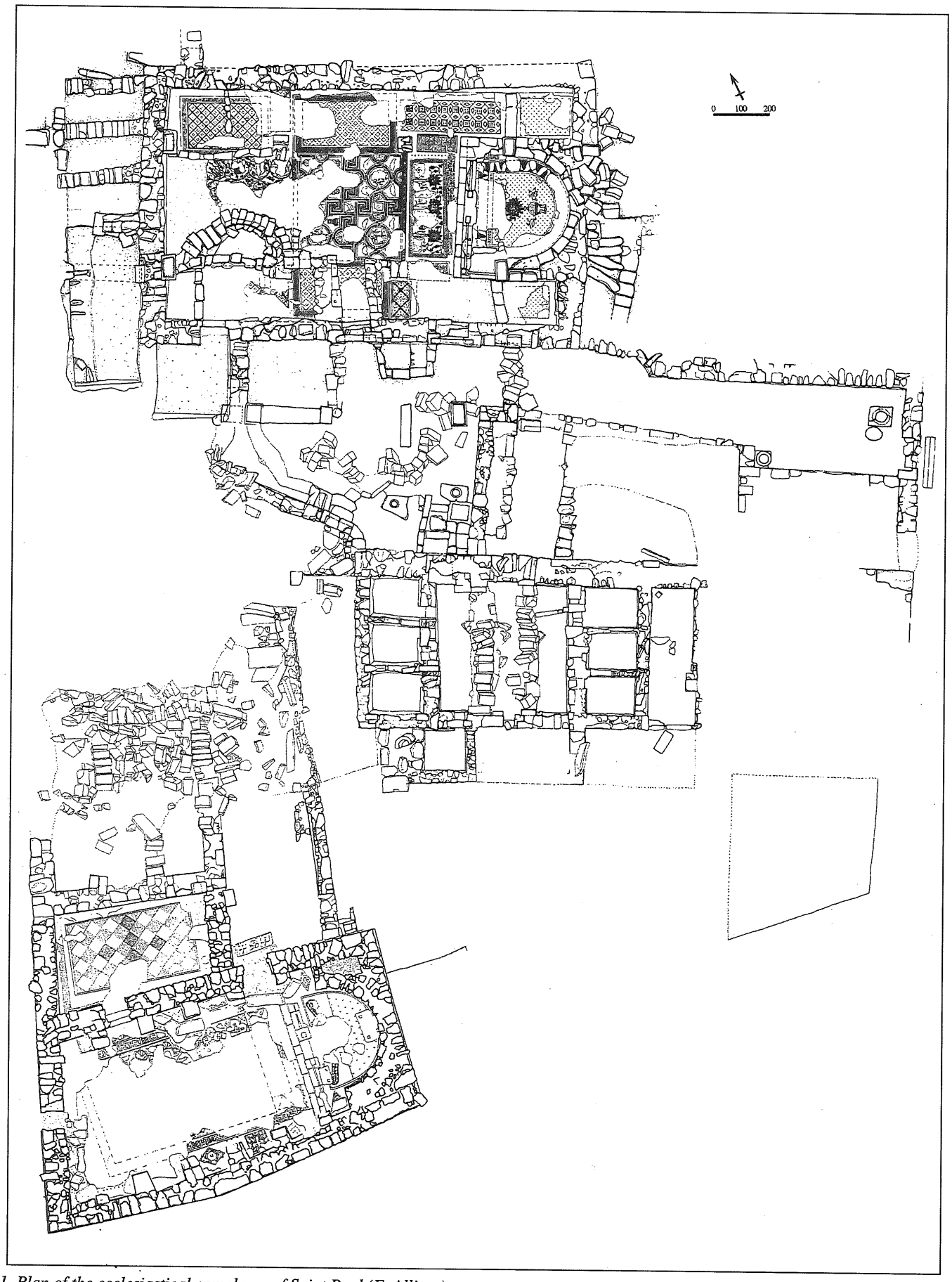
The block opens to the north on to the minor street that runs along the Saint Stephen complex. It seems to be the natural communication route between the two ecclesiastical complexes. The relationship with the surrounding areas is complicated by the presence of low walls, built during a period of re-occupation that preceded the final abandonment.

At surface level, the collapse of the church had the same characteristics encountered in the other edifices excavated to date at Umm ar-Raṣāṣ. It had a northerly slant with the collapse of the north wall being more accentuated, followed by the falling of the arches in the same direction. On the other hand the porch arches had fallen in a southerly direction. The doors on the south wall were still standing in the 1940's with the lintels still *in situ*. At the start of our excavations we found the collapsed doors.

The Excavation

Having freed the fallen arches from the accumulated surface debris, which did not provide any element of importance, the stratigraphy of all of the north sector of the church turned out to be uniform enough (**Figs. 3-4**). The arches had fallen upon accumulated debris over a meter high. At the surface there was a stratum of stones and soil, followed by plaster and tiles that reached the mosaic floor, which was covered with a layer of yellow compacted earth (**Figs. 5, 6**: east-west section). The long fossiliferous limestone slabs that covered the north nave were found in the vicinity of the north wall (**Fig. 6**: north-south section). Pockets of ashes were found both at surface level, in the vicinity of the east pilaster of the north series, as well as at deep levels. These were found beneath the moulded ashlars of the apse calotte in the presbytery area and in the northwest corner of the church. The thick accumulation and extension of this last pocket of ashes, which reaches the front door as can be seen from the remains of a hearth in use for a certain period, is to be placed in relationship with the re-use of part of the church prior to its collapse.

The new tenants used the west door on the south wall as an entrance. This led, through a corri-



1. Plan of the ecclesiastical complexes of Saint Paul (E. Alliata).

dor obtained by blocking the fall of the south nave's east sector, to a rectangular room constructed in the south nave and set against the church wall (**Fig. 5**).

The entrance to the room was in the centre of the north wall. A long sculptured lintel had been re-



2. Umm ar-Raṣāṣ - Kastron Mefaa. The Church of Saint Paul prior to excavation (view from the west).

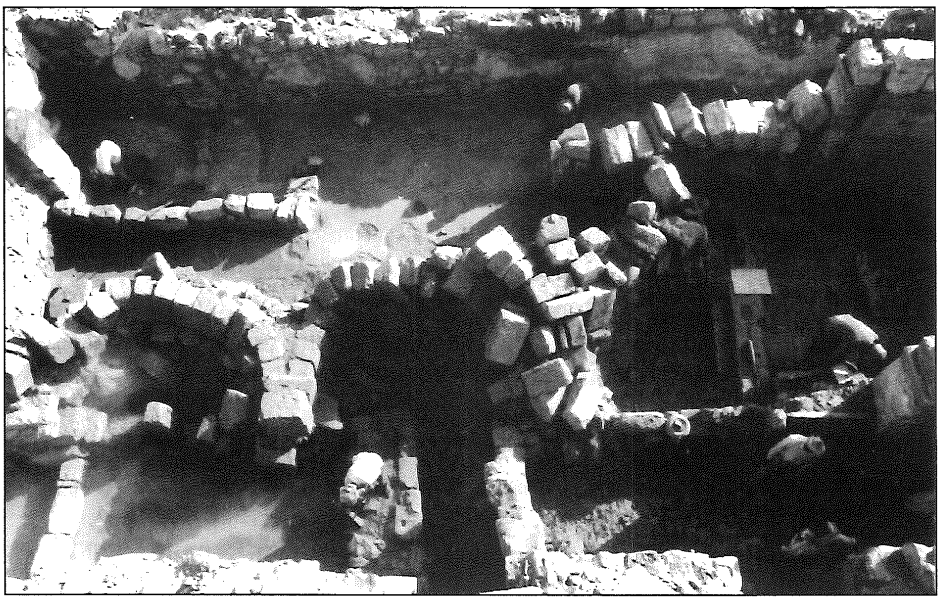
used in the east wall. A low dry wall that incorporated the balustrade slab, still *in situ*, joined the presbytery to the corresponding pilaster in the nave. Besides, a low wall, set between the corresponding pilasters, isolated the northwest corner of the church in which there had been a hearth. The door in the west wall had been blocked.

The external porch was also occupied by the new arrivals. Here a service area was obtained in the southwest corner. The area had an east entrance, obtained by blocking the area between the west pilaster and the church door. A small quadrangular room was built in dry, set against the church wall between the doors.

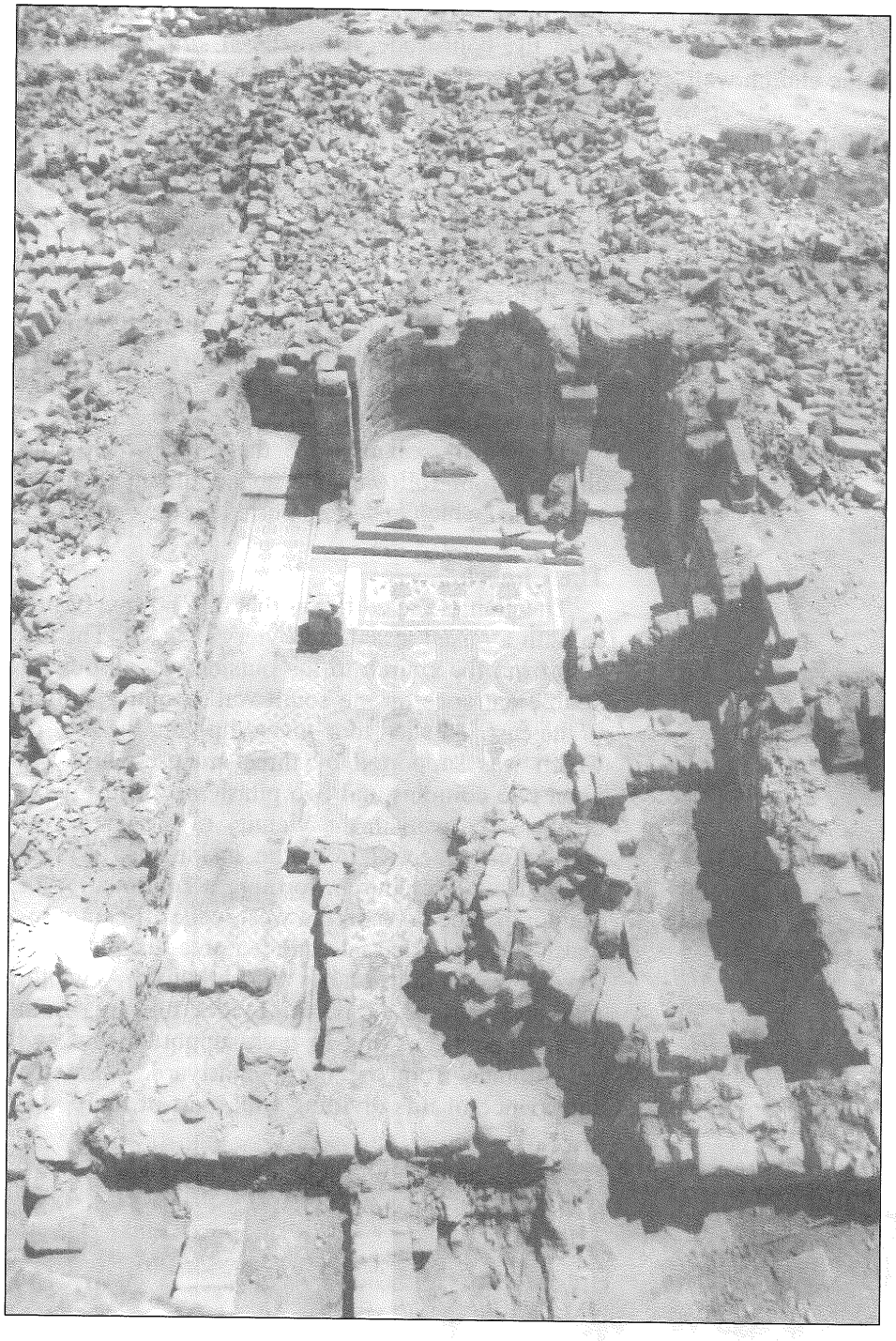
The final collapse of the arches and the church's roof followed the abandonment of these structures, which ended up buried by the debris.

The Church

The plan of the edifice is that of a normal basilica with a raised apsed presbytery (**Fig. 5**). The access from the church to the outside was through a double entrance on the south wall, slightly shifted to the east. This led to a covered porch, the roof of which was supported by three arches, which lay upon two columns and two pilasters. A third door, on the same wall in the vicinity of the southwest corner, gave access from the inside to a service area outside the church, forming a continuation of the porch. The door on the west wall, off centre towards the south, led into another area that extended beyond the church's arris to the south. A white-plastered wall, to the north, divided this area from a facing room, having an arch-supported roof and an entrance from the north courtyard. Upon the subsidence of this dividing wall, part of the possi-



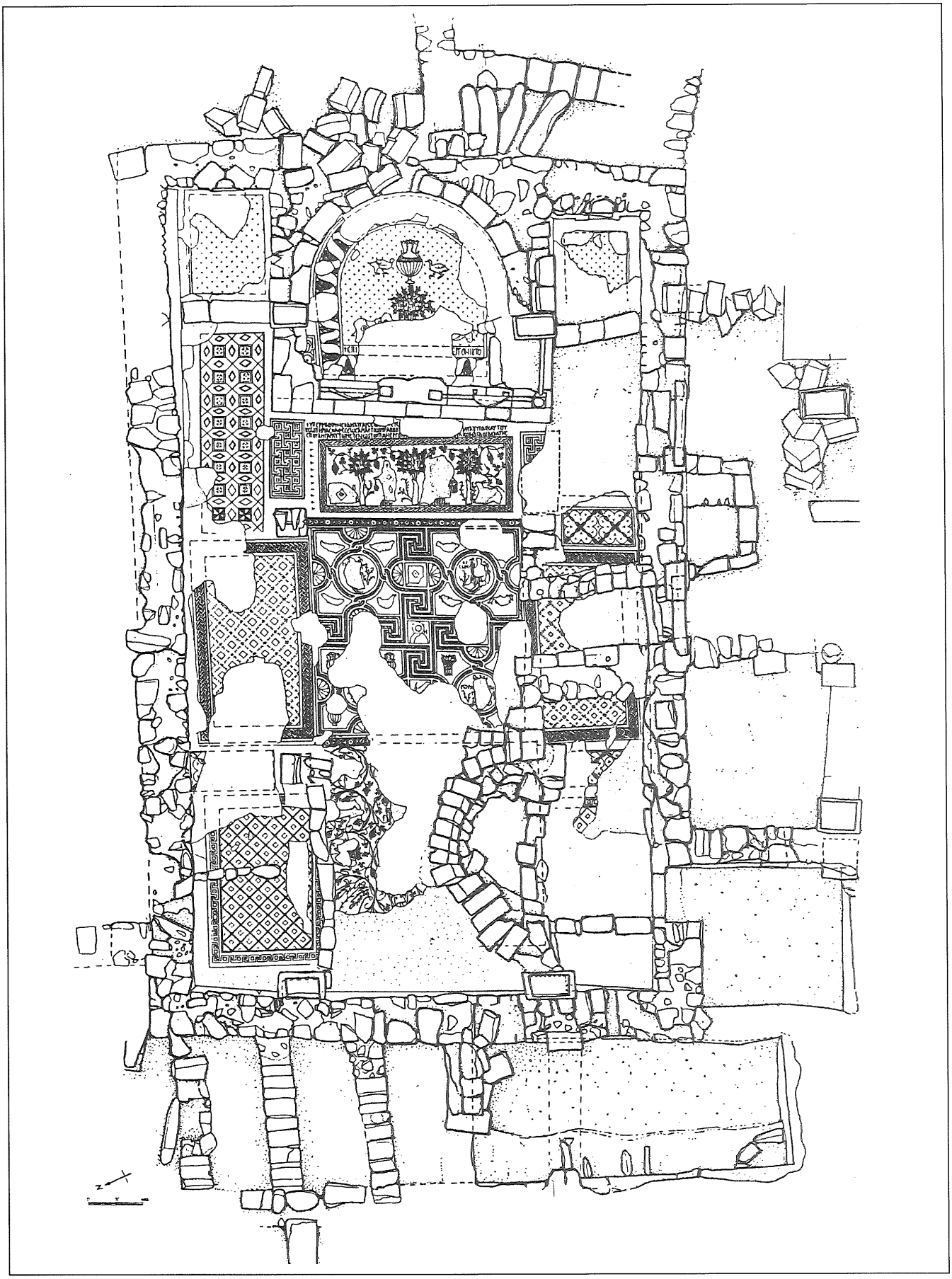
3. Church of Saint Paul after excavation, prior to the removal of the fallen arches.



4. Church of Saint Paul after the removal of the fallen arches.

ble slabbed roof was still preserved, together with some courses of an overhanging low wall made of plastered crude stone blocks. The church's interior was uniformly plastered in white. This can be seen from the ample remnants of thick plaster still preserved and which witness to several phases of intervention.

The plain jambs of the outer doors of the church ended with two jutting right-angled capitals with simple moulding upon which rested the two lentils. These were framed by a decorative element having a serrated tooth motif and covered with an arch. Two crosses in relief on either side of a rosette superimposed onto a circle were sculpted on the east door lintel. The lintel of the nearby door had two circular cosmic crosses in relief set on either side of a worn out central square whose motive is unrecognizable. The lintels of the two interior service doors were simply decorated with a cross each. The large lintel, re-used in the room during the reoccupation, was still preserved within the church. It was decorated with two couples of Catherine-



5. Plan of the Church of Saint Paul.

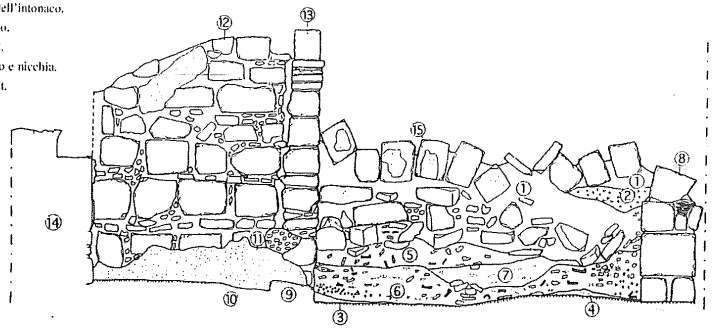
Sez. 1 Sezione est-ovest attraverso la navata centrale (B. Steri).

1. Crollo degli archi.
2. Piccole pietre, resti di intonaco in terra sciolta.
3. Strato di cenere.
4. Calcinacci e tegole.
5. Terra compatta, resti di intonaco.



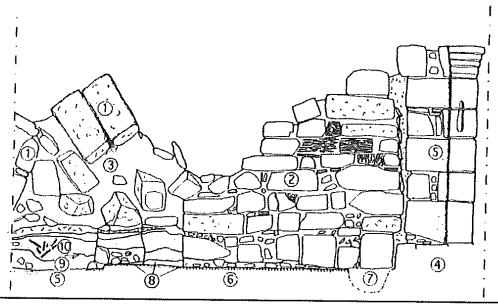
Sez. 2 Sezione est-ovest nella testata della navata nord (C. Sanmorì).

1. Terra gialla nel crollo.
2. Sacca di cenere.
3. Terra gialla molto compatta.
4. Calcinacci schiacciati sul pavimento.
5. Terra gialla con frammenti di intonaco e tegole.
6. Terra più o meno compatta con calcinacci, pietre e tessere di mosaico.
7. Lente di terra gialla molto compatta, frammista a calce.
8. Pilastro nordest della chiesa.
9. Soglia del pastoforio nord.
10. Letto del mosaico.
11. Strati di allettamento dell'intonaco.
12. Muro sud del pastoforio.
13. Pilastro addossato a 12.
14. Muro est del pastodorio e nicchia.
15. Crollo dell'arco nordest.



Sez. 3 Sezione nord-sud praticata al centro della navata sud (C. Sanmorì).

1. Crollo dell'arco centrale.
2. Muretto appoggiato al muro primetrale sud della chiesa con tegole riutizzate.
3. Stipite est della porta centrale.
4. Soglia della porta.
5. Letto del mosaico.
6. Mosaico.
7. Fossa scavata di recente sotto il mosaico.
8. Terra gialla compatta.
9. Terra gialla compatta mista a pietre e intonaco polverizzato.
10. Calcinacci e tegole.
11. Terra gialla soffice.
12. Cenere con rari carboni.
13. Crollo con terra gialla e intonaci.



6. Sections through the Church of Saint Paul:

Section 1: east-west through the nave (B. Steri):- 1. fallen arches; 2. small stones, plaster fragments and soil; 3. ashes; 4. plaster flakes with roof tiles; 5. compact soil with plaster fragments.

Section 2: east-west at the top of the north aisle (C. Sanmorì):- 1. yellow soil below the fallen arches; 2. ashes; 3. compact yellow soil; 4. plaster flakes on the floor; 5. yellow soil with plaster and roof tiles; 6. soil with plaster, stones and mosaic tesserae; 7. compact yellow soil with plaster; 8. the northeast pilaster of the church; 9. threshold of the northern service room; 10. mosaic bed; 11. different layers of wall plaster; 12. southern wall of the northern service room; 13. pilaster of the triumphal arch; 14. eastern wall of the northern service room with niche; 15. fallen northeastern arch.

Section 3: north-south in the middle of the southern aisle:- 1. the fallen central arch; 2. dry wall with roof tiles added to the south wall of the church; 3. east jamb of the central door; 4. door threshold; 5. mosaic bed; 6. mosaic; 7. modern hole into the mosaic bed; 8. compact yellow soil; 9. compact yellow soil with stones and plaster; 10. plaster flakes and roof tiles; 11. silty yellow soil; 12. ashes; 13. the fallen structure.

wheels and handled vases on either side of a central edicule, all closed by two lengths of twine.

Crosses in relief decorated the capital of the east column of the porch. The springers of the triumphal arch were decorated with a serrated motif. An acroterium was also recovered during the excavations. It was decorated with a sunken cross with traces of red paint. Two springers decorated with amphorae in relief that had fallen outside of the church were also recovered.

The walls have been preserved to a height that does not exceed one meter at the centre of the north wall, over two meters at the south and west walls, and over three meters in the apse with the maximum point being reached in the arched vault that covered the east head of the south nave (**Fig. 7**). A thick layer of white plaster hid the poor technique used in the stonework, where the ashlars were aligned with wedges and held together with poor quality mortar. The carefully squared up fossiliferous limestone ashlars had been reserved for use in the pilasters, arches and doorjamb.

Two steps raised the presbytery that juts slightly out into the nave (**Fig. 8**). Four bituminous schist chancel slabs closed off the jutting part. At the time of excavation, the south slab was still *in situ,* inserted between the apse pilaster and the corner columnette, which had a simple moulding on the frontal view face. The chancel slab was decorated with an encircled cross in relief, set in a sunken panel. Fragments from at least two chancel slabs were recovered during excavation: one had an inscription incised on its base, another was decorated with a small column in relief of which there remained part of the fust and the small foliated capital.

On the east head of the side naves, a step created a small reserved raised area characterized by a niche with jutting stone or plaster moulding set in the eastern wall. Most probably a barrel-vault or calotte covered both areas. Some ashlars of the roofing are still *in situ* in the south nave while those of the north nave were found among the debris. The niche in the south nave is still well pre-



7. The east head of the south aisle with the edicule on the east wall and the still standing chancel screen with a cross in relief.



8. The presbytery with the altar and the offerings table, during excavation.

served with its jutting stone moulding which imitates an arch supported by two small columns with capitals. The internal calotte had a double layer of lime mortar, the lower showed traces of paint while the upper stratum had sherds inserted in it. Only the lower part of the north niche survived.

Some holes found on the regular face of the apse splay are worth noting. These probably are to be placed in relation to a jutting plaster niche of which we recovered some elements from the debris of the collapse. The altar plinth was found at the centre of the conch. At least two phases in the development of the altar can be distinguished. The original altar was supported by four small columns inserted in housings hewn out of a stone base which was laid on a mortar mixture of lime and ashes and placed upon the mosaic floor. In a second instance, the small columns were removed and the altar table was supported by a masonry altar made up of soil bricks covered by a thick layer of lime plaster.

A quadrangular slightly moulded bituminous schist table, broken in two yet complete, was recovered, overturned on the initial part of the Greek inscription into the mosaic floor. This can be identified as an offering table, supposedly set within the balustrade at the northwest corner as indicated by the traces of its lodgings found in the mosaic. The excavations brought to light two small bituminous schist columns. One column is complete whereas the second has no base. The latter has holes for the application of a metal cross on its fust. These columns could be related to the offering table.

Also recovered were: a marble capital, the upper part of a basket capital decorated with a bird set between two lilies, and a roughly shaped-out capital. It is difficult to indicate the original functions of these elements within the church.

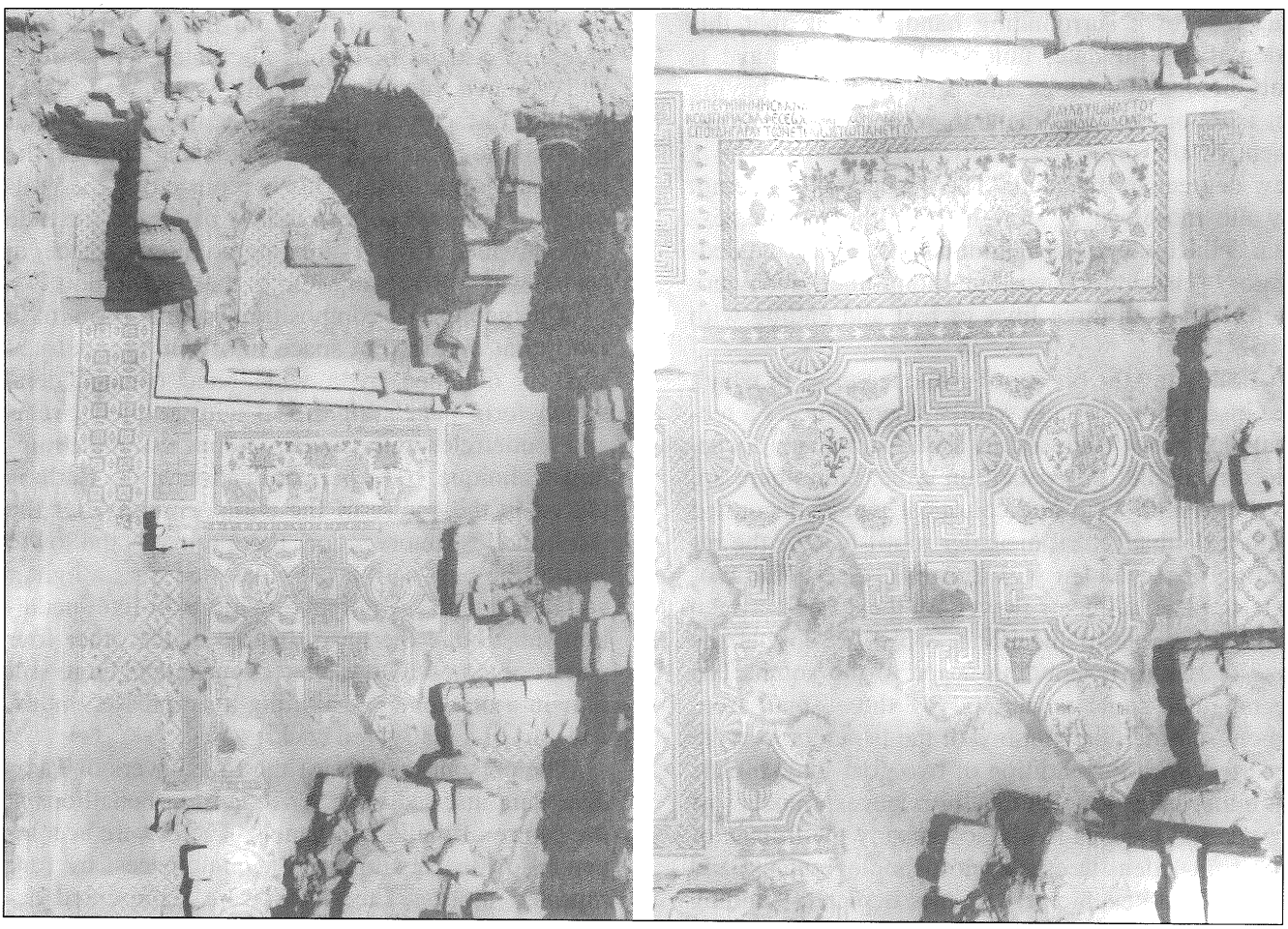
The marble lid of a reliquary, broken into three parts, was recovered during the excavation of the north nave in the vicinity of the step leading to the presbytery. The lid has the normal acroterium form. Worth noting is the hole at its centre, accurately formed by the marble-cutter.

The roof of the church was supported by two rows of three wide arches. The ashlars of the piers and the three south arches had fallen into the church together with the east arch of the north series. The other two northern arches fell outside the church, into the north courtyard. Here we recovered a keystone decorated with a cross in relief and some springers decorated with a handled chalice. The truss of the central nave was covered with roof tiles, the greater part of which ended up against the north nave wall when the roof collapsed. On the other hand, the side naves were covered with long fossiliferous limestone slabs preserved in the north nave.

The church was ventilated through a small loophole plastered window in the vicinity of the northwest corner on the north wall.

The Mosaic Floor

The church's floor is mosaiced in all its parts with a decorative programme that is new in respect to the already known mosaics within the churches at Umm ar-Raṣāṣ. Even if the programme is somewhat disorderly in its general plan (**Fig. 9**). Furthermore, the mosaic suffered heavily from the iconophobic mutilations and the damages due to



9a-b. The mosaic floor of the Church of Saint Paul.

the re-occupation of the church following its abandonment. Some motifs in the central nave were thus irreparably damaged. One can also note a singular detail in the vicinity of the door on the west wall and along the internal perimeter of the north wall. Here the mosaic had been re-laid with inferior quality larger-sized white stone tesserae. One could think of the mosaic breaking up as a result of the rebuilding of the wall due to unknown reasons or to the upheaval and removal of the original tesserae resulting from pressures exerted by the wall (a detail we have also noticed in the Chapel of the Peacocks).

The floor of the apsed presbytery was surrounded along its internal perimeter with a band containing an undulating wide ribbon, with small twigs set upright and upside down in the resulting spaces. The mosaic was executed with a wanted chromatic contrast in the alternating colours upon the background of black tesserae. A single line inscription, with black letters on a white background and framed within two lines of alternating coloured tesserae, runs alongside and internally to the band on the jutting side of the bema, parallel to the step. A uniform field of flowers that decorate the carpet follows this. Two bulls facing a fruit-laden tree were inserted upon the geometric motif created by the grid of flowers. Continuing towards the apse splay, there is a handled amphora on pedestal between two facing birds. These were partially covered by the altar. Great care had been taken in the choice of colours for these motifs. The iconophobes disfigured the head of the bird on the left but spared the one on the right.

As a result of the destruction of the central part of the composition, only the hind side and tail of one of the disfigured — and later restored — bulls remain. One can still see, on the left bull, two polychromatic medallions carried out in the post-iconophobic restoration. An interlaced geometric motif, inserted between the band and the north side of the balustrade, formed part of the decorative programme.

The final result of the decorative programme within the church's body is much more complex and confused with the suppression of the intercolumnar panels and the not too justified extension of the motifs in the aisles into the central one, which

lacks its own surrounding band. I think that this anomaly is, to date, unique. The central nave is sub-divided into three independent panels having an autonomous alignment in respect to the alignment of the presbytery step that is deviated by a few degrees to the south. The unsuccessful attempt by the mosaicist at straightening the mosaic, explains the quite unusual anomaly of having the dedicatory inscription, written along the presbytery step, start with three lines of text and ending with two.

Following the border of white tesserae, in which the inscription is freely written, there follows a rectangular panel enclosed in a two-strand guilloche. Accompanying this panel, on either side, there are two different sized intercolumnar panels decorated with a double return meander motif having the resulting spaces laden with flower crosses. The mosaicist added a line of flowers in the space between the two panels to the north, which is double the size of the corresponding space to the south. The rectangular panel is divided by three small trees amongst which the pictures of the benefactors were inserted, with the addition of two goat-like animals on either side. Vine shoots with leaves, bunches of grapes and tendrils freely accompany the foliage of the fruit-laden trees (apples, pomegranates and pears). The benefactor Sergis is depicted standing on the left holding a censer in his right hand. The small censer with lobate cup, held by three small chains, could indicate that Sergis was the church's *paramonarius*.[1] A polychromatic medallion and a diamond set on point were added in the post-iconophobic restoration. Rabbus and his son Paul were represented standing between the second and third tree, while picking the fruits of the tree.[2] Rabbus was probably depicted while picking the fruit with his right hand while Paul, held by his father's left hand, followed carrying a basket full of fruit. The mosaic was executed with the usual care by the mosaicist. Rhomboidal diamonds and flowers were added on the disfigured motifs in substitution.

The central panel is iconographically the most elaborate and is also twice the size of the other two panels. It is enclosed, only on the east and west sides, by a band of triflids alternated with circles and squares placed diagonally on a red background. In fact a characteristic of the quadrangular programme is the lack of an enclosing band on the north and south sides. This is replaced by the guilloche of the two corresponding panels in the side naves, which invade the intercolumnar space in such a way as to be adjacent to the central motif.

The geometric composition in the form of a cross that divides the space into four symmetrical parts is obtained by a wide band of meanders, which form panels alternated with knotted circles and semicircles with woven cordons using the rainbow technique.[3] The personification of the Earth is placed in the centre of the composition. After the iconophobes' intervention, there remains the lower part of the bust with a red cloak tied over a lighter coloured tunic.[4] A polychromatic halo-like medallion substituted the head. In two of the other four panels obtained by the band of meanders there still remain a diamond substituting a suppressed motif, and part of a disfigured cock.

The personifications of the four Rivers of Paradise were inserted in each of the four medallions at the centre of the lateral panels. These were accompanied, in the resulting polygonal spaces, by four repeated motifs. The rivers were represented according to the usual iconography, showing a semi-clad figure wrapped in a cloak and crowned with foliage sitting in a fluvial environment. He holds a cane stick in his right hand and a pitcher in his left hand, from which water flows. Ghion and Phison are in the top panels while Tigris and Euphrates in the lower ones.[5] A shrub to the right, the leaves of the cane stick and the three rivulets of water are all that remain of the personification of Ghion and the surrounding four fish all of which were carefully disfigured. The workman had added a cross of flowers at the centre of the substitution that was carried out using the polychromatic tesserae from the disfigured motif. The personification of Phison is the better preserved. The upper part of the body with the face, the legs and the hand holding the

1. As in the figure of Ouadia in the Church of the Bishop Sergius (Piccirillo and Alliata 1994: 127) and at Jarash in the Church of Saints Cosmas and Damian (Piccirillo 1993a: 276), in the Chapel of Elijah Mary and Soreg (Piccirillo 1993: 296) and in the Church of the Bishop Isaiah (Clark 1986: 328, n. 12).
2. As in the Church of the Deacon Thomas on Mount Nebo (Piccirillo and Alliata 1998: 339).
3. The programme is used in the Theotokos Chapel within the Memorial of Moses on Mount Nebo (Piccirillo and Alliata 1998: 301).
4. The hand-held veil full of fruit is missing. This can be seen in the bust of the Earth in the Church of Saint George and in the upper mosaic in the Chapel of the Priest John (Piccirillo and Alliata 1998: 328, fig. 138; 353, fig. 209).
5. The motif is quite frequent in the mosaics of the Mādabā region. To date it is present in the Chapel of Saint Theodore in Mādabā (Piccirillo 1989: 27), in the Ṣunnā' Church (Piccirillo 1993b: plates 8-9), in the Chapel of the Theotokos Monastery on Mount Nebo (Piccirillo and Alliata 1998: 364) and in the Church of Saint Sergius at Umm ar-Raṣāṣ (Bujard, Piccirillo and Poiatti-Haldimann 1992: 291-299; Piccirillo 1993a: 241).

pitcher had been disfigured. There remained, wholly preserved, the arm and hand that carries the cane stick, the foliate crown on the head, the pitcher from which the water flows, the folds of the cloak that covers the lower part of the body as well as the isolated cane stick on the right and the shrub on the left. The river is surrounded by four disfigured animals (three of which survive). The outline suggests they were fish. The surviving details, a sort of horned head apart from the fish tail, render difficult the interpretation of these marine animals.[6] Of the personification of the river Tigris surrounded by four handled amphorae (only three survive), there remain part of a cane and the substitution carried out using different quality white stone tesserae. The river Euphrates was surrounded by four baskets full of fruit (only one survives). What remain are part of the foot and cloak, the vegetable motifs, part of the pitcher and water and part of the foliage on the rivers' head. The restoration was carried out using mediocre white stone tesserae.

The third panel, in the vicinity of the west wall, was planned with vine scrolls sprouting from tufts of acanthus set in the corners. In the four registers of scrolls, judging from what survived the iconoclastic destruction, there were represented vintage and pastoral scenes inserted in some disorder. In the first scroll starting from the west after the breakage, there remains half the figure of a young shepherd, wearing a short tunic, with a slingshot in his right hand turned to the south. The hands of a vintager who is cutting a bunch of grapes using a pruning hook turned in a northerly direction can still be seen in the internal scroll of the third register. A farmer carrying grapes on a donkey's back, with the whip in his right hand and holding the reins in his left is a scene that develops in two scrolls on the north side. The figures face south and are thus moving towards the inside of the church.[7]

The geometric programme in the aisles is more disorderly. The programme is divided in three mirrored panels having different lengths and widths, interrupted by small panels that act as fillers. A field of flowers decorated the two slightly raised areas in front of the niches on either side of the apse. The first panel in the south nave is practically destroyed. The mosaic continues with a filler panel decorated with two adjacent polylobed hexagons, laden with flowers on a yellow background, intersected by a series of small squares set on point obtained with spindles in black tesserae. There follows a panel enclosed in a three-strand guilloche decorated with a grid of flowers laden with diamonds. The panel extends towards the inside of the church reaching the central panel. Yet another filler panel with polylobed hexagons separated it from the west panel that was decorated by a grid of rhombi and diamonds enclosed within a swastika band.

In the better preserved north nave, the east panel is decorated with a motif of interwoven octagons forming lozenges and squares laden with diamonds and flower crosses. There follow the panel with a grid of rhombi and flowers enclosed in a three-strand guilloche as in the south nave, the filler panel with polylobed hexagons and the third panel that ends in the vicinity of the west wall. This last panel is a grid enclosed within a band containing a simple meander made of two lines of tesserae, one black the other red.

The Inscriptions

Four inscriptions in Greek were recovered during the excavations of the church. Two were found in the floor mosaic, one incised on a roof tile, and the fourth on a chancel slab.

1. The Inscription in the Presbytery Mosaic **(Fig. 10)**

The single line inscription, introduced by a cross, is set between two lines of tesserae. The letters are 15cm high. There remain the first and the final letters.

+ ΕΠΙ ΤΟΥ.....ΕΤΕΛΙΟΘΗ
ΤΟ] ΕΡΓΟΝ ΤΟΥΤΟ.

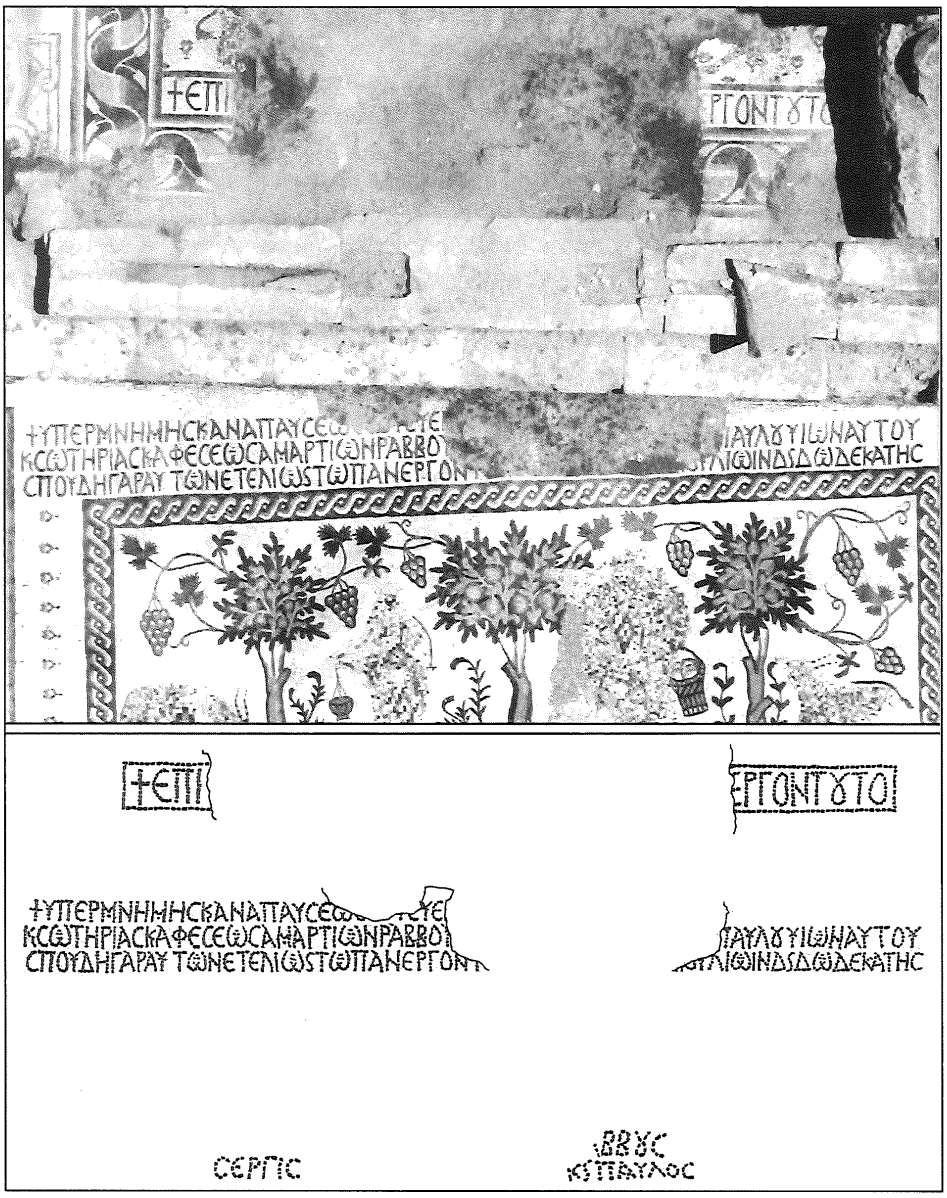
+ *At the time of the [.....was completed] this work* (in mosaic).

Keeping in mind the inscription in the other churches at Umm ar-Raṣāṣ, it is probable that the name of the Bishop of Mādabā, at the time the mosaic was completed, was remembered. In all probability this was Bishop Sergius.

2. The Inscription along the Step of the Presbytery **(Fig. 10)**

We have already pointed out the anomaly, due to the irregular form of the presbytery as a result of which the inscription that starts on three lines ends in two. The text, introduced by a cross, is destroyed at the centre. The medium height of the letters, set in black tesserae, is 9cm.

6. A similar animal was inserted in the band in the vicinity of the well-curb of the cistern in the upper mosaic of the Priest John at Khirbat al-Mukhayyaṭ (Piccirillo and Alliata 1998: 353, fig. 208)
7. As in the central panel of the church of the Holy Martyrs in Mādabā (Piccirillo 1989: 113s.).



10. The two inscriptions in the presbytery and the nave of the Church of Saint Paul.

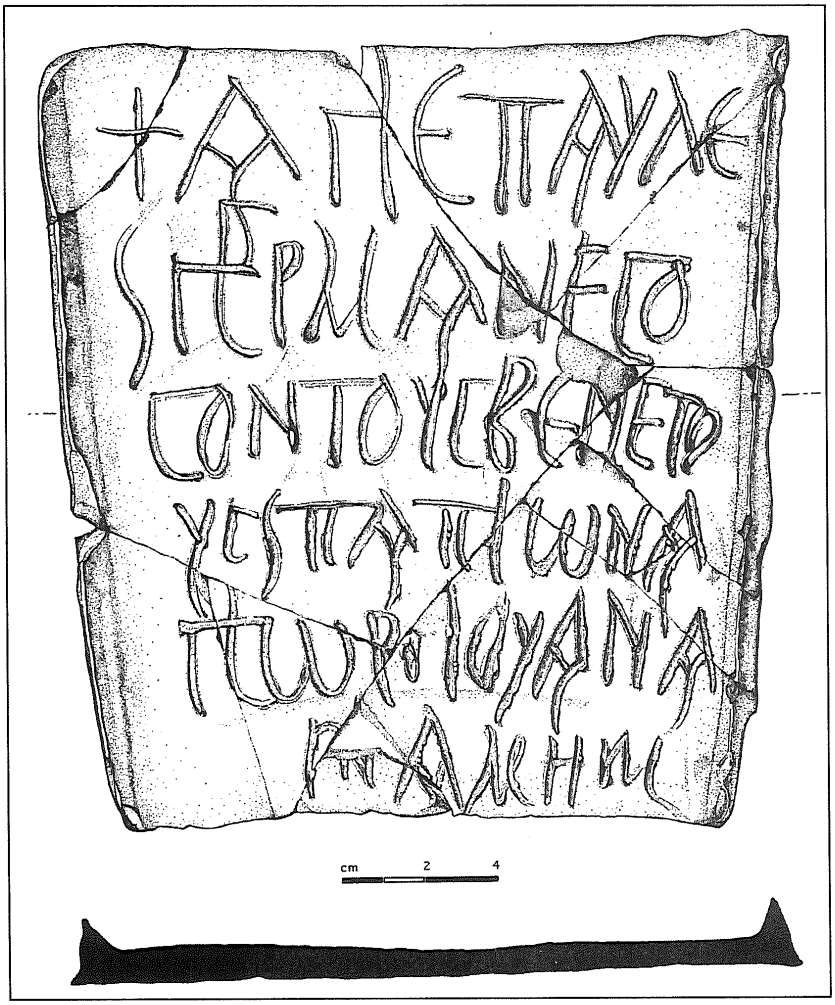
+ Ὑπὲρ μνήμης κ(αὶ) ἀναπαύσεως ....ΥΕΙ Παύλου..... υἱῶν αὐτοῦ
κ(αὶ) σωτηρίας κ(αὶ) ἀφέσεως ἁμαρτιῶν Ραββου.....
σπουδῆ γὰρ αὐτῶν ἐτελιώ(θη) τω πᾶν ἔργον τ[οῦτο....μηνὶ] Ἰουλίω ἰνδ(ικτιό-νος) δωδεκάτης

+For the memory and the repose [of...and of..... .Sergis and] of Paul his sons and for the salvation and remittance of sins of Rabbus..... through their care all the work was completed [...in the month] of July the twelfth indiction.

Ὑπὲρ μνήμης κ(αὶ) ἀναπαύσεως κ(αὶ) σωτηρίας κ(αὶ) ἀφέσεως ἁμαρτιῶν: The initial funerary form and what follows it are rather common.[8]

Rabbus is the benefactor pictured in the central nave together with his son Paul.[9] The mosaic in the Church of Saint Sergius, within the Kastrum, was completed in the month of September of the twelfth indiction (Bujard, Piccirillo and Poiatti-Haldimann 1992: 300f).

8. The first formula recurs in the inscription of the lower mosaic of the bema in the church of Kaianos at ʿUyūn Mūsā (Piccirillo and Alliata 1998: 451, no. 58) and in the dedicatory inscription in the Church of Saint Stephen at Umm ar-Raṣāṣ (Piccirillo and Alliata 1994: 244ff); the second in the dedicatory inscription in the Church of the Virgin in Mādabā (Piccirillo 1989: 47).
9. The name recurs in different transcriptions (Rabbous, Rabou, Rebbou, Robab) in the Church of Saint Stephen (Piccirillo and Alliata 1994: nos. 5a, 7a-b, 5 d, 19a).



11. The roof tile carrying an invocation to Saint Paul.

3. The Inscription on the Roof Tile **(Fig. 11)**

An expert hand had incised the invocation, before baking, while the clay was still fresh. The text, starting with a cross, is spread over six lines. The letters are 4 to 5cm high.

† Ἅγιε Παῦλε
(καὶ) γερμανὲ σῶ-
σον τοὺς Βενέτο-
υς (καὶ) Παπιῶνα
Γεωργίου ἀνα-
γν(ώστου) Αμην

+ Saint Paul
and Germanos
save the Blues
and Papiona
(son of) George the
lector. Amen

The inscription is generally noteworthy for the elegance and agility of the cursive line. We notice particularly the *alphas*, with the long sinuous central line, and the superimposition of the *gamma* with the *iota* and *epsilon*. In the first occurrence, the *gamma* is written first followed by the *iota,* in the other two instances the *epsilon* is written first then the *gamma*. Furthermore the final line that closes the invocation is also noteworthy.

The name Paul accompanied a typical portrait of the apostle, found on a small ring during the excavations of the Church of Saint Stephen (Piccirillo and Alliata 1994: 267, no. 29).[10]

Keeping in mind that the verb that follows is in the singular, we prefer to interpret γερμανε as an attribute to Paul, even if a parallel is unknown to us.[11] The Blues, a sporting later turned into a polit-

10. A church in Jarash was dedicated to Peter and Paul "the principal apostles" (Kraeling 1938: 484, no. 326). Two separate churches were dedicated to the two apostles in the village of Riḥāb (Piccirillo 1981: 78-82).

11. After a suggestion by Fr. Lino Cignelli, the Latin sounding word in hyperbation construction would have the affectionate meaning of "dear" (cf. Calonghi 1955). The invocation would be translated: "Dear Saint Paul, save ...". In the Roman liturgy that uses a hymn by Prudenzio, Paul is called 'germane Petri' (?).

ical faction in Constantinople, that are mentioned and on whose behalf the apostle's intercession is begged, are already known in inscriptions found in Jordan. The name had been read on a lintel at Umm al-Jimāl and in a mosaic inscription in Jarash (Piccirillo 1981: 60; 1982: 508f; see also Jarry 1968).

The name Papiona recurs on Mount Nebo within the inscription of the Church of Kaianos at 'Uyūn Mūsā, and in the north church at Ḥisbān (Piccirillo and Alliata 1994: 453, no. 61; Lawlor 1980: 65-76).

During our excavations at the nearby Church of the Lions, we retrieved a fragment of a tile having the opening words of an invocation (Piccirillo 1992: 223). The Max Van Berchem expedition, during the excavations of the two churches within the Kastrum, found a second fragment of tile containing a list of names preceded by a cross (unpublished). A brick, apparently from a hypocaust, with an incised inscription of what appears to be the name Stephen (ΕΣΤΕΦΑΝΟΣ) was found during the excavations at al-Mafraq (RJ. n. A303). It probably belonged to the Umayyad castle at al-Fudayn. Photographs of the brick are held in the archives of the Department of Antiquities.

4. The Inscription on the Chancel Screen **(Fig. 12)**

The inscription was scratched by an artisan who was not too masterly in his trade. The letters of the inscription, found on the lower part of the screen, are 3cm high.

.....ΝΙΚΕΝΤΟΥΑΓΗΟΥΧ

The Tile with a Witty Drawing

Among the tiles fallen from the roof that had traces of several interventions, such as hand-prints, incised crosses etc., we publish here the wittiest one of all. It can be paired up with the already published tile from Saint Stephen's and the unpublished one found by the Swiss expedition inside the Kastrum (Alliata 1987: 224, pl. 29, photo 43). The same hand, the invention of the same "naive artist" of Kastron Mefaa, supposing that the tiles were of local manufacture, incised the three graffiti. Unfortunately we were not able to complete the tile, even if the design is clearly identifiable **(Fig. 13)**. A peacock seizes or pecks a serpent that frightens a girl. The anonymous designer, using a nail or stick, was able to create a scene sketched with great liberty.

Conclusion

The Church of Saint Paul presents the same characteristics found in the other sacred edifices at Umm ar-Raṣāṣ. Having two entrances on the south wall, it is similar to the Church of Saint Stephen. In the latter, however, there is a paved courtyard with a portico on the east side that extends in front of the doors. The peculiarity of Saint Paul's is that the portico was in front of the doors. Furthermore, from the liturgical point of view, it is worth noting the two niches inside the church set in the east walls, with which we relate the reliquary lid found during the excavations.

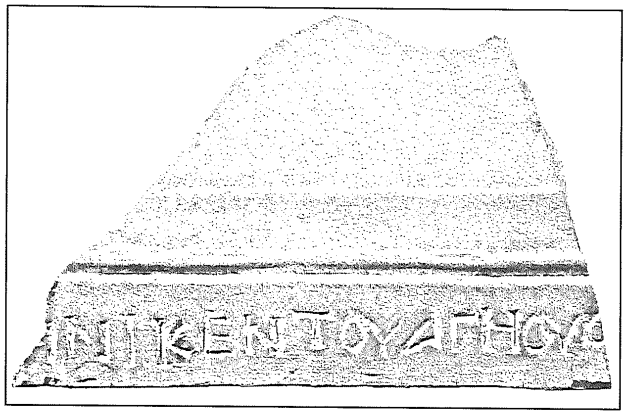
In spite of the doubt regarding the rebuilding of the walls, and missing the year and the name of the bishop, we must place our trust on stylistic criteria in dating the church and mosaic, which we think are contemporary.

Notwithstanding its peculiarities that are more concerned with the general line of the programme than the technical and chromatic characteristics of its execution, the mosaic fits well with the works carried out in the city at the time of Bishop Sergius (Piccirillo 1995). Of the two workshops we have identified as being active in the city, the mosaic would be the work of the one responsible for the mosaic found in the Church of the Bishop Sergius and the Church of Saint Sergius within the castrum.

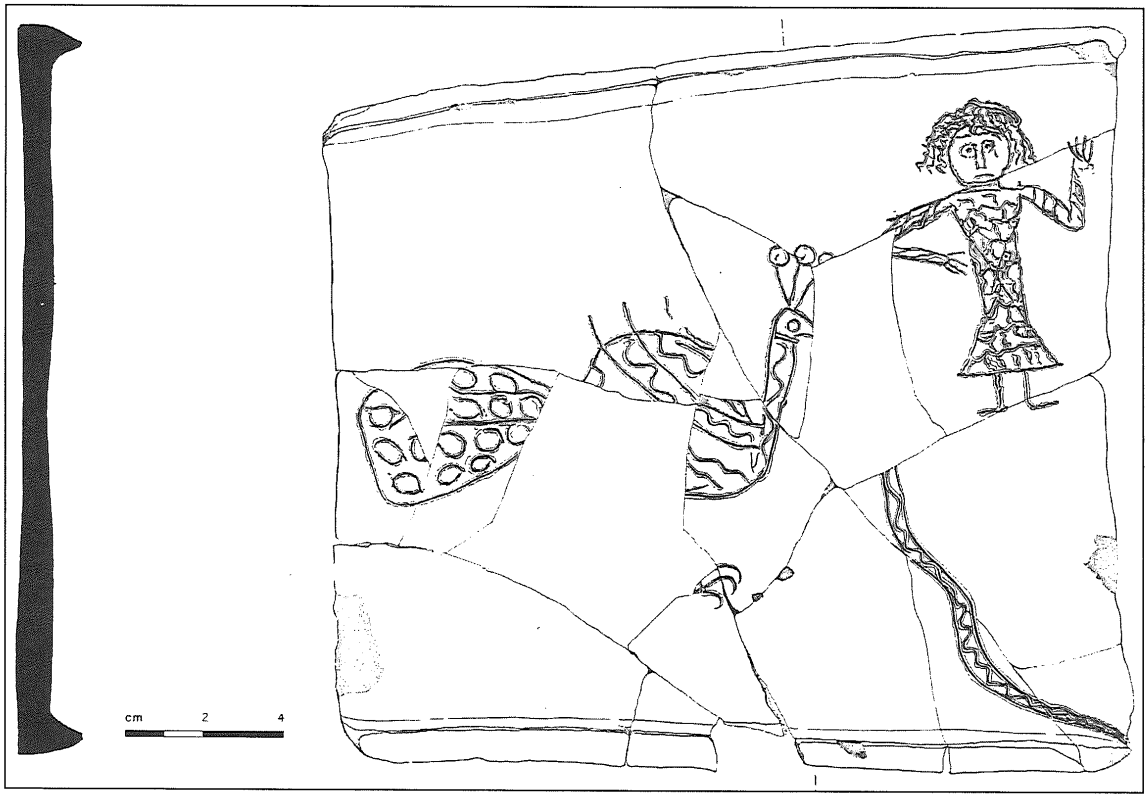
The twelfth indiction, which can be read in the inscription along the step of the bema and which we have already read in the inscription found in the Church of Saint Sergius, takes us back to AD 578 or 593. In the context of the other mosaics in Kastron Mefaa, I think that even here the former date is preferable. It is a time that saw intensive building activities in the diocese and at Umm ar-Raṣāṣ.

Even the Church of Saint Paul, like the other ecclesiastical buildings of the city, continued being officiated in after the iconophobic crisis that fell upon the figurative motifs in the mosaic. These were carefully substituted, by the workmen charged with the job, using the same tesserae or alternatively, tesserae obtained from the grayish white local stone.

When its liturgical use came to an end, the church was permanently re-occupied for a certain



12. The inscription on the chancel screen of the Church of Saint Paul.



13. The roof tile with the witty drawing.

period by a nomadic family. This can be deduced from the traces of utensils, some even set into the ground, recovered during the excavations.

Amongst the few pottery typologies found beneath the collapse we recovered the characteristic "Bedouin" pottery, similar to that recovered under the collapse in Saint Stephen's, in the Church of the Lions and the Chapel of the Peacocks. At Umm ar-Raṣāṣ, we have identified this handmade coarseware pottery, produced using a rough black mixture, as being characteristic of the families who reoccupied the edifices after they were abandoned by the Christian communities. We date this abandonment to the ninth-tenth century AD.

The Church of Saint Paul, built and paved with mosaics in the second half of the sixth century at the time of the bishop Sergius, was used for liturgy at least up to the first half of the eighth century. Following its abandonment, a Bedouin family, who added new rooms both inside and outside of the church, permanently occupied it. This occupation would not have lasted beyond the tenth century, the time in which the roof collapsed. The fall of the arches upon the preceding accumulation followed during an undefined period.

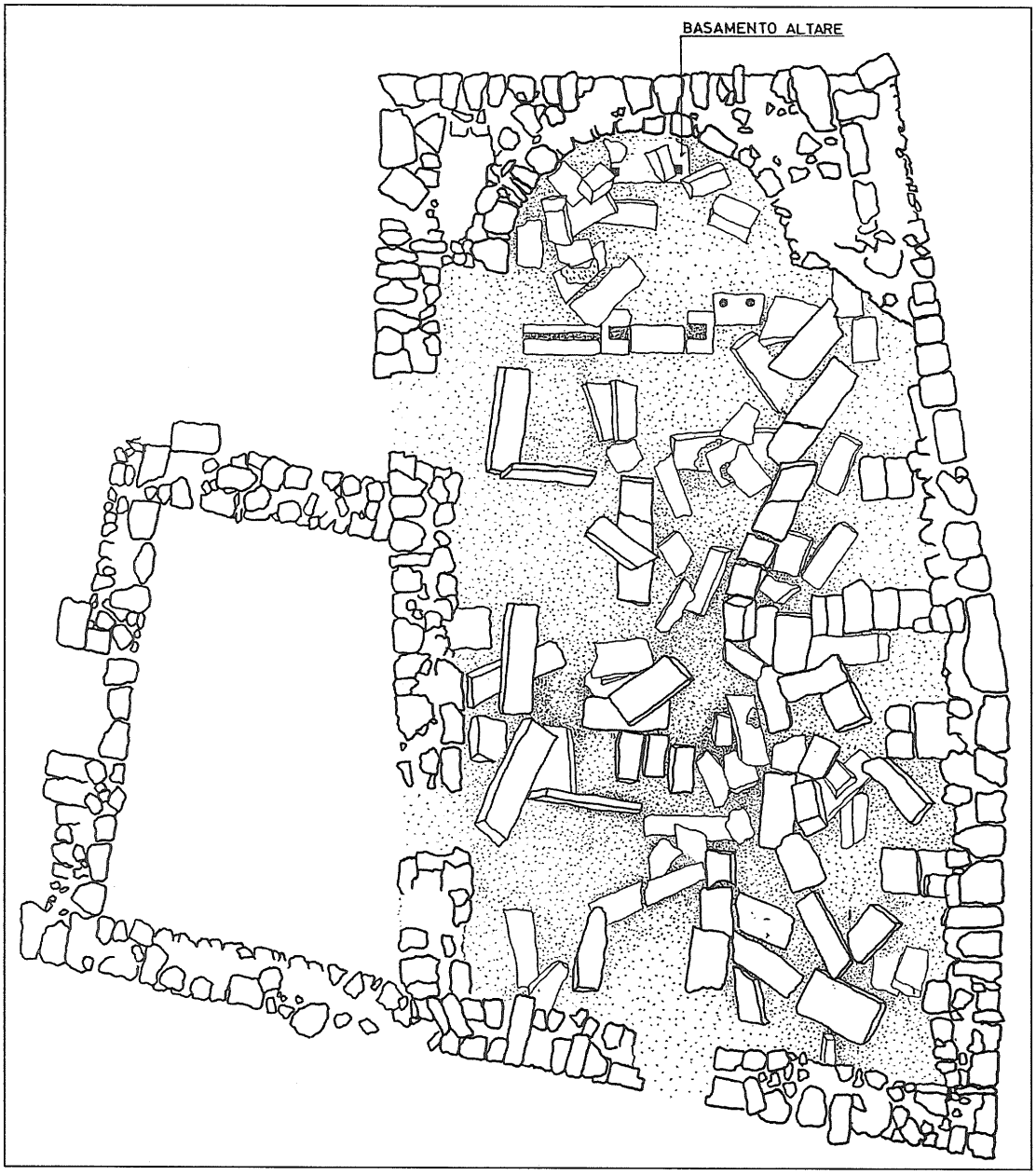
The Chapel of the Peacocks at Umm ar-Raṣāṣ-Kastron Mefaa

To the south of the Church of Saint Paul, one can see some underground arches. There is a possibility that these arches supported the roof of a cistern for the use of a small chapel built in the southwest corner of the complex. We have called this small ecclesiastical building the Chapel of the Peacocks.

The Chapel of the Peacocks

The chapel is built at a lower level than the road that runs along the south wall and partly on the facade. On the evidence of the strange sudden deviation of the southern wall of the chapel in a northwesterly direction, it can be assumed that the road pre-existed the chapel, which was built on the edge of the property (**Figs. 14, 15**). The door on the facade opened onto the road. The inner level of the chapel was reached by a flight of steps. A stone incised with Thamudic graffiti had been re-used in the building of the facade wall.

The chapel was made up of the apsed prayer hall and a northern service room that was accessed from the chapel through a door set in the north wall, close to the northwest corner of the chapel (**Fig. 16**). The lintel of this door was decorated with a cross in a circle set in its centre. A second door on the northern wall connected the chapel with an internal paved courtyard to the north. Water was stored in two stone basins, found still *in situ*, one in the small courtyard and set against the east wall, the second on the eastern outer wall of the chapel. The lintel on the door leading to the in-



14. The Chapel of the Peacocks before the removal of the fallen arches (A. Roncalli). Scale 1:100.

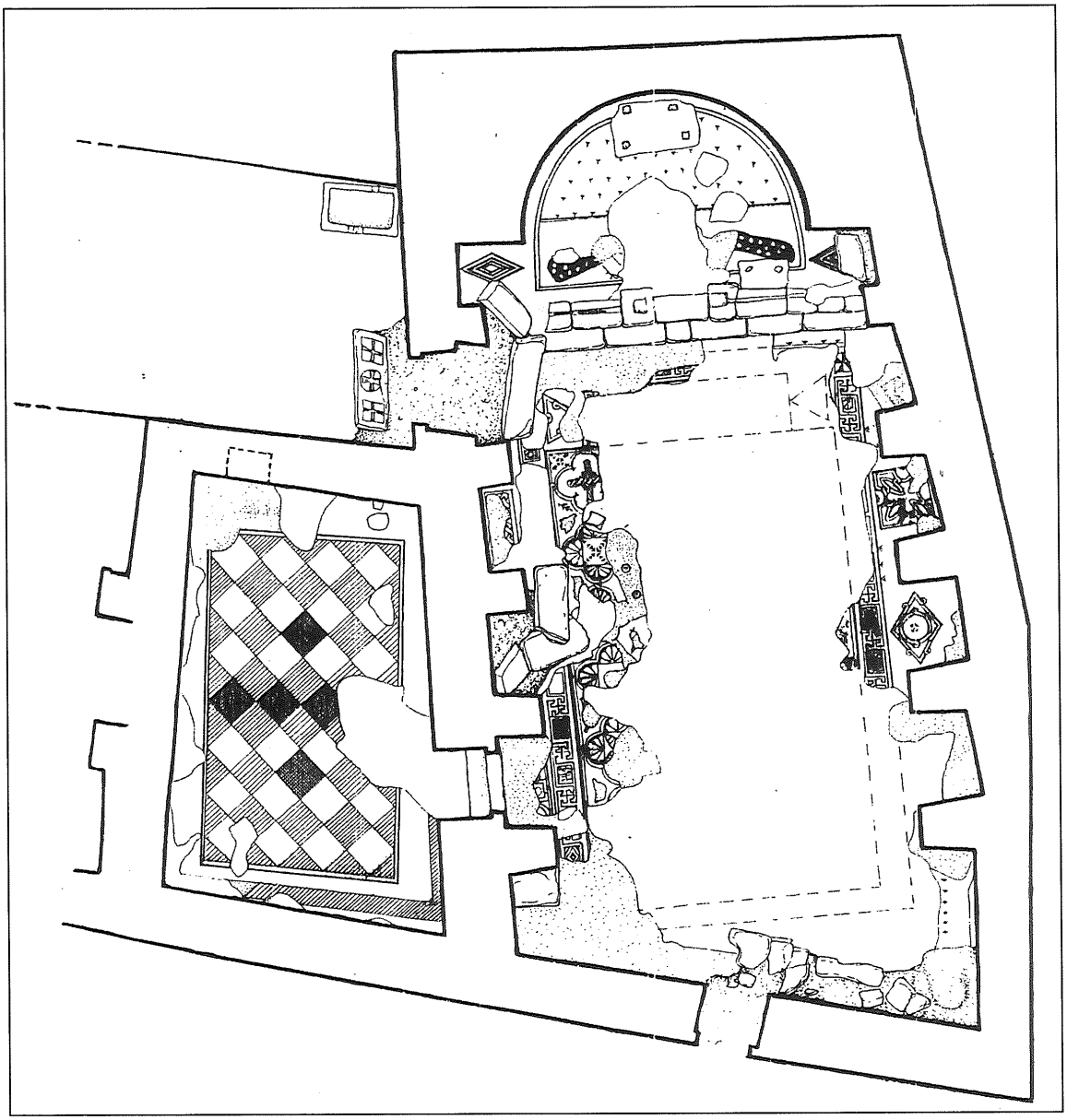
ternal courtyard was decorated with two crosses incised in a square panel on either side of a third Greek cross in circle in relief (**Fig. 17**). Another room, with its roof supported by two arches, was added on — externally to — the service room and set against its northern wall. This last room did not serve the chapel in any way but is to be placed in relation with the internal courtyard of the complex.

The perimeter walls of the chapel were still preserved up to a height of more than two meters. Five arches stretching in a north-south direction spring from the piers built against the inner wall to support the roof of the hall. The roof was covered with long rectangular beams of the local fossiliferous stone found in Umm ar-Raṣāṣ. We found the collapsed arches and stone beams inside the chapel (**Fig. 14**).

A chancel screen made of bituminous schist protected the raised sanctuary of the chapel (only 20cm high). In the apsed area there were two liturgical furnishings still preserved (**Fig. 18**). The base of the altar was found against the splay of the apse while the base of the offering table was recovered near the chancel screen, on the south side of the entrance to the sanctuary. A third element that can be related to the liturgy celebrated in the chapel is the small walled-in cupboard. This was found on the south wall of the apse, one meter from the floor.

In the northern service room, we noticed a small column inserted in the mosaic floor near the eastern wall, possibly the base of a table.

Witness to the reuse of the chapel as a dwelling, before the collapse of the roof, was a *ṭābūn* built in the southwest corner of the chapel. Here we



15. The Chapel of the Peacocks after the removal of the fallen arches (A. Roncalli).

brought to light sherds of a cooking pot made of coarse-ware pottery, a type already found in other churches at Umm ar-Raṣāṣ. The main evidence that the chapel was still standing after the Christian community abandoned it was the fact that the mosaic tesserae of the floor in the main nave had been removed.

The Mosaic Floor

The chapel and the northern service room had been paved with mosaics. Unfortunately, the central part of the mosaic floor in the nave was carefully destroyed and the tesserae taken away for some unknown reason. At the same time, the dedicatory inscription, set in a *tabula ansata* in front of the step of the sanctuary, was also removed (**Fig. 19**).

However, the surviving parts of the mosaic floor in the sanctuary and on the sides along the perimeter of the hall, give us the possibility to recreate the main decorative programme.

The main motif in the area of the bema was a semicircular composition, extending from the apse to the step, divided into two panels with a field of florets in the eastern panel, and two peacocks facing each other depicted in the western panel (which give the chapel its name). The two birds had already suffered the iconophobic mutilation before being partly destroyed. Of them only the two tails with the characteristic feathers and one leg of the northern peacock survived. On the north and south extremities, the mosaicists added two polychrome geometrical motifs.



16. The Chapel of the Peacocks with the northern service room.

The nave was wholly decorated with a single motif and surrounded by a band with a swastika meander alternated with squares knotted with the inner composition of superimposed polylobed squares. Of the dedicatory inscription inserted in a *tabula ansata,* only half a letter has been recovered. The resultant square spaces of the enclosing band as well as the resulting spaces within the main composition were filled with flowers, birds facing flowers, and geometric motifs. One polylobed square, set in the northwest corner of the main carpet, contained a large braided cross. The intercolumnar spaces on the sides, mostly preserved, were decorated with geometric knotted motifs.

The service room on the north was uniformly decorated with a checkered pattern with squares of white tesserae alternating with squares of yellow and red tesserae. **(Fig. 20)**.

Basing ourselves on the surviving parts of the mosaic that are rather scanty, we can offer our conclusions. Artistically, we can say that the mosaic floor, of good workmanship, fits well in the works of the mosaicists who paved with mosaics the churches of Kastron Mefaa at the time of Bishop Sergius in the last three decades of the sixth century (Piccirillo 1995: 391-398). Therefore, the Chapel of the Peacocks can be dated with confidence to that period.

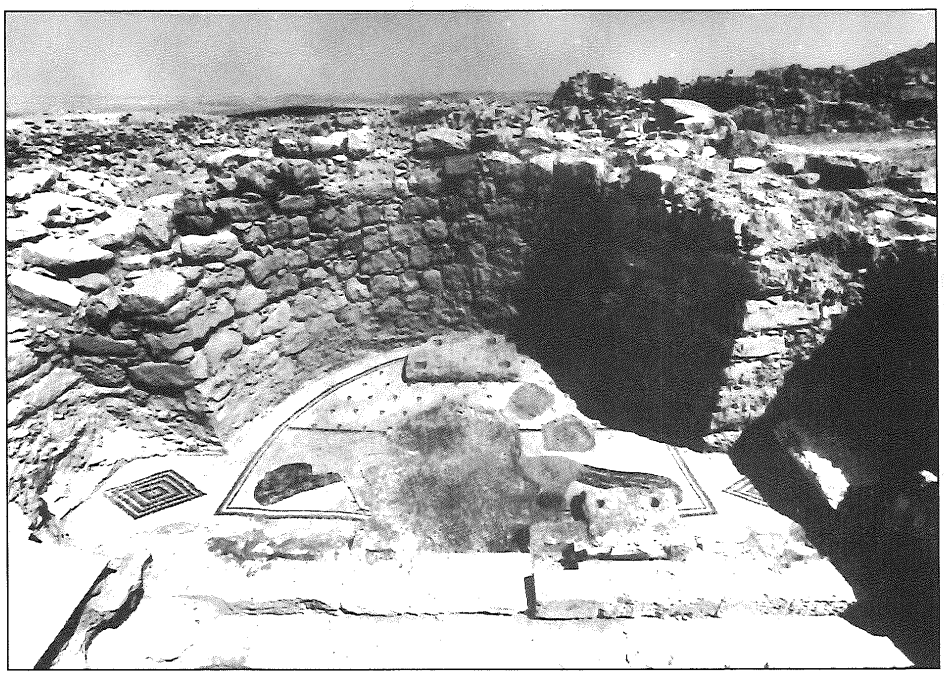
The same surviving patches of mosaic witness to the fact that the chapel was still in use in the Umayyad period, since the mosaic floor was disfigured during the iconophobic crisis currently dated in the eighth century (Piccirillo 1996a: 173-191; Schick 1987: ch. IV). The damages had been repaired; therefore the chapel was still in use after that time.

Moreover, the chapel provides three interesting details to the history of the liturgy in the diocese of Mādabā, adding new evidence to its development in the late period. As in other churches of the region, the chapel was provided with a side service room in which we found the base of a table set in the vicinity of the eastern wall, possibly the starting point of the celebration where the offerings were prepared.[12] In the bema, we noticed that the base of the altar with four sockets for the small col-

12. The service room or diakonikon on the north side, accompany the Chapel of Bishop Marianos at Gerasa (Gawlikowski and Musa 1986: 139, fig. 2), and the chapel in the monastery of the Theotokos in Wādī 'Ayn al-Kanīsah on Mount Nebo (Piccirillo 1994: 521-538, fig. 1).



17. The lintel of the northern door in the northern paved courtyard.



18. The presbytery of the Chapel of the Peacocks.

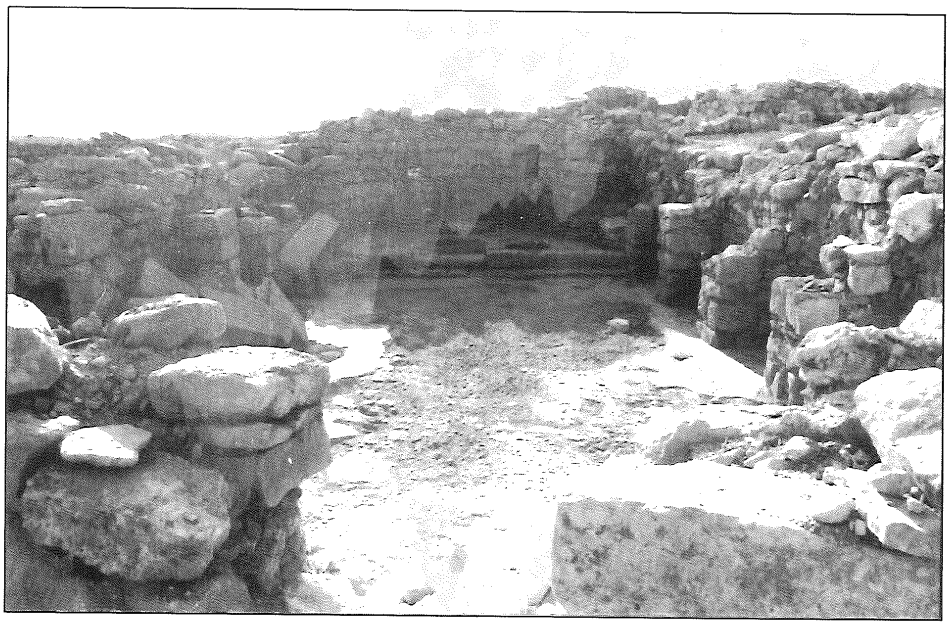
umns was positioned near the rear wall of the apse. The same position of the altar found in the Chapel of the Column in the Saint Stephen Complex, the latest dated chapel of the complex.[13] The altar is new evidence for the late use of the chapel (Michel 1994: 111-119). Near the chancel screen on the southern side, there was, still *in situ*, the base containing two sockets of an offering table, as found in other churches of Umm ar-Raṣāṣ. In the other churches, the base for the offering table was found in the northern side of the chancel screen.[14] Normally, in the churches of the Provincia Arabia, it is the ambo that is set in this southern position. Considering the small size of the chapel, we do not see the necessity to identify such a furnishing as an ambo.

Conclusion

The excavations have provided us with evidence to: the late liturgical use attested by the altar,

13. Cf. Piccirillo and Alliata 1994: 96-99. The altar was placed near the eastern wall in the chapel of the monastery at Khirbat al-Kursī in ʿAmmān (Piccirillo and ʿAmr 1988: 361-382, plan I).

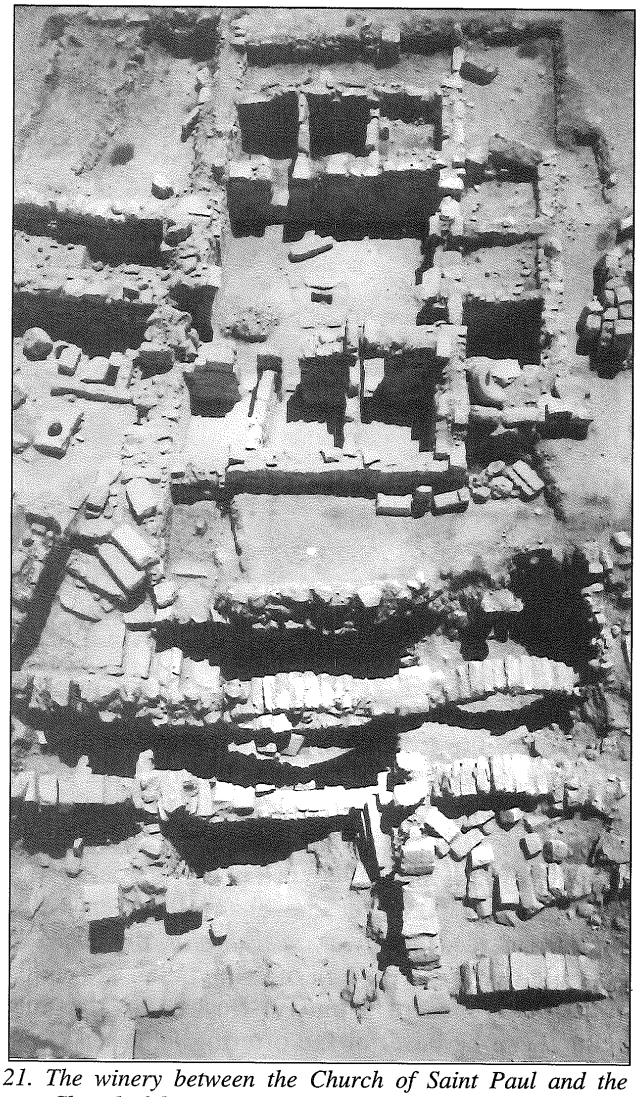
14. It was found in the church of the Lions (Piccirillo 1992: 207; tav. 7, foto 15), and in the church of Priest Wa'il (Piccirillo 1993c: 318, fig. 15).



19. The Chapel of the Peacocks seen from the west entrance.



20. The Chapel of the Peacocks seen from the northwest.



21. The winery between the Church of Saint Paul and the Chapel of the Peacocks.

the damages of the iconophobic crisis and their repairs, the despoiling suffered by the mosaic floor in the centre of the chapel, and the re-use of the chapel as a dwelling attested by the oven in the south-west corner. Moreover, we recovered a cooking pot of the so-called coarse-ware dated to the ninth-

tenth century.[15] We may conclude that the evidence gathered from the Chapel of the Peacocks parallels the chronological evidence gathered from the excavations carried out in the nearby Church of Saint Paul as well as from the other excavated complexes in the outer quarter of the ruins of Umm ar-Raṣāṣ; the Saint Stephen Complex on the north, and the Complex around the Church of the Lions to the south.[16]

The Porch of the Church of Saint Paul and the Winery in the Internal Courtyard between the Two Sacred Edifices

The 1997-1998 archaeological campaigns were centred on the northern and southern flanks of the Church of Saint Paul.

To the north of the church, work was primarily carried out to clean the area from the accumulated debris and to possibly trace any structure therein. During this phase we noted that the northern external face of the northern wall of the church was greatly damaged and we decided not to expose it completely. Some of the areas on the northern flank of the church were only partially excavated while others where only excavated up to the first treading level encountered. The area was only cleaned at surface level except for two sectors next to the east-west road, that runs along the southern limit of Saint Stephen's Complex. These two areas (courtyards?) turned out to be interconnected through a doorway whose threshold survived. The eastern courtyard was only partially excavated (not to block the entrance to the ruins from the east). We did not, therefore, reach the eastern perimeter wall of the area. Besides the door in the western wall this area had another door in the southern wall. On the beaten earth floor, in the southwestern corner of the area, a marble fragment with an inscription was recovered, while towards the centre of the area a lintel decorated with crosses was found. The second area (to the west) resulted in an elongated (12.50 x 37.5m) east-west open space (no sign of pillars were found) that also had a door on the south wall. The only pottery sherds coming from this area were recovered from a drop in the floor at the northeast corner. An almost complete small amphora was recovered here. We have also noted that the area next to the cistern in the presumed north courtyard of the Church of Saint Paul was transformed into various small rooms during a later period. A stone ball (missile?) was recovered next to the northern wall of the Church of Saint Paul. Work is to be continued there.

The Porch of the Church of Saint Paul

Excavations were extended to the south area adjacent to the Church of Saint Paul. This area covers the space between the Chapel of the Peacocks and that of Saint Paul's. We proceeded in a stratigraphical analysis of the area to better understand the subsequent stages of the structures and the continued usage of the area. Besides the excavation of the visible structures, we also excavated some in-depth trenches.

The structural remains, which were unearthed, belong to the stylobate that separated the courtyard from the two south entrances of the Church of Saint Paul. The stylobate (ca. 9m long, 63cm deep and 115cm in its foundation) did not contain any rising structure. It was formed by medium sized rectangular blocks of stone erected on a foundation made up of stones of different sizes and quality. It was 2.86m from the threshold of the church. On this stylobate, a portico was formed by three arches supported at the centre by two stone columns while on the eastern and western extremities it rested on two pillars. The whole collapsed structure emerged. Towards the eastern extremity, next to the collapsed arch and column, a stone ionic type capital-springer with a large quadrangular abacus was found. A similar example had already been noted among the ruins of Umm ar-Raṣāṣ. The lower portion of the western column (cubic base and bulging *torus*) is *in situ* and had been incorporated in the southeast corner of a room subsequently built in the western area of the portico (area 01). The eastern arch had a span of three meters — identified by the distance existing between the column base and the western pillar (which was also subsequently incorporated in the south wall of area 01). A very fine treading floor was in use in conjunction with the original porch. This had an upper layer (ca. 10cm thick) of lime and small stones laid on a well prepared fill of about 60cm. This floor and its structure were identified through the two excavated trenches, one in area 01 and the other in front of the western entrance of the south perimeter wall of the Church of Saint Paul. The fill that rests almost directly on a cistern (tomb?) contained sherds from the Roman period to the end of the sixth century. Mosaic tesserae and waste of different sizes (small and very small) and colours were found in this layer.

Two cisterns were excavated in relation to an

15. Some objects were found in the Church of the Lions (Alliata 1992: 248f "Vasi da cucina"); and in the Church of the Priest Wa'il (Alliata 1993: 336, fig. 2, 35.44-45).

16. For the final abandonment of the Complex of Saint Stephen, cf. Piccirillo and Alliata 1994: 282-286.

open courtyard laying in front of the porch which also had a beaten earth floor. The northern one was found at a distance of 3.15m from the external facade of the stylobate. The cistern lies at the centre of the two entrances to the church. It is 6.50m deep, having a diameter of around 90cm. Its opening was raised by about 80cm, which was probably due to the area being used again at a later stage.

A small channel runs under the doorway leading to the wine press excavated on the south side, and pours into a small stone basin (73cm x 50cm and 26cm deep). The basin has two holes at the bottom from which the water poured into two rectangular cisterns-reservoirs whose walls are covered with waterproof plaster. These reservoirs are more than 2m deep and had their openings at floor level.

A very thick layer of soil completely covered the reservoirs, the basin and the channel. The sherds coming from inside the channel date to the late Umayyad period. The presence of three fireplaces was noted in the upper part of the stratum next to the reservoirs.

Furthermore, the two cisterns discovered almost under the winery's doorstep have no connection whatsoever with the winery, although the "water channel" from the cisterns leads in that direction (south). This channel lies about 20cm below the floor of the central room. To date we do not have further explanations for these cisterns.

On the western part of the porch, a small area was found (Area 01) that belongs to a later period of use of the porch. The western and eastern walls of the area are made up of irregular rows of reused stones — they enclose the western arch of the portico encompassing the column and the pillar. A new floor of beaten earth was laid atop the original flooring upon a 30cm deep fill. The sherds found in this fill are from the Umayyad period.

The Winery

At about 2.25m from the porch excavations to the south, towards the Chapel of the Peacocks, there came to light a winery complex (**Fig. 21**).[17]

The winery turned up to be made up of a central roofed room around which nine wine pressers, without roofs, are located in three groups. These lie three to the west, three to the south and three to the east. The northern wall was the limit in this direction, while a 170cm wide corridor flanked the pressers to the east and west. To the south the pressers were flanked by a courtyard, which we only partially excavated. This south corridor was 18cm higher that the eastern corridor. A stone step placed in relation to the southern enclosing wall of the southeast winepress led from the corridor to the courtyard.

All six completely excavated wine pressers presented the same characteristics: a thick layer of white plaster covered the walls of the presses. Large traces of this plaster had been preserved. White mosaic floors (tesserae of 2-2.5cm) were laid in a slight incline towards the central room, or better still towards a hole in the wall that divided the pressers from the central room, from where the must flowed out. Three pressers, two on the southern wall, and one on the eastern wall, were only partially excavated. These same three pressers had their entrances blocked during a successive use after the abandonment of the area.

All the pressers are linked to the central roofed room (10.90m x 5.20m x ca. 1.50-1.95m) through an opening of 75-90cm. Two north-south arches supported the roof. The lack of roof stone slabs during excavations leads us to suppose that the roof was made up of wood covered with beaten earth. The walls of the central room are preserved to a height of almost two meters, which walls were also plastered. Over three of the openings to the pressers, the lintel was still *in situ*. Furthermore in the walls flanked by the pressers (west, south, and east) there remains the niche for the settling of the must. These were made up of a semi cupola hewn out of a block of stone and a small stone basin connected to the pressers through a hole. The central one on the southern wall did not have the niche but only a small stone basin under an opening in the wall. The niches are well preserved and have traces of plaster.

The mosaic floor of the pressers is 20-30cm higher than the floor of the central room. Thus a stone step within the wall filled the gap. The floor of the central room was laid in mosaic using large sized tesserae (2-2.5cm). Two-three lines of tesserae bordered the diagonal filling. On the southeast corner there is a rectangle (60cm x 35cm) with an enclosing border and horizontal filling. The mosaic also enclosed a rectangular stone slab (20cm x 15cm) placed beneath the stone step of the entrance to the central room. The door in the northwest corner of the central room, together with two steps (15cm each), lead up and out of the central room.

A monolithic block of stone (115cm x 60cm) with a hewn out hole (62cm x 52cm x 25cm) was embedded in the floor at the centre of the room. This served to hold the wooden winepress. Large

17. For winery complexes see Ahlström 1978: 19-49; Ayalon 1983: 17-30. For a very similar wine press found on Mount Nebo, see Piccirillo 1996b: 393f.

stone slabs around which there is the mosaic border, which mosaic was also used to fill up the remaining spaces, then blocked this stone. The mosaic floor towards the northwest corner was patched with stones of different sizes. The floor is inclined toward the northwest corner, towards a hole, that poured into a collecting basin for the must obtained within the wall (between the north arch and the door). More than half the length of the basin (80cm x 120cm x 105cm) is buried under the door and it is completely under the floor level.

Excavations showed that the hole for the wooden winepress was full of ashes that spilled around the area. The pottery found in the abandonment level above these ashes, and also directly on the mosaic floor, belongs to the Umayyad period. The central room had been reused at a later period, blocking off three pressers and leveling the abandonment stratum of yellowish soil (ca. 20cm thick) to create a treading level on which a *tannūr* (oven) was built. The oven was found very badly damaged. This helped explain the quantity of ashes found at this stratum. The complete abandonment of the winery brought with it the filling up of the structures with rubble. The arches were the last to fall down on top of all the rubble. The excavations revealed that a beaten earth floor unearthed in front of the porch of the Church of Saint Paul, containing Umayyad sherds, was the treading level for those going in or out of the winery.

A continuous wall delimits the pressers to the west. Outside this wall a beaten earth floor leads from the south towards the southern courtyard of Saint Paul's. A small (35cm diameter) circular oven made up of refractory earth (*tannūr*) was unearthed infixed in this flooring — thus revealing a later use of this space. This floor lies at about 40cm below another beaten earth flooring that exists next to the Chapel of the Peacocks. It is interesting to note that no walls or other structures were encountered between the two levels of floorings. Further investigation also revealed that the lower flooring made up of chipped stone, lime and soil, whitish in colour, lies on yet another beaten earth flooring, some 15cm below. This passage was delimited to the west by a wall that runs from the Chapel of the Peacocks towards the courtyard of Saint Paul's, some 180cm wide. To the north the winery had a door (ca. 65cm wide) that led directly to the courtyard outside the church's portico — the door is actually blocked by rubble.

In the filling of the wine pressers the pottery comes from the late eighth-ninth century. In this regard, the discovery of two different oil lamp fragments, which have vine scrolls filled in with grapes, pomegranates, cantharus and a bird, is very significant. Both these belong to the second type (Arndt 1987). The fragments of one or more cups are also noteworthy These are of the type with geometric decoration in reddish-brown paint on a white background, already found at Umm ar-Raṣāṣ and of which various pieces were found even inside the Church of Saint Paul (Alliata 1994: 278-289).

The Various Phases

The excavations carried out so far have revealed that the actual porch of the church was built over the bedrock, lying 115cm below the level of the original beaten floor of the same portico. A layer of about 15cm covered this, made up of silt soil and ashes. The research also revealed at least two other later phases of usage of the area of the portico and the courtyard annexed to the church. These are documented first of all by the construction of a northeast-southwest wall. The accentuated difference in levels was covered by three steps, which were laid on the original beaten earth treading level. Future research might clarify better this phase and the subsequent use of the main part of the courtyard, outside the church's portico, as part of the winery.

There follows, on a higher level, the last beaten earth treading level that lies directly under the fallen structures and on which also rests a re-used basin towards the centre of the courtyard, almost in front of the southern entrance to the church. It is interesting to note that the southern nave of the Church of Saint Paul had been transformed into a dwelling place at a later date after it was abandoned, and this entrance leads directly into this "new" dwelling. A very irregularly shaped low wall rests on this higher beaten earth flooring, partially closing the area to the southeast.

A further phase results in the collapse of the porch structure which must date back to the period when the place was completely abandoned, as witnessed by the thick layer of soil on which the collapsed arches rest. The presence of fireplaces is further documented in various points of the area lying between the second phase flooring and the last flooring of the area.

Excavations to the East of the Porch (North of the Winery)

By extending the excavation to the east of the porch of the Church of Saint Paul we were able to locate an entry corridor for the church which came from the street flanking the buildings. The corridor is delimited to the south by two walls, one of which is out of axis, and goes directly to rest on the

southeast corner of the porch. The door (120cm) for this corridor had a lintel decorated with crosses and was found at 14m from the eastern facade of the porch of the church. A cistern with well-curb was situated in the northeast corner of the corridor while a round stone basin (55cm outer radius) raised on a rectangular plastered platform was situated towards the centre of the corridor, in a corner resulting from the junction of the two east-west southern walls. From under this stone basin a water channel led to the cistern. All the area was reorganized with various modifications and additions.

The trenches revealed various treading floors belonging to the various modifications of the area with some being cut for the insertion of the various additional walls:

1) In a trench towards the centre of the corridor (near the round stone basin), we noticed that in 48cm there where 5 superimposed treading levels, three of lime and two of earth. The lower three lime treading levels (being also the most ancient) were cut to insert the southern enclosing wall, while the upper two beaten earth floorings rest directly on the same wall. The small stone basin and the water channel were laid directly on top of the most ancient floor. No significant sherds were collected to be able to date the different phases.
2) Another trench (on the outside of the southeast corner of the Church of Saint Paul) revealed that even parts of the church walls were re-laid. Under a 20cm lime treading level, which is attached directly to the church walls, there is a beaten earth flooring which had been cut to insert the stones of the church wall. It is interesting to note that on the surface of this floor various roof-tiles splinters were found, splinters that result from the work carried out in the lying of the roof-tiles. The trench also revealed that the lowest filling, which is directly attached to the church wall's foundation, contains pottery sherds belonging to the first decades after the mid-sixth century. The thick layer of lime, present on all the surface of the porch, preserved some fine white smooth plaster with which the outer walls of the church were covered.
3) Another trench next to the north wall of the winery revealed that the area next to this wall had been completely re-laid by removing two superimposed treading levels. The lower one was laid on a bed of rounded stones. The fill, from the bedrock, was made up of earth containing Umayyad pottery sherds.

M. Piccirillo
Franciscan Archaeological Institute

Mount Nebo - Jordan

Bibliography

Ahlström, G.W.
1978 Wine presses and Cup-Marks of the Jenin-Megiddo Survey. *BASOR* 231: 19-49.
Alliata, E.
1987 Nota sulla ceramica dello scavo. *LA* 37: 221-239.
1992 Ceramica e piccoli oggetti dallo scavo beila chiesa dei Leoni a Umm al-Rasas. *LA* 42: 227-250.
1993 Ceramica dello scavo della chiesa di Wa'il a Umm al-Rasas. In F. Manns and E. Alliata (eds.), *Early Christianity in Context. Monuments and Documents*. Jerusalem.
1994 Ceramica romana, bizantina e araba. In M. Piccirillo and E. Alliata, *Umm al-Rasas- Mayfa'ah I. Gli scavi del Complesso di Santo Stefano*. Jerusalem.
Arndt, M.B.
1987 Lucerne arabe con decorazione "a vite" dallo scavo della Probatica (1956-1967). *LA* 37: 241-290.
Ayalon, E.
1983 Roman-Period Wine Presses Excavated in the Haaretz Museum Center. In R. Zeevy (ed.), *Israel-People and Land*. Haaretz Museum Yearbook I. Tel-Aviv.
Bujard, J., Piccirillo, M. and Poiatti-Haldimann, M.
1992 Les églises géminées d'Umm al-Rasas. Fouilles de la mission archéologique suisse (Foundation Max van Berchem). *ADAJ* 36: 291-306.
Calonghi, F.
1955 *Dizionario della lingua latina*. Torino.
Clark, V.A.
1986 The Church of Bishop Isaiah at Jerash. In F. Zayadine (ed.), *Jerash Archaeological Project 1981-1983, I*. Amman.
Gawlikowski, M. and Musa, A.
1986 The Church of Bishop Marianos. In F. Zayadine (ed.), *Jerash Archaeological Project 1981-1983, I*. Amman.
Jarry, J.
1968 *Hérésies et factions dans l'Empire Byzantin du IVe au VIIe siècle*. Paris.
Kraeling, C.H.
1938 *Gerasa City of the Decapolis*. New Haven.
Lawlor, J.I.
1980 The Excavation of the North Church at Hesban, Jordan: A Preliminary Report. *AUSS* 18: 65-76.
Michel, A.
1994 Le installazioni liturgiche. In M. Piccirillo and E. Alliata, *Umm al-Rasas- Mayfa'ah I. Gli scavi del Complesso di Santo Stefano*. Jerusalem.
Piccirillo, M.
1981 *Chiese e mosaici della Giordania Settentrionale*. Jerusalem.
1982 Ricerca storico-archeologica in Giordania II - 1982. *LA* 32: 461-513.
1989 *Chiese e mosaici di Madaba*. Jerusalem.

1992 La chiesa dei Leoni a Umm al-Rasas - Kastron Mefaa. *LA* 42: 199-225.
1993a *The Mosaics of Jordan*. Amman.
1993b Ricerca storico-archeologica in Giordania XIII - 1993. *LA* 43: 447-516.
1993c La chiesa del Prete Wa'il a Umm al-Rasas - Kastron Mefaa in Giordania. In F. Manns and E. Alliata (eds.), *Early Christianity in Context. Monuments and Documents*. Jerusalem.
1994 Le due iscrizioni della cappella della Theotokos nel Wadi 'Ayn al-Kanissah - Monte Nebo. *LA* 44: 521-538.
1995 The Activity of the Mosaicists of the Diocese of Madaba at the Time of Bishop Sergius in the Second Half of the Sixth Century. Pp. 391-398 in *SHAJ* 5. Amman.
1996a Iconofobia o iconoclastia nelle chiese di Giordania. In *Bisanzio e l'Occidente: arte, archeologia, storia. Studi in onore di Fernanda de' Maffei*. Roma.
1996b Ricerca storico-archeologica in Giordania XVI - 1996. *LA* 46: 391-242.

Piccirillo, M. and Alliata, E.
1994 *Umm al-Rasas- Mayfa'ah I. Gli scavi del Complesso di Santo Stefano*. Jerusalem.
1998 *Mount Nebo. New Archaeological Excavations 1967-1997*. Jerusalem

Piccirillo, M. and 'Amr, A.
1988 A Chapel at Khirbet el-Kursi - Amman. *LA* 38: 361-382.

Saller, S. and Bagatti, B.
1949 *The Town of Nebo*. Jerusalem.

Schick, R.
1987 *The Fate of the Christians in Palestine during the Byzantine-Umayyad Transition, A.D. 600-750*. University of Chicago.

RECENT DISCOVERIES IN THE BAPTISM SITE
THE POTTERY

Adeib Abu Shmeis and Mohammad Waheeb

Important new information about the area of Bethany beyond the Jordan, where John the Baptist preached and baptized, has recently been revealed following archaeological sites along the length of Wādī al-Kharrār (وادي الخرّار) since 1996.

Combined evidence from the holy texts, Byzantine and medieval writers accounts, and most recently archaeological work place the site of Jesus Baptism directly east of the Jordan River.

Wādī al-Kharrār is the modern name for Sapsaphas, which is depicted on the Mādabā mosaic map. The archaeological remains are scattered over small hills and barren terraces of marl and limestone. Several kinds of trees and plants still grow in the valley and reflect the beautiful nature of the area.

The Roman Period

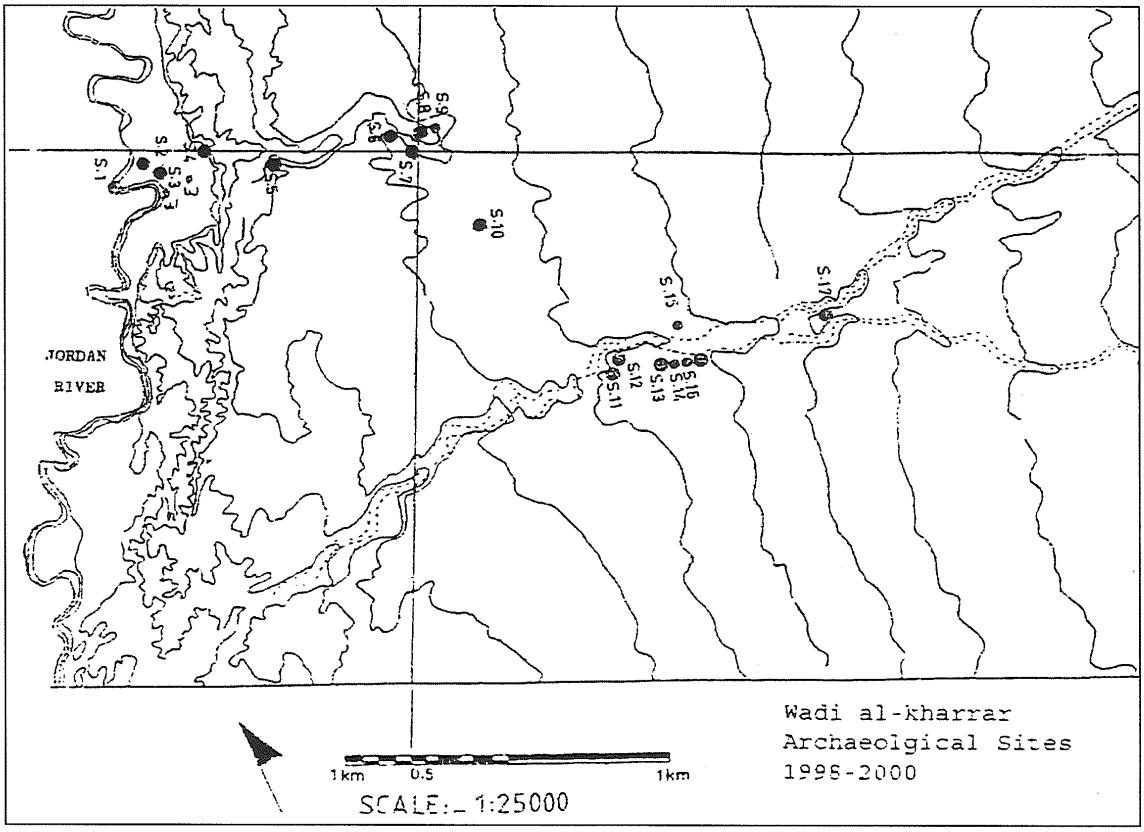
Several structure and buildings were constructed on the hill during the Roman Period. The main archaeological sites were numbered on the general map of the area (**Fig. 1**) as follows:

Site no. 3

A church, thought to be dedicated to John the Baptist, was discovered 300m east of the Jordan River in the Zawr area, bordered by Lisān marl cliffs on the east. Further excavations were conducted in the southern area of the prayer hall. More than 20 squares were opened at the site. Few architectural remains were found such as three *ṭawābīn* (ovens) and foundations of unknown structures. The recovered pottery dated to the early Roman period.

Site no. 8 (Tall al-Kharrār):

Tall al-Kharrār is a small low hill located at the southeastern end of Wādī al-Kharrār. The *tall* consists of white Lisān marl mixed with red soil on the top.



1. Wādī al-Kharrār archaeological sites.

The hill was occupied during the Roman and Byzantine periods. Systematic excavations at the site revealed the presence of three churches, three caves and three baptismal pools, with a protection wall around the hill. Two entrances were used to access the site from the south and from the west. Orthodox monks between the 12th and 19th centuries later occupied the top of the hill.

Further excavations under the damaged floor of the northeastern pool revealed a well, circular in shape on top and built of well-cut sandstone ashlars. There are no remains of lime or plaster covering the inner sides, which leads us to think that the well was built at the level of the water table of the nearby spring. The recovered pottery and other material from the well date from the early Roman to late Byzantine periods.

The church had a monastic community attached to it. Excavations have revealed the foundations of arches, walls and partly preserved mosaic and marble floor *in situ.* Pottery, coins, marble fragments, and roof tiles were among the findings.

The discovered remains represent and fit the descriptions of the ancient pilgrims who passed through this area on their way from Jerusalem to Mount Nebo. This discovery clarifies all doubts as to the exact location of the church that was built on the eastern side of the Jordan River to commemorate the sacred event of the Baptism.

Site no. 6 (the Lura)

Not far from Tall al-Kharrār, at a distance of 300m to the west on the edge of Wādī al-Kharrār, some architectural remains were discovered. They consist of a small structure with foundations built of local fieldstones, and upper courses built of mud brick. Wooden beams were used to roof the structure, which was evidently used by monks as a *lura.*

Site no. 7

The systematic excavations to the south of Tall al-Kharrār uncovered several buildings such as a prayer hall, chapels and a water system. The prayer hall is a rectangular structure built of undressed field stones, located at the southeastern corner of Tall al-Kharrār. A white mosaic pavement covered the floor. The manner of construction and location support the suggestion that the structure functioned as a prayer hall or chapel for Christians. Material recovered from the excavations date the structure to the late Roman period, with a few early Roman pottery sherds.

The Pottery

The aim of this article is to study the pottery, whether intact vessels or sherds, that were discovered during the 1997-2000 seasons of excavations at the Baptism site.

The study will focus on description, typological with chronological sequences and parallel examples from the surroundings and nearby areas.

The early Roman pottery concentrated mainly in sites no. 7 and 8, while other scattered pottery sherds were recovered at other sites along the southern bank of Wādī al-Kharrār. The presented assemblage was spread out along Wādī al- Kharrār for a distance of around two kilometers.

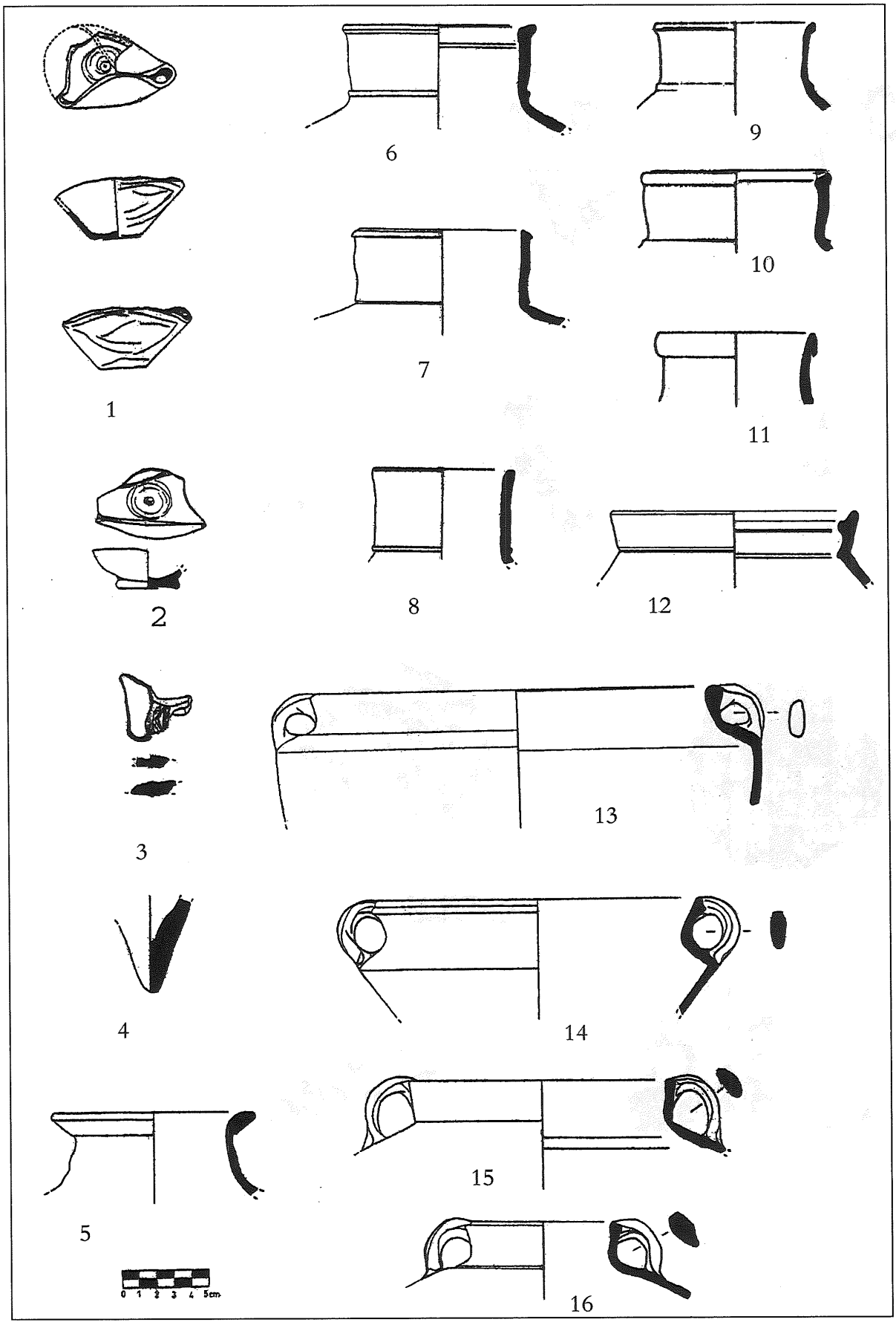
The Occupational Phases

1- Late Ottoman period. The monastic buildings include a late Islamic cemetery on the summit of Tall al-Kharrār and vicinity (end of the 19th century).
2- Middle Islamic period (MIs I, Crusader and Ayyubid/Mamluk AD 1070-1200), represented at sites no. 3 and 8 (very little evidence).
3- Early Islamic (EIs I-II-III; Umayyad, Abbasid and Fatimid periods AD 661-900), represented at sites no. 3, 5, 6, 7 and 8.
4- Byzantine period: A-Late Byzantine, phases II-III (ca. AD 520-640), represented in all sites. B-Early Byzantine, phase IV (ca. AD 480-520) represented at sites no. 3, 6, 7 and 8.
5- Roman period: A-Late Roman, phase I (till the end of second century AD), represented at sites no. 7 and 8. B- Pre and early Roman, phase I (ca. 100 BC- AD 73).

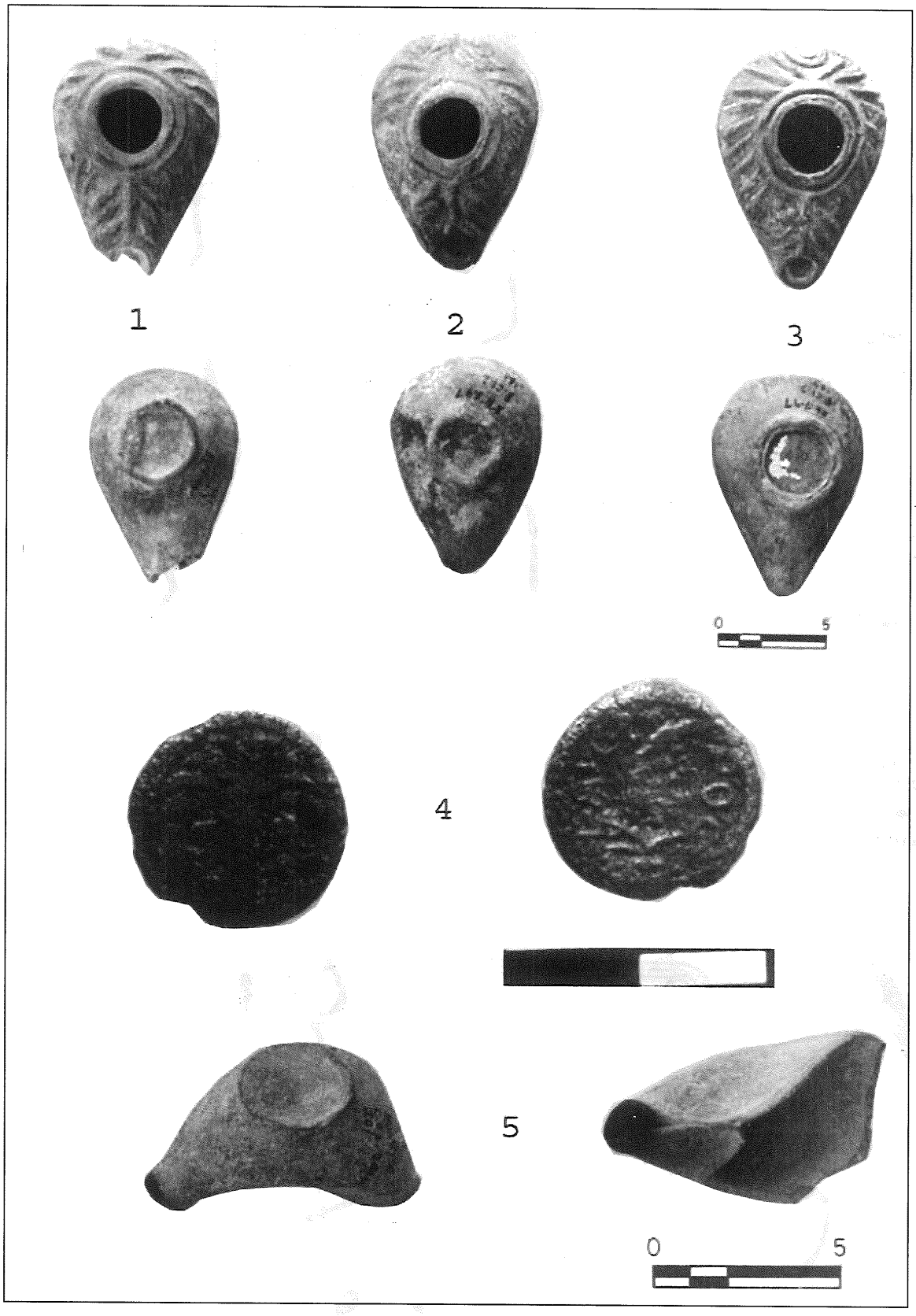
Catalogue

First: The earliest cultural remains, Item 5, Roman pottery A and B (note: C. C2.1 C = area, C2 = square no., 1 = locus no.).

1- Lamps. C.C2 balks. Site no. 8 Tall al-Kharrār field no. 201: small bowl pinched by fingers so as to makes nozzle; 7cm in length, 3.5cm height. Fine ware, red core (2.5YR 4/6) good firing, string-cut base, 1st century BC pre-Roman (Late Hellenistic). **Figs. 2:1-2; 3:5.**
2- Vertical jar necks ending with ridge. B.C 2. The well, site no. 8 Tall al-Kharrār field no. 275, and sites no. 7. 10cm diameter. Rough surface with small white grits, wedge rim in section some of it closed by mud, grayish to dark core (10YR 2/1). Early Roman phase I. **Fig. 2:6-11.**
3- Fragments of stone cups. C.F17.4 site no. 7 field no. 249 (the single chapel south of the *tall*), clean chalk deposit, easy to cut, simple round rim with one straight spout, rectangular handle scraped by knife which appears as a system of carving decor. Cups: 11cm diameter, 12.4cm deep, 3cm straight spout, and from 0.8-1cm

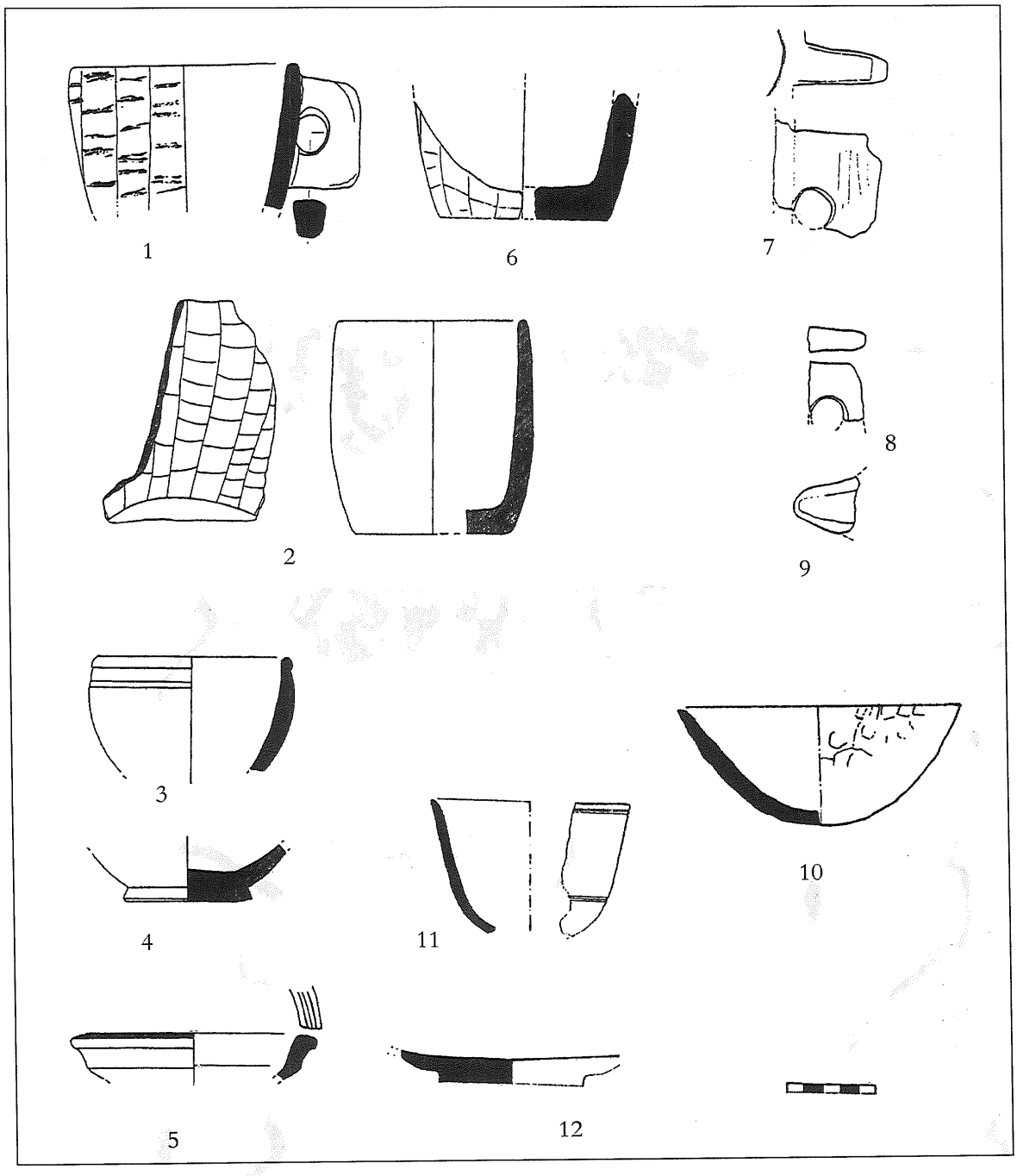


2. Pre-ER/ER I.



3.

thick. There are other stone fragments of bowls, vats or mortars and small cups. Fig. **4:1-6**. Bowls: everted walls with two regular incised lines on the rim, and similar lines above the disc base. Fine finishing at body, 15.2cm diameter, 8cm height. **Fig. 4:7-11**. Vat or mortar: has the same design as the cups, simple rim and irregular body. 28cm diameter, 13cm height. **Fig.**



4. ER I.

4:12. This clean chalk helps in producing such vessels (**Fig. 4:1-12**), 1st century BC. In B.C.2, the well has more than one fragment of this fabric. They may be measuring cups. The example on **Fig. 6:1**, because it is heavy and of one spout, may be ritual.

4- Sherds of open cooking pots. C.I18.2 site no. 7 field no. 248, short vertical neck with ear handle, carinated body, fine ware red core (10YR 4/6), very good firing. 23.5cm diameter. Pre-Roman. **Figs. 2:13, 14; 5: 11, 14**.

5- Globular juglets. B.C2:2., site no. 7 field no. 189. 2.7cm diameter, thin ware with creamy surface, sharp loop handle attached the folded rim, red core (2.5YR 4/8), common in early Roman. **Figs. 5:1-7; 6:5**

6- Sherds of Herodian lamps. C.H18.3 site no. 7 field no. 225 and C.F17.1 field no. 245, circular body, some have incised line adjacent to the nozzle, looks round base, fine ware, reddish brown core (5YR 6/4), the end of 1st century BC. **Fig. 7:1-8**.

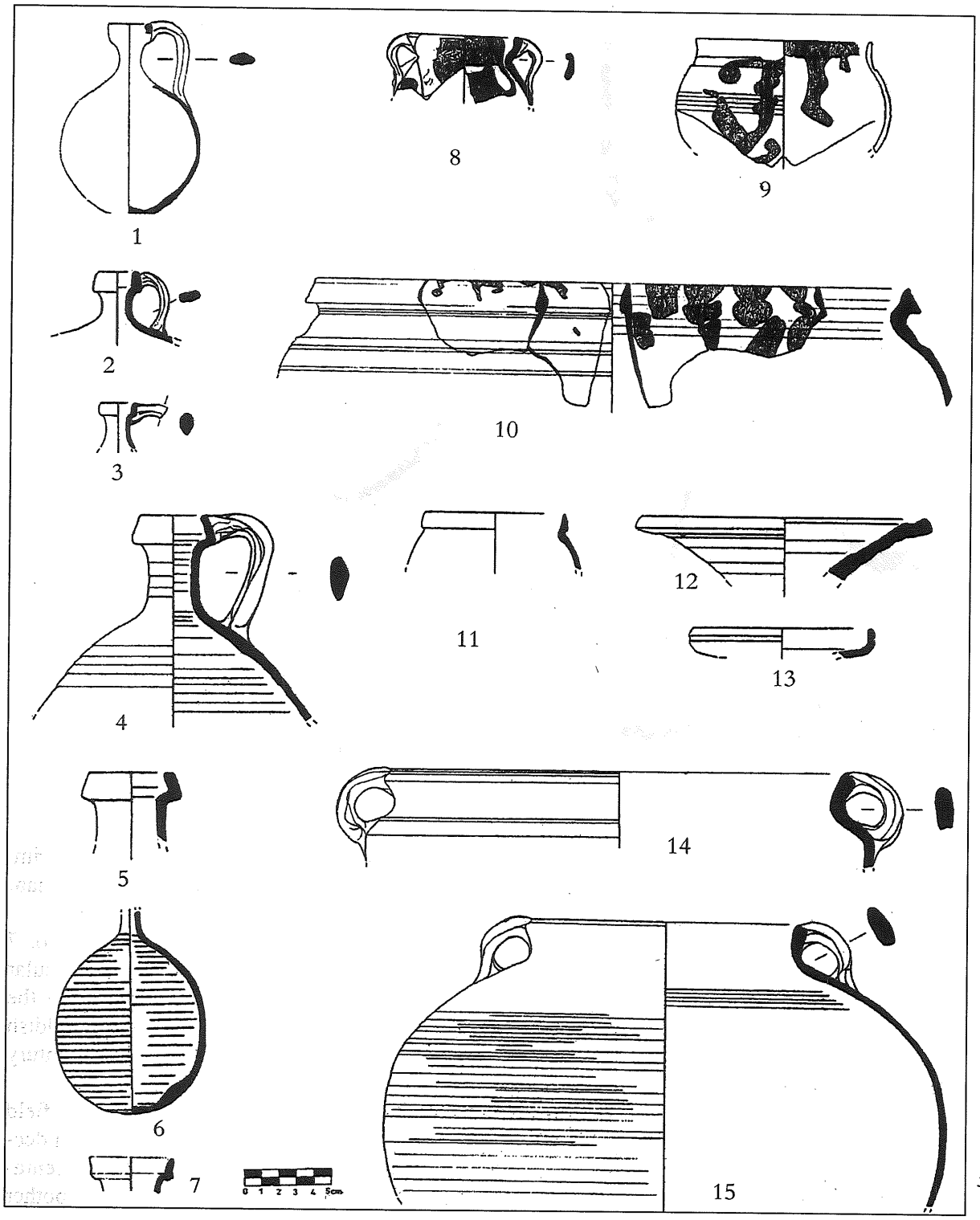
7- Sherd of moulded lamp. C.H 14.4 site no. 7 field no. 232, fragment of black ware lamp with decorated nozzle (10YR 2/1), imported, 2nd century BC. Hellenistic. **Fig. 2:3** (there is another

sherd, with two nozzles).

8- Rim of a small pot/bowl. C.J 17.2 site no. 7 field no. 237. 8cm diameter, thin ware, ER fabric, first half of the 1st century AD, elongated wedge rim in section, splash red paint inside the pot, light red core (2.5YR 6/8). Similar to that ware found in cistern B.C 2. **Fig. 5:8-13**.

9- Oil lamp. C.J 19.2. site no. 7 field no. 222 (the single chapel south of the *tall*), 10cm length, 4.2cm height, fan impression, two central circles around the filling hole, elongated nozzle, fine inclusions, and reddish brown core (5YR 4/6). L.R. the end of first century AD. **Fig. 7:9**.

10- Broken moulded lamp. C.I14.2 site no. 7 field no. 220. 3.4cm height, fan impression around the oil mouth, fragile body, the upper part is rounded in shape, pale brown core (10YR 7/3). Red splash paints, first half of 1st century AD.

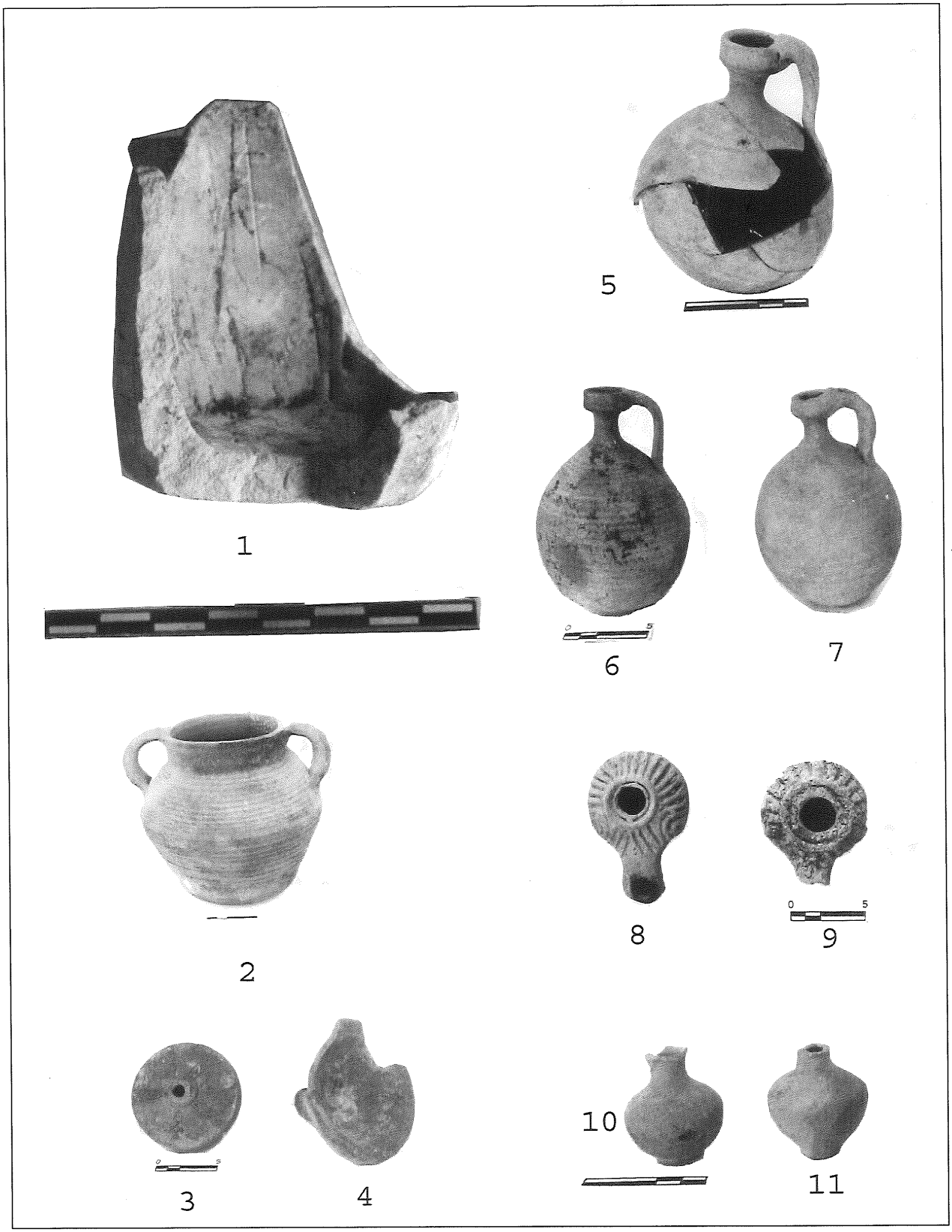


5. ER I-LR I.

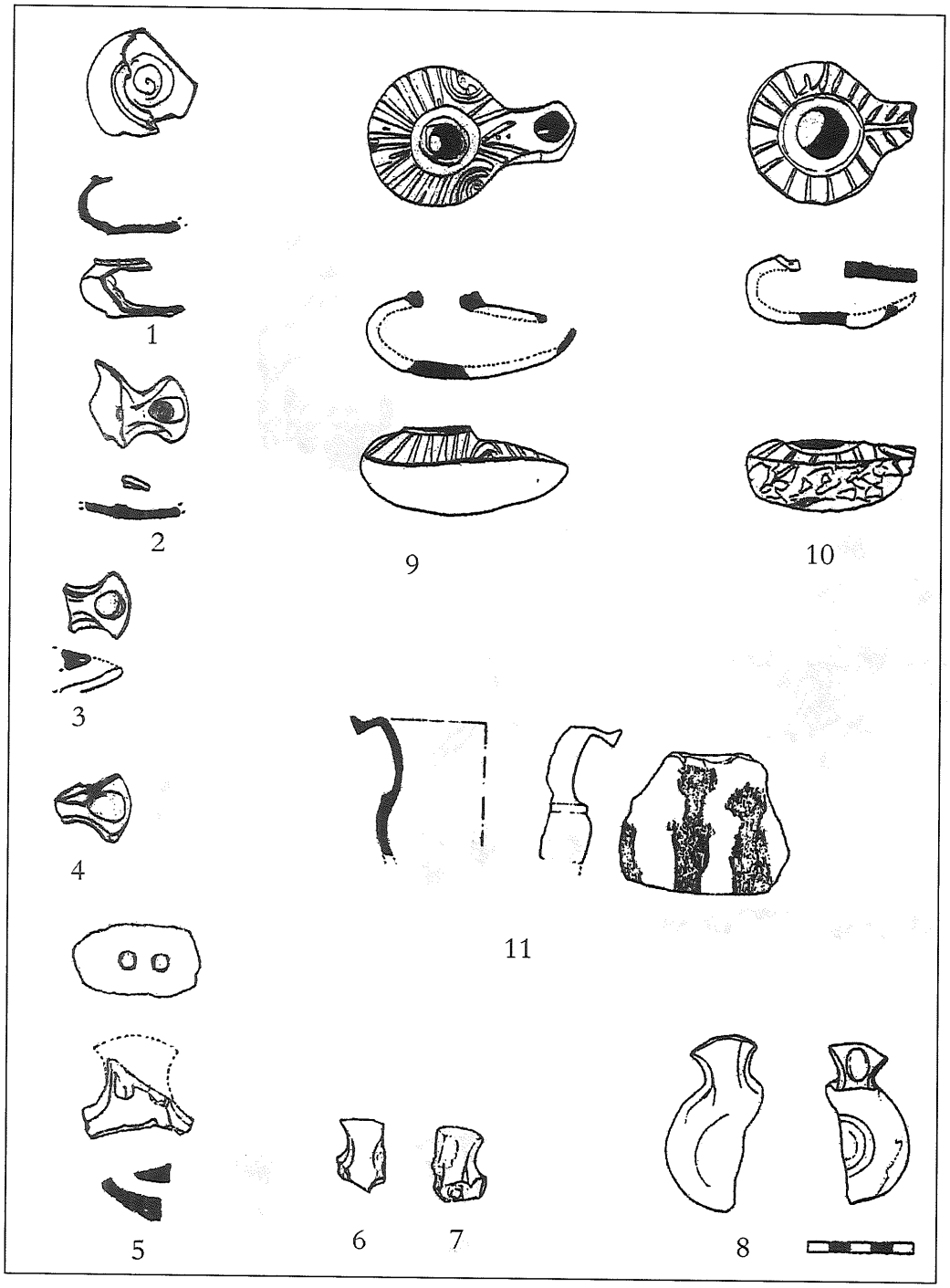
Figs. 6:8, 9; 7:10.

11- High stump base of amphora, spindle bottle A. E1 west of surround wall, site no. 8 field no. 227 (Tall al-Kharrār), fine light red core (2.5YR 6/8), faint string cut base, first century AD. **Fig. 8:1, 2.**

12- Rim with small loop handle of cooking pot. A.A2. site no. 8 field no. 231. Short everted neck, fine ware 10YR 4/6. 15cm diameter. L. Roman. **Fig. 8:5.**



6.



7. ER I-LR I.

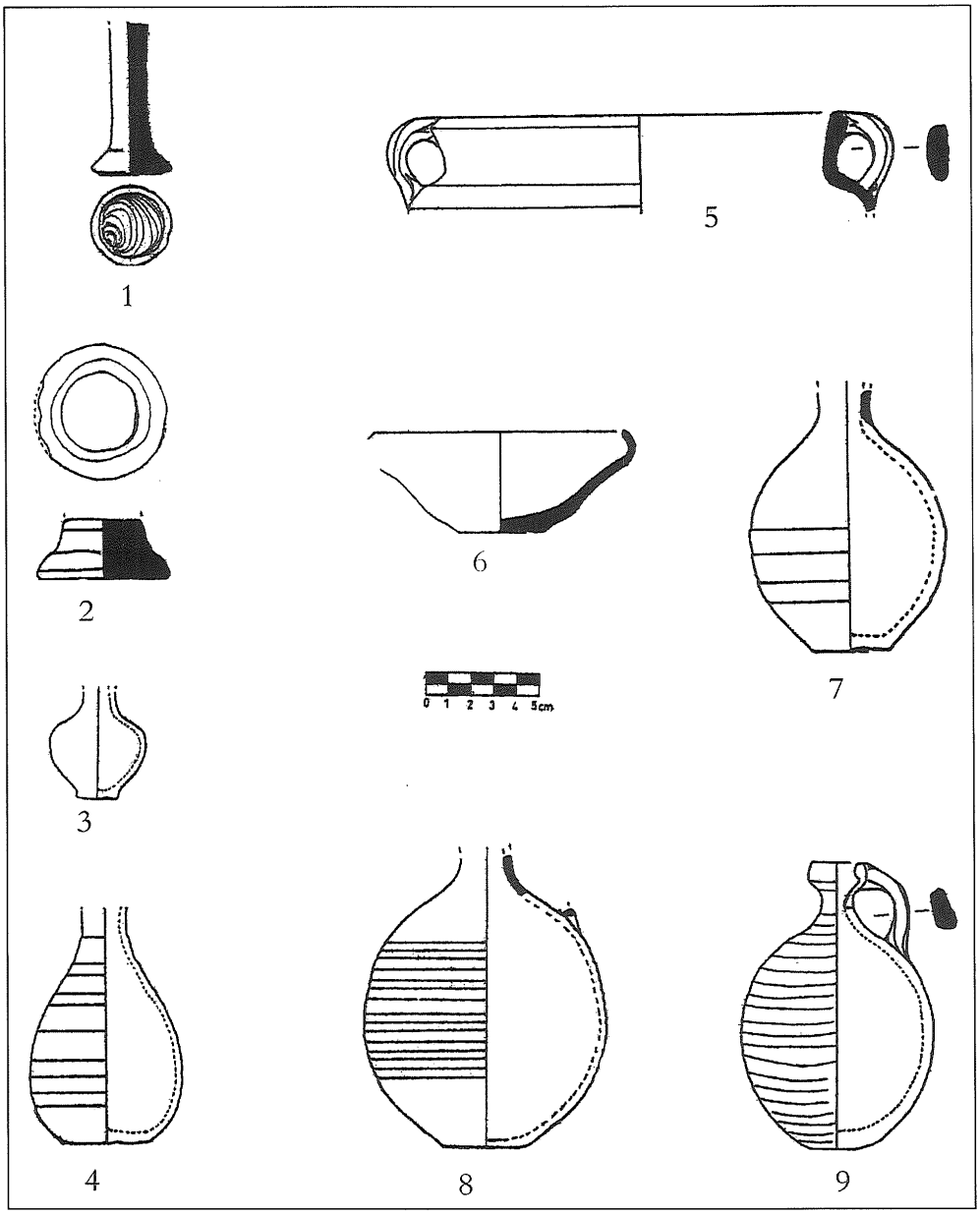
13- Sherd of open cooking pot. B.C2 the well, site no. 8 field no. 279, carinated body, fine thin ware 10YR 4/6. 22cm diameter. Early Roman. **Figs. 2:15, 16; 5:14, 15**.

14- Rim of a small bowl. C.F17: 1, site no. 7 field no. 242, fine and thin ware. Splash red paint on both sides 2.5YR 4/6. 10cm diameter. Early Roman. **Fig. 5:8, 9**.

15- Neck with handle of a small jar, fine and thin ware, and splash red paint on both sides 2.5YR 4/6. 6.5cm diameter. Early Roman. **Fig. 7:11**.

The best parallels had been found at Khirbat Qumrān (Lapp 1961), related to the first century BC. Early Roman sherds are abundant in some patches, inside the well on the summit of Tall al-Kharrār and on site no. 7 area C, south of the *tall*, also in the surveys near Wādī Ḥisbān (Ibach 1987). This phase of occupation is attested at Machaerus (Loffreda 1981; Corbo and Loffreda 1996), and Central Moab (Brown 1991). The ridges at the bottom of jar necks were common in the beginning of first century AD, Sauer (1973; 1994) gave accurate dates fore the Hellenistic and early Roman pottery.

Some early Roman pottery has also been pub-



8. ER I-LR I.

lished from Khirbat al-Mukhayyaṭ (Saller and Bagatti 1949; Alliata 1988).

Unstratified early Roman pottery had been found on the *tall*, in less than half a meter of debris mixed with very few late Hellenistic pottery sherds and one coin. Ceramics include red wares, shallow ribbed and elongated jars and juglets (**Fig. 6:6, 7, 10, 11**). The best examples came from Khirbat Qumrān Lapp (1961), 'Ayn Jidi/Ein Gadi (Hirchfeld 2000) and az-Zāra (Strobel and Clamer 1986). In case we had more details about the 31 BC earthquake, we can know why there are no Roman structure except for the pools and paths on both sides of the *tall*. The mound was also cleaned up in the Byzantine period.

The various pottery types presented here are a special group, including close and perfect parallels to the local group that had been dated in general from late second century BC to the end of the first century AD. The coin found at site no. 7 area C.E4.2, D.D1.2, C.F 14.2 is Herodian — obv: an ear of barley with a round inscription (KAICA-ROC); rev: palm tree with two bunches of fruit, and the reign year L, S (AD 9-11) (**Fig. 2:4**).

The pottery recovered from Tall al-Kharrār fits into both the local and regional assemblages. We believe that there was a small settlement somewhere around the *tall*, and the well in B.C2 was built in the late part of the fifth century AD — we found that one course comes up of the bottom of the ritual pool, which was partitioned into two parts. In fact, the earlier material dumped into the well dates to the sixth-seventh centuries AD. We also found many sherds from the late Hellenistic/

early Roman periods mixed with the other occupational periods.

Second: Item 4 includes Byzantine pottery (E. Byz. IV-L. Byz.). Pottery sherds represent two phases of local occupational levels in this region, from the end of the fifth till the middle of the seventh century AD. The majority of the pottery related to this period was used by monks who settled in the region and constructed cells, chapels, churches and monasteries.

This group was recovered at the western side of Tall al-Kharrār, site no. 6, which has a room with a flagstone pavement and several domestic installations, from where we recovered a complete cooking pot and two slipper lamps (A.C2.4). The northern portion of the flagstone pavement was destroyed and replaced by a beaten earth floor, while the southern sector was covered by *ḥuwwar*. This occupational phase might have come to an end as a result of the earthquake in AD 551, judging by the collapse found inside the room. Pottery in this house came from a few loci, and a pit was identified below the floor.

The great number of recovered sherds were found distributed at all sites of the al-Kharrār Valley. This settled area belonged to the founders of the monastic installations. Jericho was the center of this route at that time, so most of the pottery sherds — especially from sites no. 3, 5, 6, 7 and 8 — are related to the Khirbat al-Mafjar ceramic assemblage (Baramki 1944), and belong to the "Levant ware".

Some "imitation wares" are represented here and are usually dated to around the first half of the sixth century AD (North African wares and Jarash bowls). These wares appear at several sites, for example Jarash, Pella, Khirbat al-Mukhayyaṭ and Nebo. There are also bowls with rouletted surfaces on red slip ware. This ware was imported, because all the other types had sand and quartz inclusions coming from the main soil in the Jordan Valley. Cooking pots have triangular rims in section with small vertical loop handles, and reflect the seasonal domestic life in these hermitage cells. The dark orange ware is common, with quantities of sand and calcite inclusions. This ware goes back to the Late Roman period (Watson 1992; Magness 1993). Ribbing is common and started from the shoulder of the vessel, which have rounded shapes (Watson 1992).

1- Casserole: C.D3.1 site no. 7, field no. 138, sandwich core, dark reddish gray (2.5YR 3/3). B.B3.2 site no. 7, field no. 223, angular rim; 31cm diameter, very small white grits, reddish brown (5YR 5/4). A.E3.3 site no. 8, field no. 210; hallow handle, spiral incised surface, small white grits, reddish yellow (7.5YR 6/6) E. Byz. III-IV. **Fig. 9:1, 2, 12**.

2- Bowl: A, A4. 4 site no. 7, field no. 211, base, North African ware, red slipware (RSW), light red (2.5YR 6/8). E. Byz. III-IV. **Fig. 9:3**.

3- Inscribed body sherd of jar. C.D2. out of surrounded wall, west side, site no. 7 field no. 226, ribbed, the inscribed letter "M" could be Maria; fine ware, reddish gray (10YR 5/2). E. Byz. III-IV. **Figs. 9:4; 10:6**.

4- Jug: A, A5. site no. 8, field no. 319, strong cut base, ribbed body, and irregular shape, light yellowish brown (10YR 6/4). E. Byz. IV. **Fig. 9:5**.

5- Cooking pots: A.CL.3 site no. 6 field no. 32, wedge rim in section, ribbing on body, 7cm diameter, red (2.5YR 5/5). E. Byz. III-IV. **Figs. 6:2; 9:6, 7, 8**. Parallels: Mount Nebo (Alliata 1986: figs. 8, 6-12); Ḥisbān (Sauer 1973: figs. 2:85-88); Dhībān (Tushingham 1972: figs. 5:35; 9:1-5).

6- Flasks: C.B5.1 site no. 7 field no. 78, pilgrim flask, folded-out rim, 2.5cm diameter, slipped and twisted loop handles, red (2.5YR 5/8). E. Byz. III-IV. **Fig 9:9, 10, 11**. Parallels: Pella (Walmsley *et al.* 1993: fig. 20:1).

7- Jug: A.Al.2, site no. 6. field no. 125, neck of strainer jug, folded-out rim, 8cm diameter, few inclusions, reddish brown (2.5YR 4/4). E. Byz. III. **Fig. 9:13**.

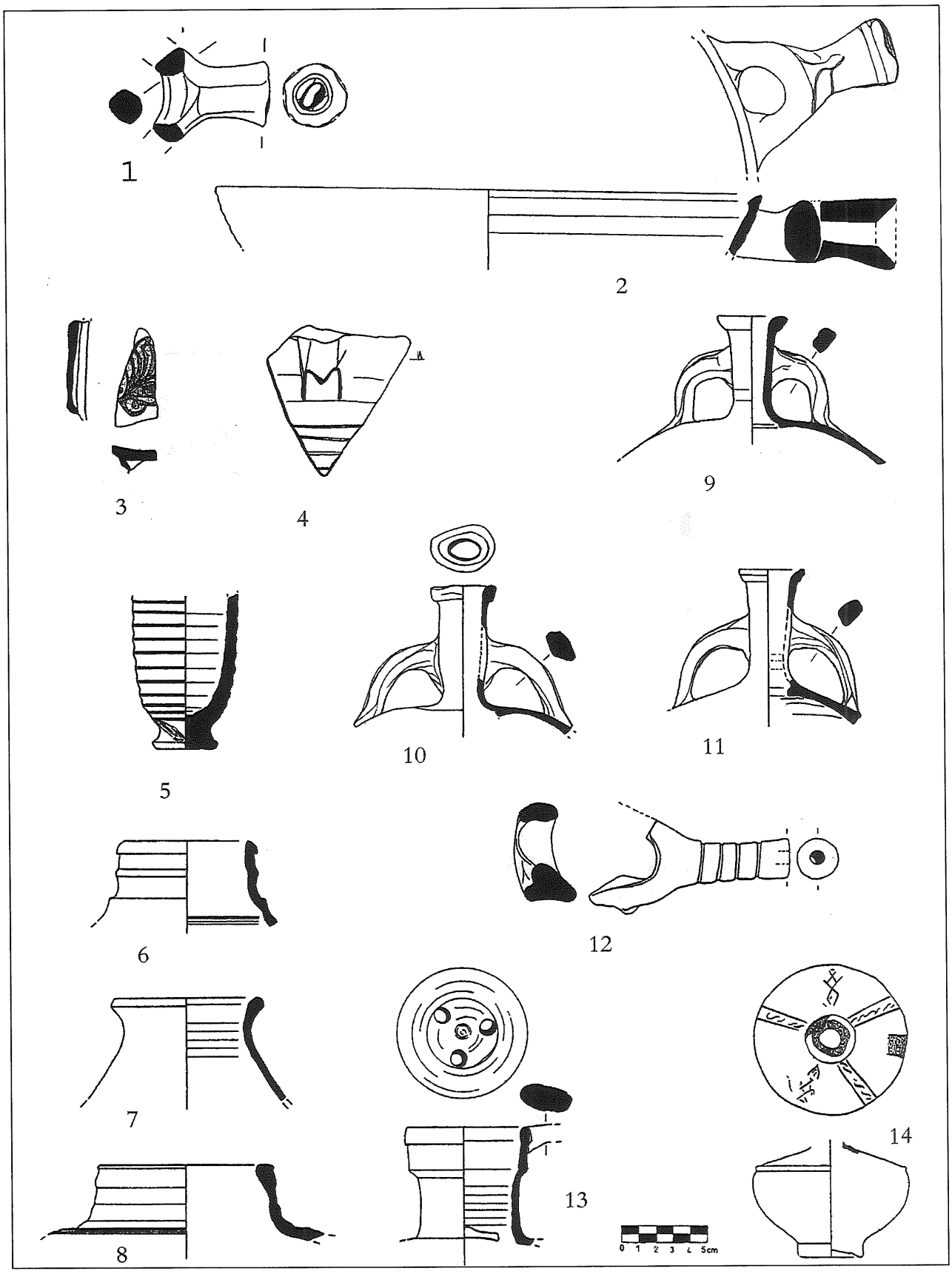
8- Juglet: C.D2.2, site no. 7 field no. 7,191, broken neck with handle, carinated shoulder and divided into three zones by incised lines forming fish-like shapes, North African ware, red (2.5YR 5/6). E. Byz III-IV. **Figs. 6:3; 9:14**.

9- Cooking pot: C.A3.2 site no. 7 field no. 26, neck with rim, everted, 9.5cm diameter, with loop handle, ribbing on body, dark reddish brown (2.5YR 3/4). E. Byz. III-IV. **Fig. 11:1, 3, 4, 6**. Parallels: Mādabā (Harrison 1994: fig. 4:6-7); Ḥisbān (Sauer 1973: figs. 2:85-88, 3:104-7); ʻAyūn Mūsā (Bagatti 1985: figs. 3:12, 4:14).

10- Bowl: A.A3.2, site no. 6 field no. 27, cross impression on body sherd, cultic purpose (RSW), reddish brown (2.5YR 5/4). E. Byz. III-IV. **Figs. 10:7; 11:7**.

11- Lid: C.B1.2 site no. 7 field no. 68, angular rim, ribbing on body, 20cm diameter, red (2.5YR 4/8). E .Byz IV. **Fig. 11:8-10**. Parallels: ʻAyūn Mūsā (Alliata 1990: fig. 1:14-16); Mādabā (Harrison 1993: fig. 3:3-4, 7); Ḥisbān (Sauer 1973: figs. 2:91-92, 3:109-110).

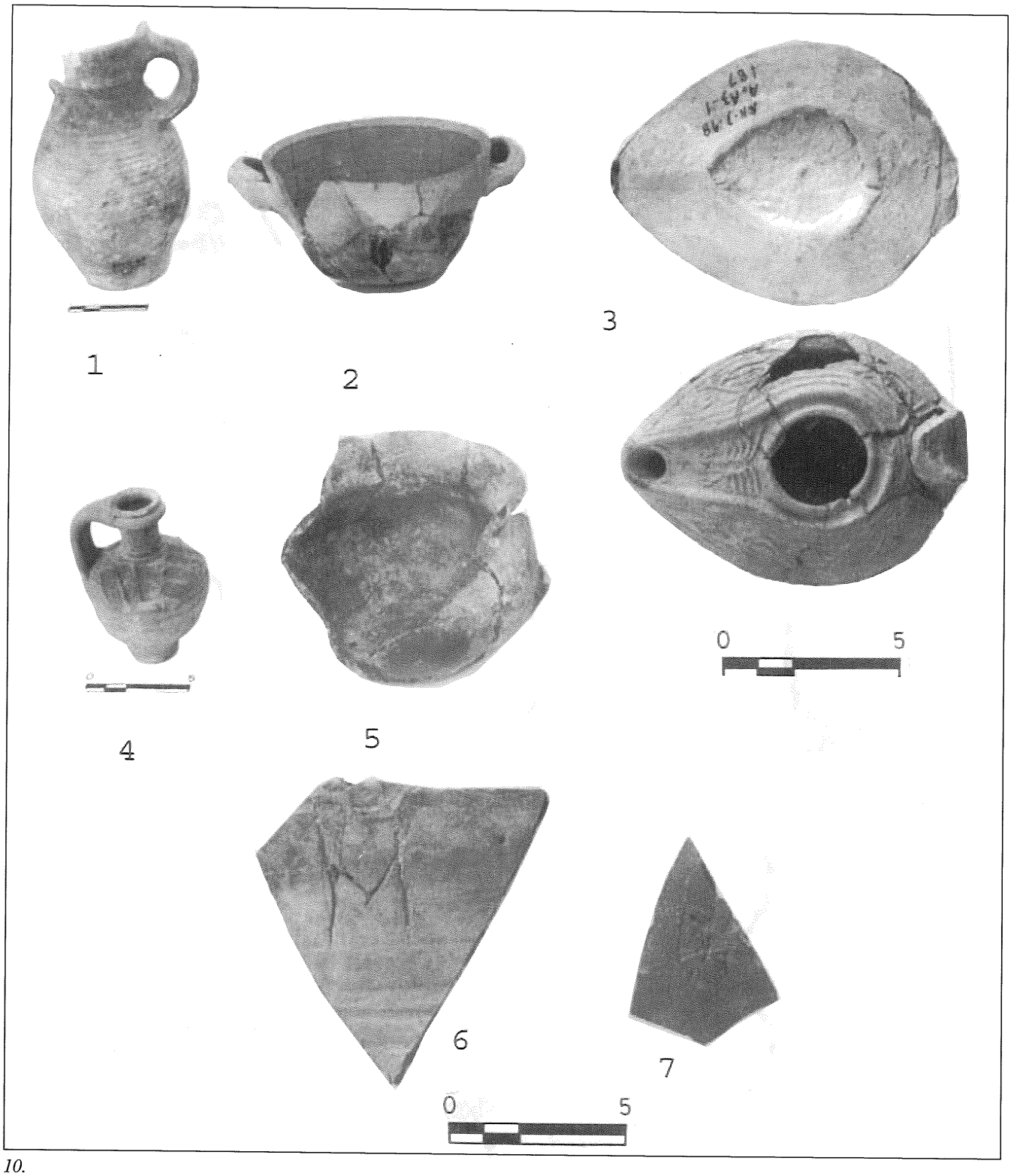
12- Jug fragment: A.E2, 2. site no. 8 field no. 274, folded-out rim, ribbing on body, grayish brown (2.5Y 5/2). E. Byz. IV-L. Byz. I. A.E1.3 site no. 8, handles of casserole. E. Byz. III-IV. **Fig.**



9. EByz IV.

11:12, 13.

13- Plate: C.D2.4, site no. 8 field no. 71, everted rim, 2cm diameter, burnished surface, sandwich core, reddish yellow (5YR 6/6). E. Byz



10.

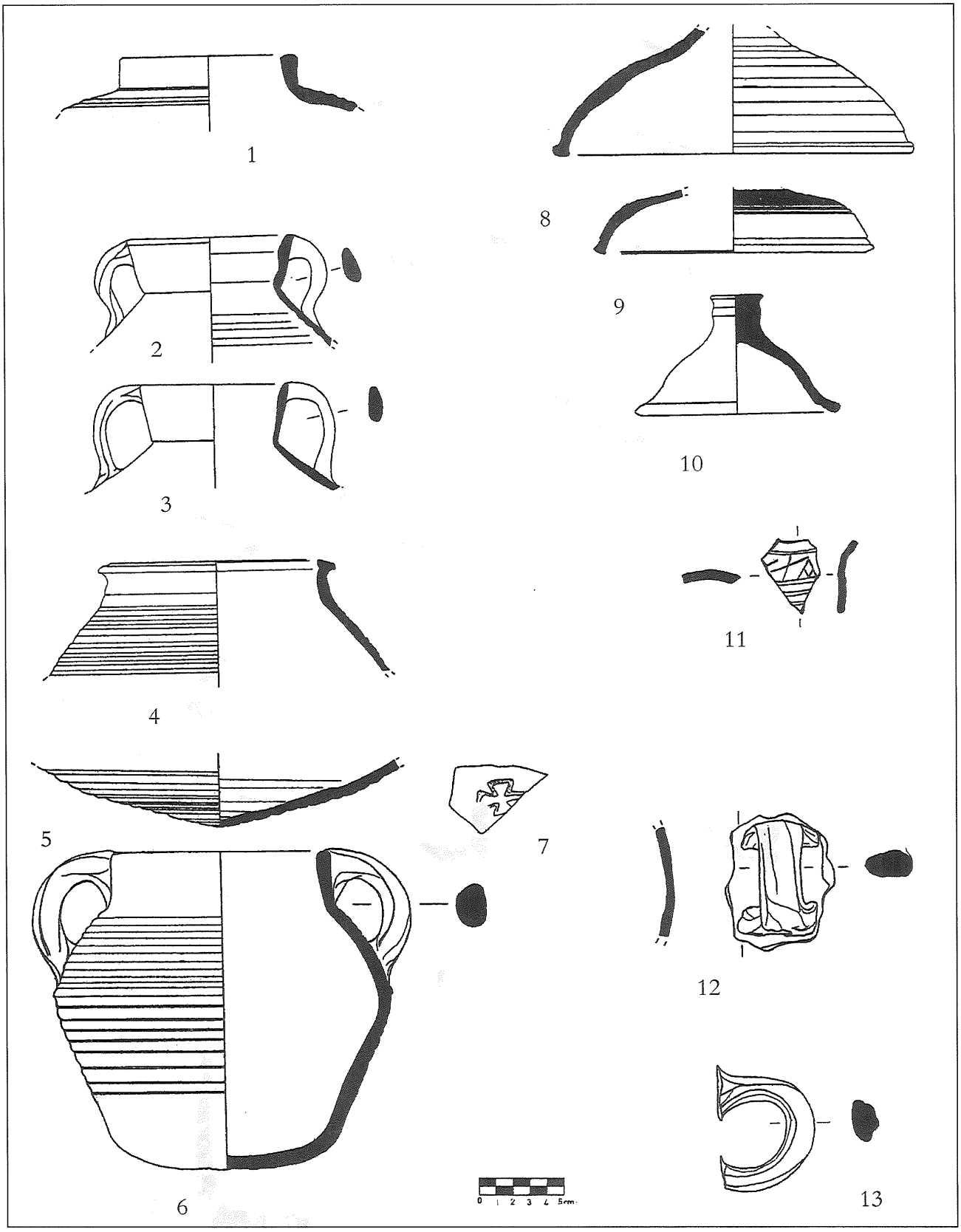
III. **Fig. 12:1, 2**.

14- Bowl: A.E4.2, site no. 8 field no. 209, everted rim, fine inclusions, 29cm diameter, red (2.5YR 4/8). E. Byz. III. **Fig. 12:4**.

15- Ring base of jar: A.C4.1, site no. 8 field no. 6, slipped, sandwich cores, reddish brown (2.5YR 5/4). E. Byz. III-IV. **Fig. 12:3**.

16- Stopper jar: A.E1.3, site no. 8 field no. 45, knob in the inner center of the basin-like handle, 4cm diameter, light yellowish brown (10YR 6/4). E. Byz. IV. **Fig. 12:5, 10**. Parallels: Mount Nebo (Shneider 1950: fig. 14:5); Mādabā (Harrison 1994: fig. 6:14-15).

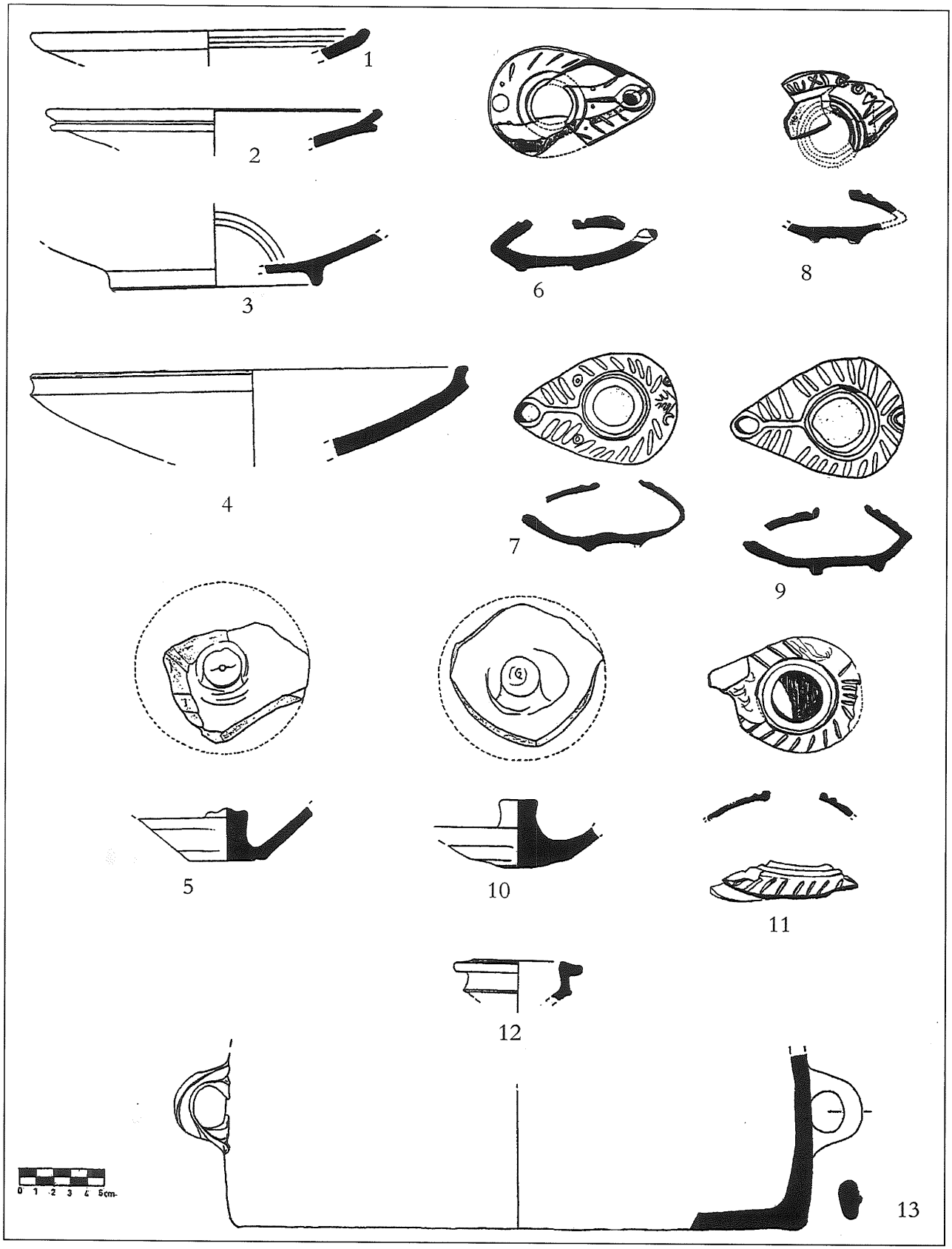
17- Oil lamp: E.D2.W. Balk, site no. 7 field no.



11. EByz IV.

208, molded lamp, channel extended from mouth to nozzle, decor with relief lines and circles instead of handles, fine ware, round base, yellowish brown (10YR 5/4). E. Byz. IV. **Fig. 12:6, 8.**

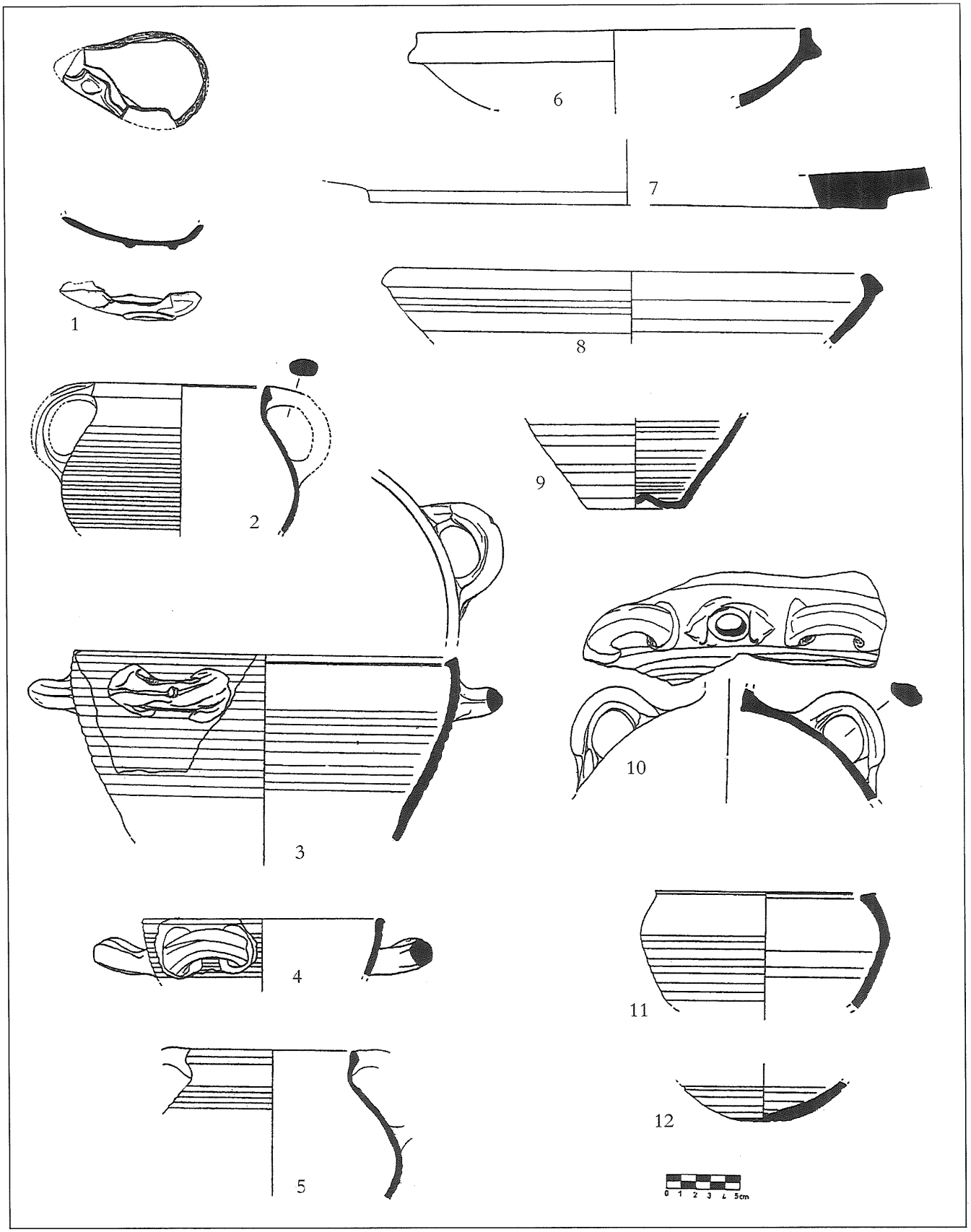
18- Oil lamp: B.C1.2, site no. 7 field no. 185, oval



12. EByz IV-LByz I.

shape, 4cm high, 8cm long, slipped and low ring base, grayish brown (2.5YR 5/2). E. Byz III-IV. **Figs. 2:1-3; 12:7, 9-11**. Parallels: Mādabā (Alliata 1982: fig. 11:50; Piccirillo 1993); Ḥisbān (Sauer 1973: fig. 3:126).

19- Jug: A.B1.2, site no. 6 field no. 93, flattened



13. LByz III.

rim, slipped, brown core (7.5YR 5/4). E. Byz. III. **Fig. 12:12**.

20- Basin: A.C2, site no. 6 field no. 179, flat base, hand-made, twisted handles, fine inclusions,

pale yellow core (2.5YR 7/4). E. Byz. IV-L. Byz I. **Fig. 12:13**.

21- Cooking pots: A.A3.2, site no. 6 field no. 192, globular body, 11cm diameter, triangular rim in section, grayish brown (10YR 5/2) E. Byz. IV-L. Byz I. A.A, 2 site no. 6 field no. 130, horizontal handles, 26cm diameter, angular rim, small white grits, red (2.5YR 4/6) L. Byz. II-VI. **Fig. 13:2-5, 9-12**. Parallels: Mādabā (Alliata 1986: fig. 8:14-15); 'Ayūn Mūsā (Alliata 1990: fig. 1:17-19; Ḥisbān (Sauer 1973: figs. 2:90, 3:108); Umm ar-Raṣāṣ (Alliata 1991: fig. 15:7-8).

22- Bowl: A. E4, 2, site no. 8 field no. 172, round rim, 32cm diameter, North African ware, red (2.5YR 4/8). E. Byz. IV. **Fig. 13: 6, 8**. Parallels: Mādabā (Harrison 1994: fig. 1:14; Alliata 1982: fig. 11:43-44).

23- Basin: A: A5: 3. site no. 3 field no. 152, handmade and irregular in shape, pale yellow core (2.5YR 7/4). L. Byz. III. **Fig. 13:7**.

24- Flask: A.C2.2, site no. 7 field no. 15, fine ware, reddish yellow (5YR 6/6). Parallel: Pella (Walmsley *et al.* 1993: fig. 20:1).

Late Byzantine Pottery: This group seems to be connected with the architectural elements of churches. Pre-Umayyad pottery represented in several loci includes: white paint on a dark ribbed jars, metallic hardness, oval lamps and wavy incised design on jars, bowls and basins. This period is well attested in Jordan, particularly in central areas including the Karak Plateau (Brown 1991), Ḥisbān region (Ibach 1986), Wādī al-Ḥasā (MacDonald 1988) and Jarash (Zayadine 1986). These sites continued during the Umayyad period. The hydraulic plaster of the water system at the site contains red and black potsherds in great density, the pipes and strainers fit within the late Byzantine and early Islamic period (Patrich 1991).

1- Basin/Bowl: A.A5.3 site no. 3 field no. 158, inverted rim with sharp edge, 15cm diameter, red slip, yellowish red (5YR 5/6). L. Byz II. **Fig. 14:1, 2**. Parallel: Hendrix *et al.* 1996: fig. 367.

2- Jugs: A.A1.4, A.A5.3, site no. 3 field no. 268, 161, short necks, brown core. L. Byz II. **Fig. 14:3, 5**. The turban handle of lid **Fig. 14:4**.

3- Handles: B, A3.2 site no. 3 field no 273, handle of lamp, incised cross with trace of inscription, red ware and fine inclusions. Handle of jug, incised cross on dark core, fine inclusions. L. Byz-Umm. Parallel: Piccirillo 1993.

4- Bowl: A E1.3, site no. 8 field no. 41, 46-48, wavy incised line on the hemispherical shape, 10-13cm diameter, with ring base, fine, light yellowish brown (10YR 6/4). **Fig. 14:8-13**. Parallels: Mādabā (Alliata 1982: fig. 11:38-42); 'Ayūn Mūsā (Alliata 1990: figs. 2:26, 5:77); Umm ar-Raṣāṣ (Alliata 1991: fig. 10:29-30).

Islamic Pottery [A- Early Islamic (EIs. I-III); B-Middle Islamic (Crusader and Ayyubid-Mamluk; MIs)]: The monastic complex of the site might have been reconstructed in the early Islamic period. The excavations indicated the restoration of white mosaic floors, the mosaic of the Rhoterus Church, and the mosaics and marbles of churches at site no. 3. Islamic pottery is abundant in the area: the early Islamic pottery has red-painted designs and this found at most Jordanian sites. But the following periods, Abbasid-Fatimid (AD 750-969) are not as common. Pottery presented here includes reddish-orange ware, and internally glazed ware ("Mefjer ware").

1- Juglet: D.Al.2 site no. 8 field no. 190, wide incised decoration on shoulder, strap handle, string-cut base, ridged rim, diameter 2.4cm, fine ware, reddish brown (2.5YR 3/5). EIs. I. **Figs. 10:4; 15:1, 2**. Parallel: Umm ar-Raṣāṣ (Piccirillo 1987).

2- Jug: C.D1. Balk, site no. 7 field no. 198, upper part of jug, diameter 6.4cm, ribbed body, loop handle, with faint ridge, few grits, yellowish red core (5YR 5/8). Several other examples. EIs. I. **Figs. 10:1; 15:4, 5, 7-10, 12, 13**.

3- Jar: A.C2.3 site no. 6 field no. 34, handle with neck, diameter 8cm, slipped, fine ware, strong brown (7.5YR 5/6). **Fig. 15:10**, also **Fig. 15:7-8** spouted jugs, light red (2.5YR 6/6). EIs. I. Parallels: Umm ar-Raṣāṣ (Alliata 1991: figs. 6:13, 14:3); 'Ayūn Mūsā (Bagatti 1985: figs. 4:16, 6:6).

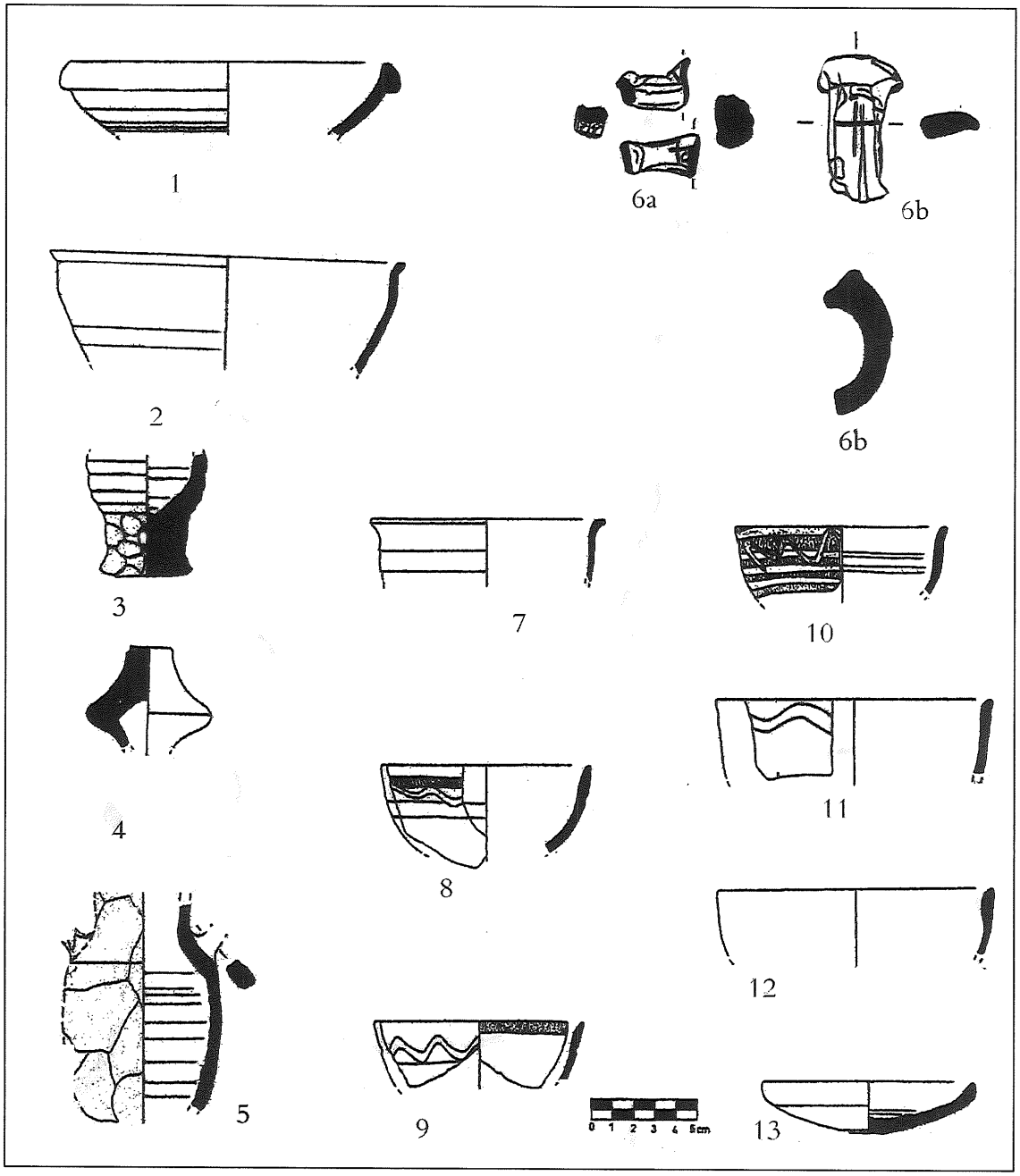
4- Storage jar: A.A1.2, site no. 6 field no. 128, wavy incised lines, brown core (7.5YR 5/4).

5- Bowl: A.A5.3, site no. 3 field no. 169, everted rim, band combing, diameter 19.5cm, few grits, reddish yellow core. **Fig. 16:1, 3, 6**.

6- Bowl: A.A4.2, site no. 3 field no. 261, red paint inside and on the rim, hemi-spherical shape, white slip under painting, reddish yellow core (5YR 6/6) (Coptic ware). L. Byz./Umayyad. **Fig. 16: 7, 8, 12**.

7- Spout and handles of jugs: B.B4.3, site no. 7 field no. 51, light brown (7.5YR 6/4). A.A5.3 site no. 3 field no. 176, elongated loop handle with faint ridge, gray core (7.5YR 5/1). Late Umayyad-Abbasid. **Fig. 16:4, 9, 11**. Parallel: Jarash (Hendrix *et al.* 1997: fig. 44).

8- Oil lamp: A: A5.2, site no. 3 field no. 213, oval shape, heavy incised lines on the upper part,



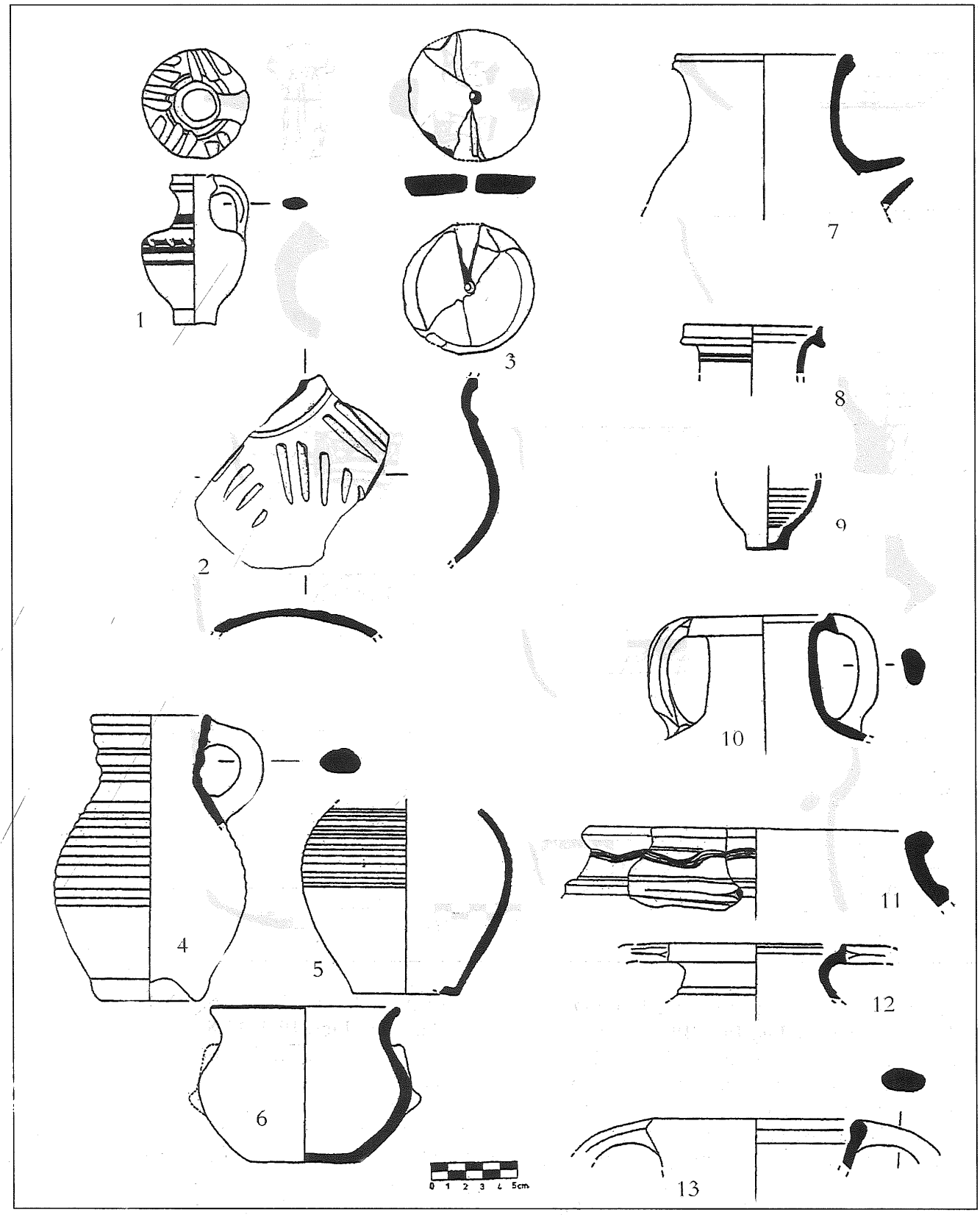
14. LByz III.

dots around the filling hole, reddish yellow (5YR 6/8). Abbasid. **Fig. 16:5, 10.**

9- Cooking pots: A.A5, site no. 3 field no. 72, 146, 162, 170 and 171; rims of cooking pots, without neck, round and folded-out rims, red ware and glazed from the inside; flat base with ridge from the inside red (2.5YR 5/6); rim of open cooking pot, pinched handle (no. 7) and some have glazed "ear" handles. EIs. III (Fatimid). **Fig. 17:1-7.** Parallel: Khirbat al-Mafjar (Baramki 1944).

10- Oil lamp: A.A3.1 site no. 3 field no. 187, channel nozzle within palm tree in relief design, spiral motives on both sides, ring base like heart in shape, reddish yellow core (5YR 6/8). EIs. III (Fatimid). **Figs. 10:3; 17:8.**

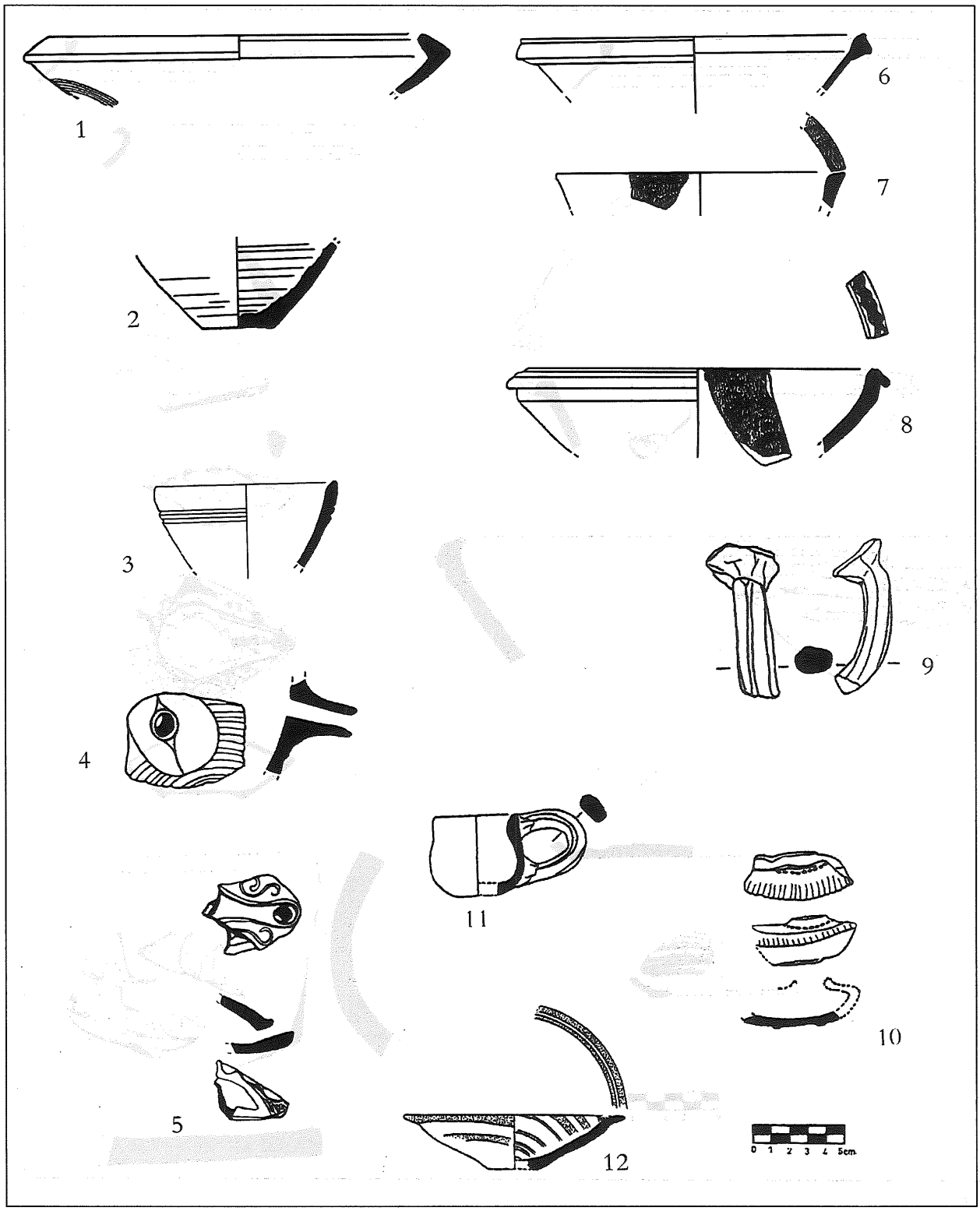
The evidence of the EIs. III means that Jordan, especially the Jordan Valley, had small villages during that period, although it seems that the major cities were reduced in size during the later part of the Abbasid period. This idea depends on the discoveries at Pella, Jarash, the 'Ammān Citadel and Umm ar-Raṣāṣ. This no doubt has changed our impression about the settlement patterns, especially that no major monuments were discovered in this region, which changed into industrial-agricultural centers and became an important economic part of the Islamic world.



15. EIsl.

1- Cooking pot: C.E2.3, field no. 28, short and thick walls, hand-made simple rim, diameter 10.5cm, flat base, coarse ware, greenish black (10BG 2.5II). Mamluk. **Figs. 10:5; 15:6.**

2- Pipe: pottery pipe, A.A5.3, site no. 3 field no. 197. inscribed fragment, cursive Arabic without

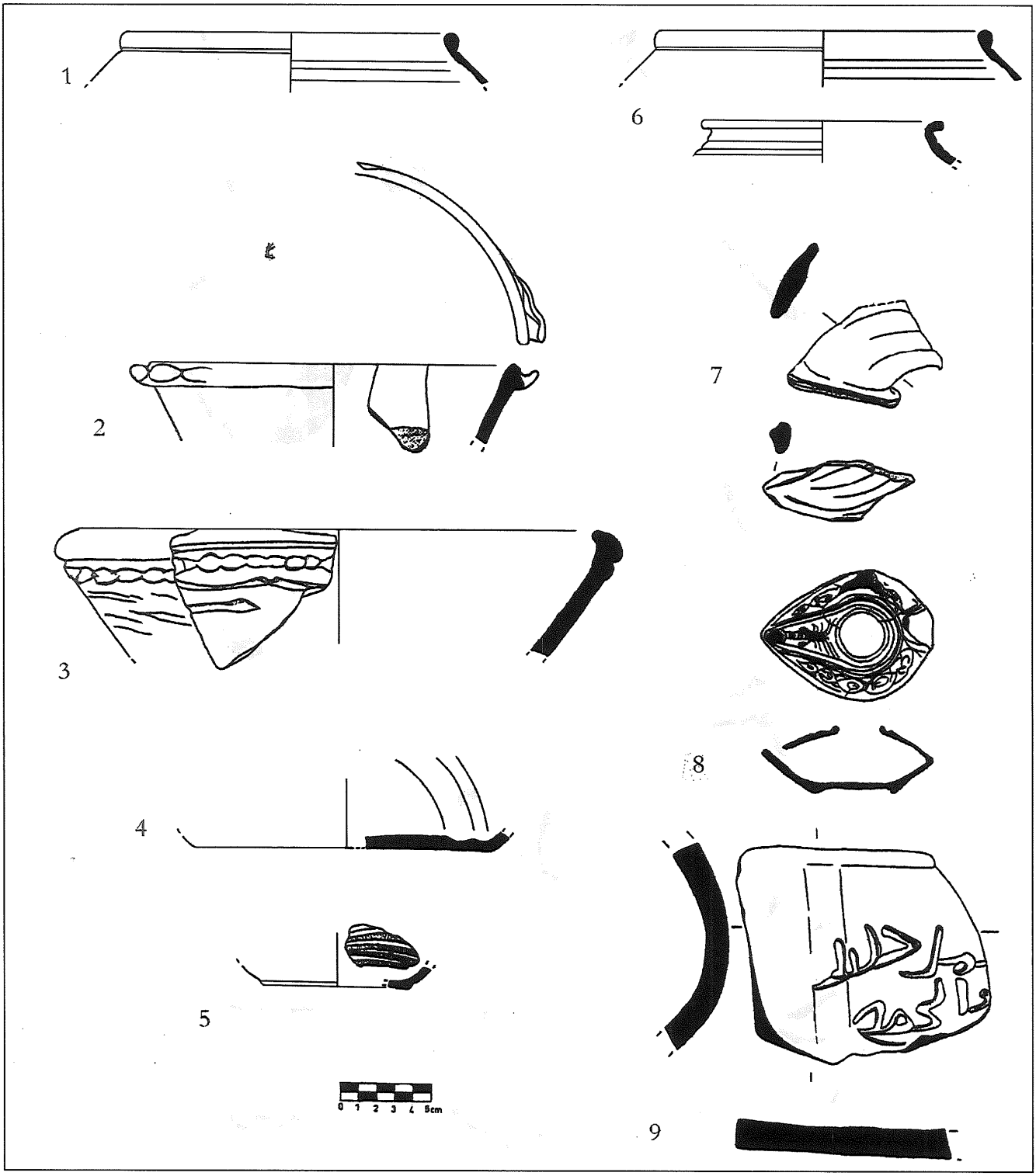


16. EIsl I-III.

dots, salt deposit inside, reddish yellow (7.5YR 6/6). MIs. I (Mamluk) **Fig. 17:9**.

Ayyubid wares were found on top of site no. 8, and a few glazed sherds mixed with the destruction at site no. 3, some with geometrical painting, but the numbers are not sufficient to consider an occupational level.

A. Abu Shmeis
M. Waheeb
Department of Antiquities
Amman - Jordan



16. EIsl I-III.

Bibliography

Alliata, E.
1982 Nota sulla ceramica dello scavo alla Chiesa della Vergine di Madaba. *LA* 32: 405-408.
1986 Nota sulla ceramica dello scavo del Palazzo Bruciato di Madaba. *LA* 36: 328-334.
1988 La ceramica dello scavo della capella del Prete Giovanni a Kh. Mukhayyat. *LA* 88: 317-360.
1990 Ceramica Bizantina e Omayyade di Uyun Musa. *LA* 40: 247-261.
1991 Ceramica dal Complesso di S. Stefano an Umm al-Rasas. *LA* 41: 365-422.
Avi-Yonah, M.
1950-1 The Development of the Roman Road System in Palestine. *IEJ* 1: 54-60.

Bagatti, B.
1985 Nuova ceramica del Monte Nebo (Siyagha). *LA* 35: 249-278.
Blake, I.
1970 El-Kuseir. A Hermitage in the Wilderness of Judaea. *PEQ*: 88-93.
Baramki, D.C.
1944 The Pottery from Kh. al Mafjer. *QDAP* 10: 65-103.
Brown, R.M.
1992 Ceramics from the Kerak Plateau. Pp. 169-280 in J.M. Miller, *Archaeological Survey of the Kerak Plateau*. Atlanta: Scholars Press.
Corbo, L. and Loffreda, S.
1996 *La Ceramica di Masheronte e dell' Herodian (90AV-135AC)*. Jerusalem: Franciscan Printing Press.
Harrison, T.P.
1994 A Sixth-Seventh Century Ceramic Assemblage from Madaba. *ADAJ* 38: 429- 446.
1996 Surface Survey. Pp. 19-25 in *Madaba, Cultural Heritage*. Amman.
Herr, L.G.
1989 The Pottery Finds. Pp. 299-354 in L.T. Geraty, L.G. Herr, Ø.S. LaBianca and R.W. Younker (eds.), *Madaba Plains Project: The 1984 Season at Tell el-Umeiri and Vicinity*. Berrien Springs, Mi: Andrews University.
Hendrix, R.E., Dery, P.R. and Strofjell, T.B.
1997 *Ancient Pottery of Transjordan*. Berrien Springs, Mi: Horn Archaeological Museum.
Hirchfeld, A.
2000 Hermits above En Gedi. *Tel Aviv* 27: 125-129.
Ibach, R.D.
1986 Archaeological Survey of the Hesban Region: Catalogue of sites and characterization of periods. *Hesban 5*. Berrien Springs, Mi: Andrews University.
Ji, C.C. and Lee, J.K.
1999 The 1998 Season of Archaeological Survey in the Regions of 'Iraq al-Amir and Wadi al-Kafrayn. *ADAJ* 43: 521-539.
Lapp, P.W.
1961 *Palestinian Ceramic Chronology: 200 BC-AD 70*. New Haven: ASOR.
Loffreda, S.
1981 Qal'at el-Mishnaqa-Mukawir. *LA* 31: 342-343.
MacDonald, B.
1988 *The Wadi el-Hasa Archaeological Survey 1979-1983*. Waterloo.
McGovern, P.E.
1989 The Baq'ah Valley Project 1987. Khirbet Umm ad-Dananir and al-Qesir. *ADAJ* 33: 123-136.
Magness, J.
1993 *Jerusalem Ceramic Chronology (ca. 200-800 C.E.)*. JSOT/ASOR Monograph Series No. 9. Sheffield.
Parker, S.T.
1987 The Pottery. Pp. 525-619 in S.T. Parker (ed.), *The Roman Frontier in Central Jordan: interim report on the Limes Arabicus Project, 1980-1985*. BAR International Series 340(ii). Oxford.
Patrich, J.
1990 The Sabaite Monastery of the Cave in the Judean Desert. *LA* 41: 429-448.
Piccirillo, M.
1987 The Jerusalem–Esbus Road and its Sanctuaries in Transjordan. Pp. 165-172 in *SHAJ* 3. Amman: Department of Antiquities.
1989 *Chiese e Mosaici di Madaba*. Jerusalem: Studium Biblicum Franciscanum.
1993 *Madaba, Mosaics and Churches*. (Arabic).
Saller, S.J. and Bagatti, B.
1949 *The Town of Nebo (Khirbet el-Mekhayyat)*. Jerusalem: Studium Biblicum Franciscanum.
Sauer, J.A.
1973 *Heshbon Pottery 1971: a preliminary report on the pottery from the 1971 excavations at Hesban*. Andrews University Monographs 7. Berrien Springs, Mi: Andrews University.
1994 The Pottery at Hesban and its Relationships to the History of Jordan: an interim Hesban pottery report, 1993. Pp. 225-281 in D. Merling and L.T. Geraty (eds.), *Hesban after 25 Years*. Berrien Springs, Mi: Horn Archaeological Museum.
Schneider, H.
1950 *The Memorial of Moses on Mount Nebo* (part III). Jerusalem: Studium Biblicum Franciscanum.
Strobel, A. and Clamer, C.
1986 Excavations at ez-Zara. *ADAJ* 30: 381-384.
Tushingham, A.D.
1972 *The Excavations at Dibôn (Dhiban) in Moab. AASOR* 40.
Waheeb, M.
1998 *Bethany and John the Baptist*. Unpublished manuscript.
Walmsley, A.G. *et al.*
1993 The Eleventh and Twelfth Seasons of Excavations at Pella (Tabaqat Fahl) 1989-1990. *ADAJ* 37: 165-240.
Watson, P.
1992 Change in Foreign and Regional Economic Links with Pella in the Seventh Century AD: The ceramic evidence. Pp. 237-264 in P. Cavinet and J.-P. Gatier (eds.), *La Syrie de Byzance à l'Islam, VII-VIII siècles*. Beirut: IFAPO.
Zayadine, F. (ed.)
1986 *Jerash Archaeological Project 1981-1983, I.* Amman: Department of Antiquities.
Zayadine, F., Najjar, M. and Greene, J.A.
1987 Recent Excavations on the Citadel of Amman (Lower Terrace): A preliminary report. *ADAJ* 31: 299-311.

UNE MOSQUÉE À QUṢAYR 'AMRA

Denis Genequand

English Summary

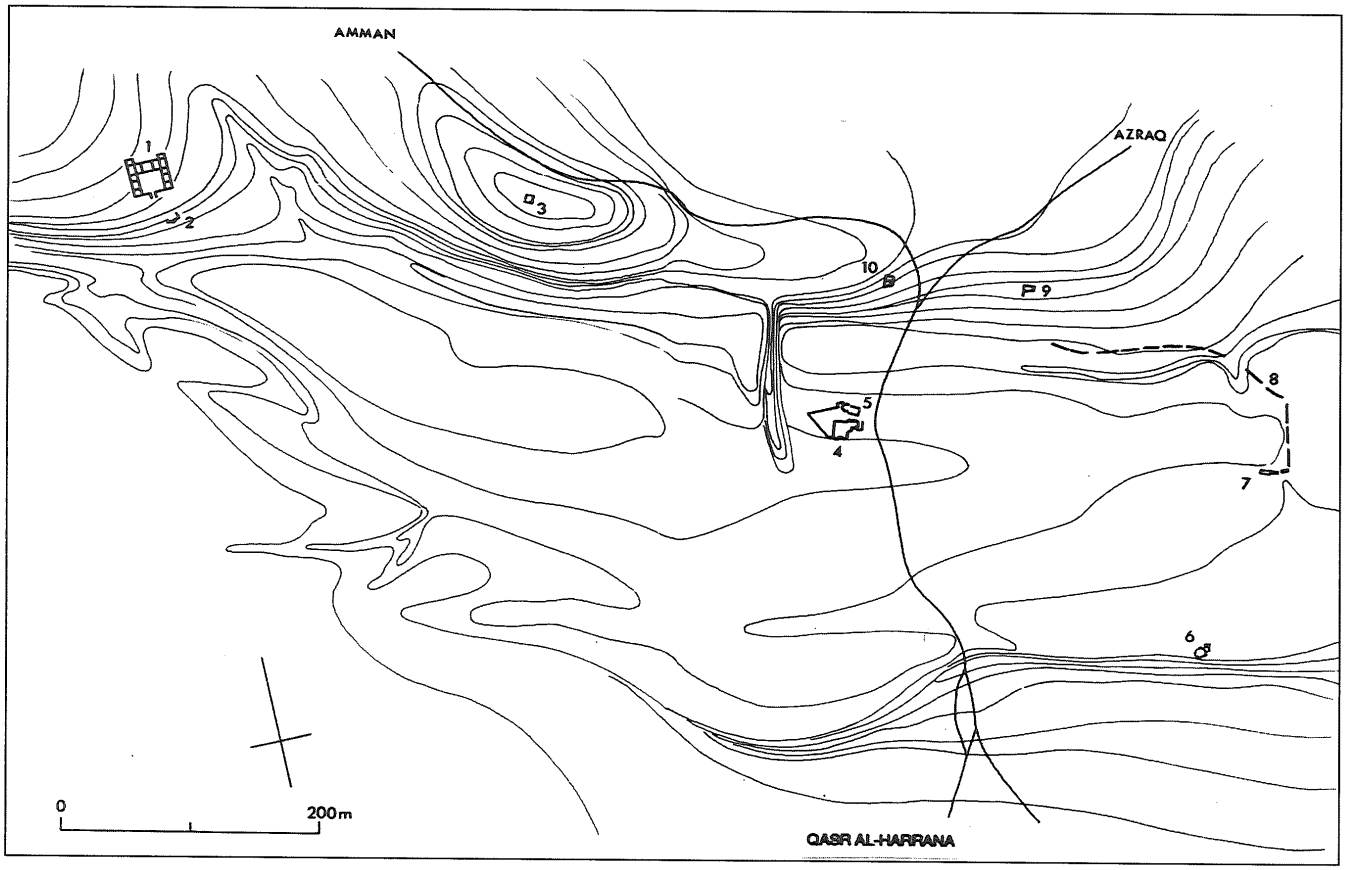
This article presents the discovery of a mosque at Quṣayr 'Amra, near the small "castle" and about six hundred metres to the west of the bath. This building is now almost completely destroyed and the remains appear to be only one or perhaps two courses high. The ***qibla*** *wall — 9.45m long — is the best preserved and can be very clearly seen with the* ***miḥrāb*** *in the centre. This mosque is presumably Umayyad and in all probability its construction has never been completed. Nevertheless, the hypothesis that it was a mere* ***muṣallā*** *should not be definitely ruled out. In any case, it would appear that the construction programme of Quṣayr 'Amra was never fulfilled.*

C'est au cours d'une campagne de reconnaissance de sites omeyyades de Jordanie, menée dans le cadre d'un projet de la Fondation Suisse-Liechtenstein pour la Recherche Archéologique à l'Etranger (FSLA), que les fondations d'une petite mosquée ont été repérées à Quṣayr 'Amra (قصير عمرة)[1]. Ce site, redécouvert par Musil en 1898 et célèbre pour les peintures murales ornant les parois intérieures d'un bain et d'une salle de réception qui lui est accolée, se trouve dans la steppe à environ 80km à l'est de 'Ammān (عمّان) le long de la route menant à l'oasis d'Azraq (الأزرق).

La visite du site de Quṣayr 'Amra était avant tout destinée à se pencher sur le problème des structures environnant le bain, bien plus qu'à s'intéresser au bain lui-même qui a attiré toute l'attention jusqu'à maintenant (**Fig. 1**, n° 4). On dispose en effet de deux plans du site établis à soixante-dix ans d'intervalle. Le premier est celui de Musil (Musil 1907a: fig. 96), qui est le plus complet, le second a été levé par la mission espagnole (Almagro *et al.* 1975: fig. 2) et est plus précis, mais certaines structures n'y figurent pas. Tous deux répertorient un certain nombre de structures attribuées sans distinction à l'époque omeyyade: ce sont elles qui ont été examinées. Un troisième plan, publié récemment, offre apparemment un compromis entre les deux précédents tient compte des modifications actuelles du paysage (Vibert-Guigue et Morin 2000: fig. 9).

Le mur d'enclos (**Fig. 1**, n° 8) qui, conformemt au plan dressé par les Espagnols, englobait tout le site, ne subsiste que sous forme de lambeaux et seule une partie de ce que Musil avait interprété comme une chaussée est conservée (**Fig. 1**, n° 7). Il s'agit d'un blocage enserré entre deux parements de blocs grossièrement équarris ou bruts; l'aménagement n'a qu'une assise de haut et sa fonction reste inconnue. Ce n'est en tout cas ni une chaussée, ni un support de canalisation comme il avait été proposé. Il n'y a rien à ajouter à ce qui a été dit sur les deux *sāqiya*-s (ساقية) déjà étudiées, l'une au sud-est du site (Almagro *et al.* 1974: 30) et l'autre devant le bain (Bisheh *et al.* 1997) (**Fig. 1**, n° 5 et 6). Les bâtiments repérés au nord du bain sont conformes, pour leurs emplacements respectifs, au plan de Musil (**Fig. 1**, n° 9 et 10). Il n'est toutefois plus possible de repérer le moindre indice de leur plan; une citerne moderne aux importantes substructures a été récemment implantée dans le plus petit d'entre eux (le plus à l'est) et il sera difficile d'en tirer quoi que ce soit. Tout le flanc de la colline au nord du wâdî a été labouré et remué pour planter des arbustes dans le cadre de la mise en valeur du site; ces cultures s'étendent jusque contre les deux bâtiments évoqués. Plus à l'ouest, dans toute la zone comprise entre les deux bras du wâdî, se trouvent encore de nombreux arbres de térébinthe (pistachiers sauvages) ainsi que de gros buissons; mais ce sont des espèces très résistantes

1. La visite de Quṣayr 'Amra en juillet 2001 s'est faite dans le cadre du projet «Implantations umayyades de Syrie et de Jordanie» de la Fondation Suisse-Liechtenstein pour la Recherche Archéologique à l'Etranger (FSLA-Zürich). Mes remerciements s'adressent au Dr. Fawwaz al-Khraysheh, Directeur du Département des Antiquités de Jordanie, à M. Faysal al-Qudda, Directeur adjoint, et au Dr. Mohammad al-Najjar, Directeur du Service des Fouilles Archéologiques, pour m'avoir autorisé à mener cette campagne de reconnaissance en Jordanie, ainsi qu'à la FSLA qui en a permis la réalisation. Je tiens aussi à remercier le Dr. Timothy Harrison (University of Toronto - Tell Madaba Project) pour son accueil à Mādabā qui a grandement facilité mon séjour en Jordanie. On trouvera un rapport détaillé sur l'ensemble de cette campagne de reconnaissance dans: Denis Genequand, Projet «Implantations umayyades de Syrie et de Jordanie». Rapport sur une campagne de prospection et reconnaissance. *SLSA/FSLA/SLFA - Jahresbericht 2001*. Zürich, 2002.



1. Plan général du site de Quṣayr 'Amra (W. Trillen, d'après Almagro 1975).

et les vestiges ne laissent pas penser qu'il y ait eu là des infrastructures agricoles, pas plus d'ailleurs qu'au nord et au sud du wâdî où tout aménagement se remarquerait sur le sol noirâtre du *ḥamād*. On ajoutera encore, à propos de la zone enclose, que sa superficie de près de 16ha, pour autant qu'elle ait été cultivée, ne permet pas d'y voir les limites d'un domaine agricole de taille suffisante pour être rentable et correspondre au modèle de *villa rustica* proposé par Sauvaget (Sauvaget 1967: 33-34). Il faut plutôt y voir une limite de propriété, peut-être aménagée en jardin.

La «tour» repérée par Musil et interprétée par Sauvaget comme une base de minaret (Sauvaget 1967: 34) a, semble-t-il, fait récemment l'objet d'un nettoyage de surface (**Fig. 1**, n° 3). Les murs ont un mètre de large en moyenne et une porte se trouve au sud. En revanche, il n'y a pas suffisamment d'éboulis pour restituer une tour, mais juste un bâtiment carré, de 6.80m de côté, plus large que haut. Quelques tessons datables de l'Age du fer et de l'époque romaine ont été trouvés juste à côté, confirmant ainsi qu'il y a une occupation préislamique sur ce site et que, contrairement à ce qui a toujours été proposé, l'on ne peut pas rapporter à l'époque omeyyade toutes les structures visibles. Une très grande citerne a été construite il y a peu de temps dans le lit du wâdî, en contrebas de cette construction, ce qui a perturbé une grande surface de la zone qui était enclose à l'époque omeyyade, et qui avait été fortement remaniée lors des travaux de protection du bain. Les carrières sont conformes au plan de Musil, mais il faut y ajouter une grotte, dont l'ouverture est séparée en deux par un pilier, en contrebas de la résidence.

La petite résidence située à 550m au nord-est du bain a aussi subi récemment les assauts des bulldozers (**Fig. 1**, n° 1): dégâts à l'aile nord, à la porte et dans toute la cour. Partout les déblais on été repoussér contre le mur d'enceinte et parfois au-delà! Un examen de ceux-ci rènouveaux remués n'a permis de retrouver ni céramique, ni éléments de décor. De par sa petite taille (env. 35m de côté) et de par son plan, cet édifice ne peut être considéré comme un château mais plutôt comme une grande maison. Les parallèles qu'on lui trouve à Jabal Says, où plusieurs bâtiments ont en commun avec lui des plans et des dimensions approchantes (bâtiments E, F, G et H), ainsi que l'existence de murs encadrant la porte et perpendiculaires à l'enceinte (bâtiment G, H et J) (Sauvaget 1939: 250-252; Brisch 1965: 152), confirment cette interprétation.

Cependant, la découverte la plus importante de

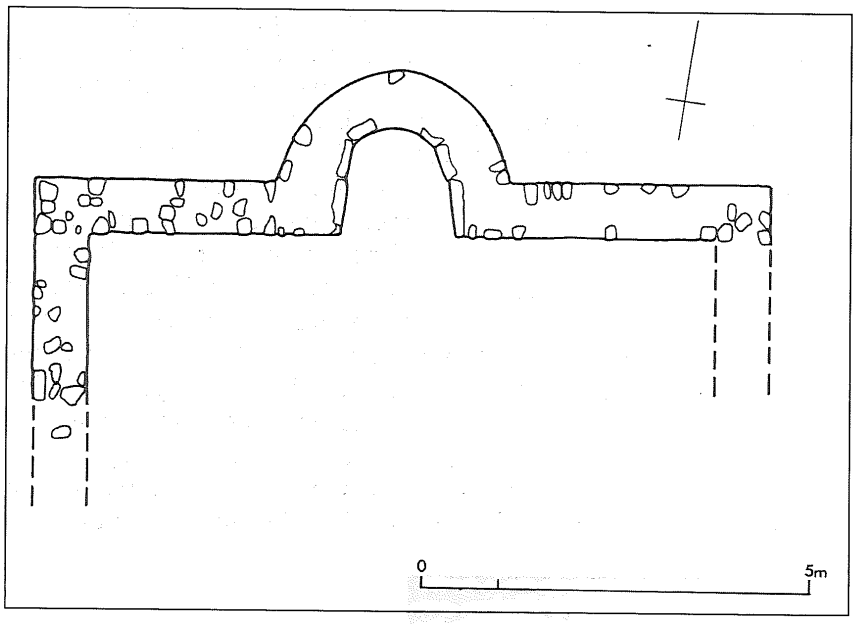
cette visite à Quṣayr 'Amra est celle — tout à fait inattendue — d'une mosquée située à une vingtaine de mètres au sud de la petite résidence (**Fig. 1**, n° 2). Conservée seulement sur une ou deux assises, elle n'apparaît que peu au sol et a été mise au jour par des pillards fouillant dans le *miḥrāb* (محراب) (**Figs. 2, 3**). Elle est constituée de murs à double parement en appareil moyen irrégulier de calcaire local très friable. Le mur de la *qibla* (القبلة) est conservé sur toute sa longueur (9.45m), le mur oriental sur près de trois mètres mais le mur occidental n'est bien visible qu'à l'angle sud-ouest (**Fig. 4**). On peut toutefois suivre une ligne de pierres longue de dix mètres à l'emplacement du mur occidental, mais aucun parement n'est visible, l'orientation n'est pas bonne par rapport au reste de l'édifice et elle semble plus récente. Après dix mètres cette ligne de pierres tourne en direction de l'ouest où on peut la suivre sur quatre mètres. Le mur nord n'est repérable nulle part. L'élément qui permet une identification sûre de l'édifice comme mosquée est le *miḥrāb*, à peine dégagé, mais dont la forme caractéristique et l'orientation ne laissent planer aucun doute sur la fonction du bâtiment. Placé au centre du mur de la *qibla*, le *miḥrāb* est concave (large de 145cm et profond de 135cm) et saillant à l'extérieur (**Fig. 5**). L'appareil de son parement interne est constitué de blocs allongés de plus grandes dimensions que ceux des autres parements. Son orientation, décalée de quelques degrés vers l'est par rapport au sud, est bonne et correspond à ce qui a été observé dans les autres petites mos-



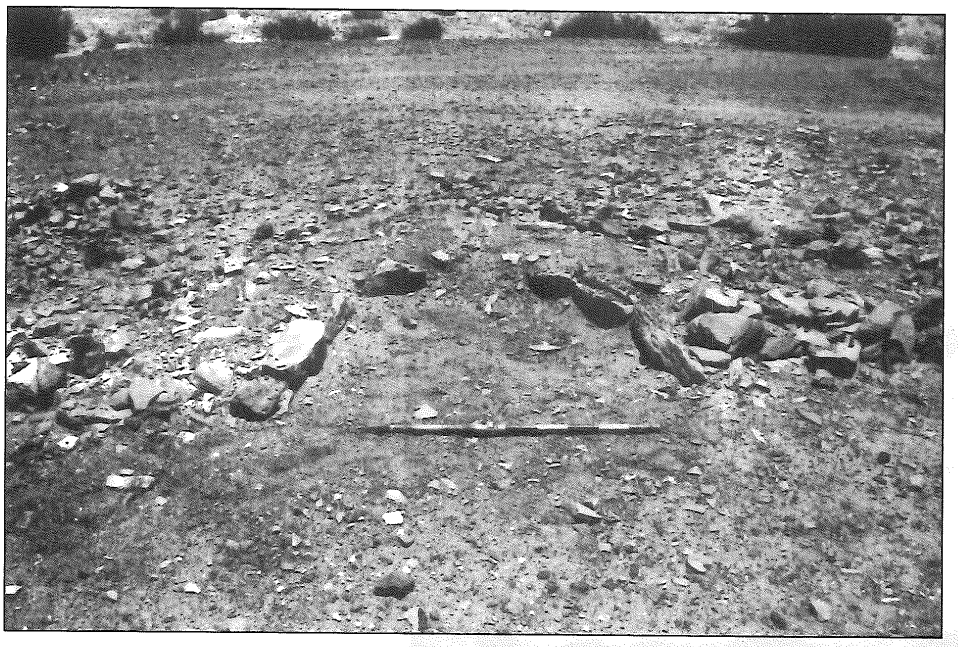
2. Quṣayr 'Amra. Vue de la résidence, la mosquée est sur sa gauche sous les térébinthes.



3. Mosquée de Quṣayr 'Amra; fondations du mur de qibla, au centre le miḥrāb.



4. Plan de la mosquée de Quṣayr 'Amra (D. Genequand/W. Trillen).



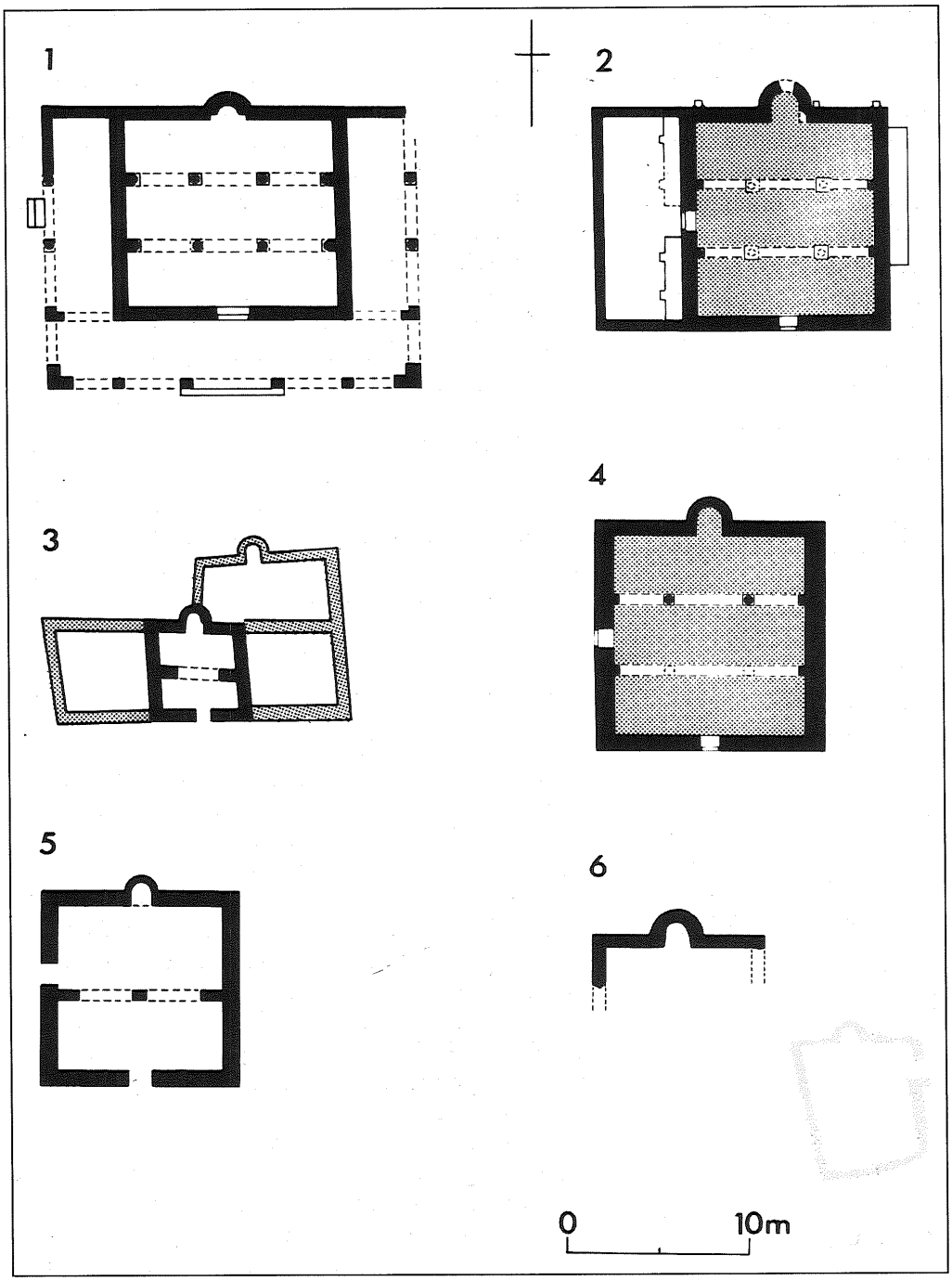
5. Mosquée de Quṣayr 'Amra; détail du miḥrāb.

quées des châteaux omeyyades de la région.

Même si la datation de cette mosquée ne peut être assurée de manière définitive, et ne le pourra pas de par l'absence probable de stratigraphie, il paraît assez logique d'y voir un édifice omeyyade. Les activités de construction sont rares dans la steppe jordanienne à partir de cette époque, mais surtout une mosquée restait le principal élément manquant encore à Quṣayr 'Amra. Sa présence à côté de la petite résidence et à distance du bain rappelle l'organisation de Qaṣr al-Ḥallābāt (قصر الحلابات) ou de Qasṭal (القسطل) où le bain est aussi à distance du groupe château-mosquée.

Au vu des vestiges subsistants de l'édifice et de l'absence d'éboulis, deux interprétations peuvent être proposées: il s'agit soit d'une mosquée dont la construction n'a pas été achevée, soit d'un *muṣallā* (مصلى) (emplacement de prière en plein-air).

Dans le premier cas, le plan de la mosquée — tel qu'on peut le restituer — est très simple et proche de ceux de plusieurs autres mosquées liées à des châteaux omeyyades du Bilād ash-Shām: Jabal Says (Brisch 1965: 147-149, Abb. 5), al-Ḥumayma (Oleson *et al.* 1999: 348), al-Ḥallābāt (Bisheh 1980: 73-74), Umm al-Walīd et Khān az-Zabīb (Bujard 1997: 353-356) (**Fig. 6**). Il n'est toutefois pas possible de savoir si cette mosquée était destinée à être hypostyle et subdivisée en plusieurs nefs, peut-être deux comme à Jabal Says ou al-Ḥumayma au vu de ses dimensions. L'absence apparente de blocs tombs des murs du bâtiment, le fait que les murs nord et ouest ne soient percepti-



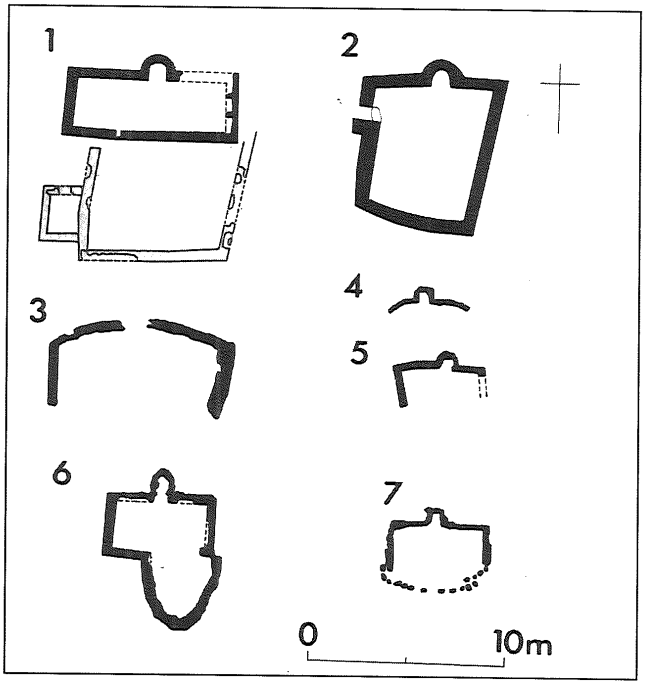
6. Plans de la mosquée de Quṣayr 'Amra et des proches parallèles de mosquées de châteaux omeyyades. 1: Ḥallābāt; 2: Umm al-Walīd; 3: al-Ḥumayma; 4: Khān az-Zabīb; 5: Jabal Says; 6: Quṣayr 'Amra (W. Trillen, d'après Bisheh 1980; Brisch 1965; Bujard 1997; Oleson et al. 1999).

bles nulle part et que les matériaux des autres monuments du site n'aient pas été récupérés tendraient à prouver qu'il s'agit d'une construction inachevée. Un petit tas de pierres (120cm de diamètre), situé dans la partie occidentale de la mosquée, pourrait évoquer un chantier en cours et interprété comme des matériaux prêts à être utilisés. Au momént de l'abandon du site ou aprés que les travaux y aient cessé, seule une partie des fondations et des murs de la mosquée avait été construites. La largeur des murs (70cm en moyenne), semblable à ce qui est observé ailleurs, et la régularité des parements plaident aussi en faveur d'un édifice qui devait être achevé.

Si ma préférence va à cette première interprétation, je ne peux exclure qu'il n'ait pu s'agir d'un *muṣallā*. Plusieurs structures de ce type sont attestées pour l'époque omeyyade. Au Wadi Shirah (Jordanie du sud) dont la datation de l'édifice est rendue 107/726 ou 109/728, plausible par une inscription provenant des environs immédiats de l'édifice (Jobling 1989a: 21; 1989b: 255), et par celles des sites du an-Naqab/Néguev, parmi d'autres (Avni 1992) celles de à Be'er Ora (Sharon

1988: 230-232, 235; Sharon *et al.* 1996), Har 'Oded (Rosen et Avni 1989: 119-120), 'Ayn Qadais (Haiman 1995: 37 et fig. 6.2) ou Sde Boqer (Rosen-Ayalon 1988: 261-262). On remarquera que ces *muṣallā*-s ne sont jamais en relation avec des châteaux, mais toujours avec des installations très simples volontiers attribuées à des communautés nomades ou semi-nomades musulmanes. Ces structures peuvent se présenter de diverses façons: soit l'ensemble du plan est marqué au sol par une ou deux assises, soit il y a seulement le mur de *qibla* présentant des retours latéraux plus ou moins longs. Le mur de *qibla* offre en général un *miḥrāb* concave, mais parfois, en lieu et place de ce dernier, quelques plus grosses pierres indiquent la direction de prière (**Fig. 7**).

L'inachèvement de la mosquée — ou l'existence d'un *muṣallā* dont le rôle ne peut être que provisoire dans un tel cadre — se reflète aussi sur l'ensemble du site; en effet se manifeste l'absence d'un véritable château, l'édifice proche de la mosquée n'étant tout au plus qu'une petite résidence qui ne soutient pas la comparaison avec les autres châteaux omeyyades. Comme sur d'autres sites — 'Ammān, al-Mushatta, Khirbat al-Mafjar — on a construite d'abord la salle de réception (*majlis* مجلس), ici liée au bain, puis la suite des infrastructures (Northedge 2000: 52-53). S'il paraît clair maintenant que le programme de construction du site de Quṣayr 'Amra n'a pas été terminé, on peut légitimement s'interroger à nouveau sur son attribution à un commanditaire précis.



7. Plans de muṣallā-s datés de l'époque omeyyade. 1: Sde Boqer; 2: Horvat Sharav; 3: Har 'Oded; 4: Be'er Karkom 1; 5: Nahal 'Arod; 6: Bor Betor; 7: Be'er Karkom 2 (W. Trillen, d'après Avni 1992).

On sait, par la représentation sur l'une des peintures de la salle de réception d'un groupe de six rois soumis au calife musulman et en particulier du roi wisigoth Roderic défait par les troupes d'al-Walīd b. 'Abd al-Malik en 92/711 à la bataille du Guadalete, que le bain est postérieur à cette date (van Berchem 1909: 367-370; Herzfeld 1913: 338-339; Jaussen et Savignac 1922: 111; Creswell 1969: 400-401). L'existence dans la petite mosquée d'un *miḥrāb* concave, attesté pour la première fois lors de la reconstruction de la mosquée de Médine en 88-90/707-709, tend aussi à confirmer une date de construction au plus tôt durant la dernière décennie du Ier siècle de l'Hégire/deuxième décennie du VIIIe siècle de notre ère. Sans reprendre tous les éléments du long débat portant sur le commanditaire de Quṣayr 'Amra, il me semble que deux propositions récentes méritent d'être mentionnées ici. Il y a en premier lieu le déchiffrement par F. Imbert d'un fragment, jusque là non lu, de l'inscription peinte dans le bandeau arqué («baldaquin») de l'abside de la salle de réception. Il propose d'y lire le titre de *walī 'ahd al-muslimīn* (ولي عهد المسلمين), soit le titre exact de l'héritier présomptif, successeur désigné du calife (Imbert 1996: 440-446). Puis, sur cette nouvelle base épigraphique, Northedge a émis l'hypothése que le site avait été commandité par Sulaymān b. 'Abd al-Malik (règne de 96/715 à 99/717 et désigné comme second héritier présomptif par son père en 85/704) avant son accession au trône; il s'appuie en sur la présence de Sulaymān b. 'Abd al-Malik dans al-Balqā' en 96/715 et de ce que l'architecture du bain se rapporte à la phase ancienne de l'architecture omeyyade (Northedge 2000: 53 et 58).

C'est dans cette dernière proposition que l'inachèvement du programme de construction de Quṣayr 'Amra — confirmé par la découverte de la mosquée — trouve le mieux son explication; il est en effet probable que Sulaymān, commanditaire lorsqu'il était encore dauphin sous al-Walīd b. 'Abd al-Malik, se soit, une fois devenu calife, désintéressé du projet et n'ait pas donner suite aux travaux. Sulaymān, ancien gouverneur de Palestine et fondateur d'ar-Ramla, qui deviendra résidence califienne, était avant tout tourné vers cette dernière région où il disposait d'un fort soutien des leaders locaux du parti yéménite; après son accession, il ne portera qu'un intérêt moindre à al-Balqā'.

On terminera cette cette brève notice en ajoutant que, outre les hypothèses que l'on peut en tirer sur le plan historique, la découverte de cette mosquée apporte un élément du plus haut intérêt à l'in-

ventaire des structures du site. Quṣayr 'Amra était en effet jusqu'à maintenant l'une des rares implantations omeyyades où, malgré les nombreux travaux qui y ont été menés, aucune mosquée n'avait été repérée et où l'on mettait volontiers en avant, en raison des thèmes représentés sur les peintures murales, un héritage hellénistique. Il y a — s'il faut encore le prouver — bel et bien une composante musulmane dans ce site.

D. Genequand
(IASA/Lausanne et Université de Paris I)
104 Rte de Suisse
CH-1290 Versoix
Switzerland

Bibliographie

Almagro, M., Caballero, L., Zozaya, J. et Almagro, A.
1975 *Qusayr 'Amra. Residencia y baños omeyas en el desierto de Jordania*. Madrid.

Avni, G.
1992 Ancient Mosques in the Negev Highlands. *'Atiqot* 21: 69*-81* (Hebrew, English Summary: 179-180).

Berchem, M. van
1909 Au Pays de Moab et d'Edom. *Journal des Savants* 7: 293-309/363-372/401-411.

Bisheh, G.
1980 Excavations at Qasr al-Hallabat, 1979. *ADAJ* 24: 69-77.

Bisheh, G., Morin, T. and Vibert-Guigue, C.
1997 Rapport d'activités à Qusayr 'Amra. *ADAJ* 41: 375-393.

Brisch, K.
1965 Das omayyadische Schloss in Usais (II). *Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo* 20: 138-177.

Bujard, J., avec la collaboration de W. Trillen
1997 Umm al-Walid et Khan az-Zabib, cinq qusur omeyyades et leurs mosquées revisités. *ADAJ* 41: 359-382.

Creswell, K.A.C.
1969 *Early Muslim Architecture (Umayyads A.D. 622-750)*. Oxford, 2 vols.

Grabar, O.
1954 The Painting of the Six Kings at Qusayr Amrah. *Ars Orientalis* 1: 185-187.
1988 La place de Qusayr Amrah dans l'art profane du Haut Moyen Age. *Cahiers Archéologiques* 36: 75-83.

Haiman, M.
1995 Agriculture and Nomad-State Relations in the Negev Desert in the Byzantine and Early Islamic Periods. *BASOR* 297: 29-53.

Herzfeld, E.
1913 'Amra. *Encyclopaedia of Islam*[1], Leyden, I: 336-339.

Imbert, F.
1996 *Corpus des inscriptions arabes de Jordanie du Nord*. Thèse de doctorat de l'Université de Provence/Aix-Marseille I, 3 tomes.

Jaussen, A. et Savignac, M.-R.
1922 *Mission archéologique en Arabie. III. Les châteaux arabes de Qeseir 'Amra, Haraneh et Tuba*. Paris.

Jobling, W.J.
1989a 'Aqaba-Ma'an Archaeological and Epigraphic Survey. *Archaeology of Jordan*, II/1, D. Homès-Fredericq et J.B. Hennessy (eds.), Leuven: 16-24.
1989b Report of the Eight Season of the 'Aqaba-Ma'an Archaeological and Epigraphic Survey (January-February 1988). *LA* 34: 253-255.

Musil, A.
1907a *Arabia Petraea*. T. I, Moab. Wien.
1907b *Kusejr Amra*. 2 vols, Wien.

Northedge, A.
2000 *Entre Amman et Samarra: l'archéologie et les élites au début de l'Islam (VIIe-IXe siècle)*. Mémoire d'habilitation, Université de Paris I.

Oleson, J.-P., 'Amr, K., Foote, R., Logan, J., Reeves, B. and Schick, R.
1999 Preliminary Report of the al-Humayma Excavation Project, 1995, 1996, 1998. *ADAJ* 43: 411-450.

Rosen, S. and Avni, G.
1996 Har 'Oded, 1988. *IEJ* 39: 117-120.

Rosen-Ayalon, M.
1988 New Discoveries in Islamic Archaeology in the Holy Land. *The Holy Land in History and Thought*, ed. M. Sharon, Leiden: 257-269.

Sauvaget, J.
1939a Remarques sur les monuments omeyyades. *Journal Asiatique* 231, janvier-mars 1939: 1-59.
1939b Les ruines omeyyades du Djebel Seis. *Syria* 20: 239-256.
1967 Châteaux umayyades de Syrie. Contribution à l'étude de la colonisation arabe aux Ier et IIe siècles de l'Hégire. *Revue des Etudes Islamiques* 35: 1-52.

Sharon, M.
1988 The Birth of Islam in the Holy Land. *The Holy Land in History and Thought*, ed. M. Sharon, Leiden: 225-235.

Sharon, M., Uzi, A. and Nahlieli, D.
1996 An Early Islamic Mosque Near Be'er Ora in the Southern Negev: Possible Evidence For an Early Eastern *Qiblah*. *'Atiqot* 30: 107-114.

Vibert-Guigue, C. et Morin, T.
2000 Une structure d'accueil des visiteurs à Qusayr 'Amra. *ADAJ* 44: 581-591.

THE SUGAR INDUSTRY IN THE SOUTHERN JORDAN VALLEY: AN INTERIM REPORT ON THE PILOT SEASON OF EXCAVATIONS, GEOPHYSICAL AND GEOLOGICAL SURVEYS AT ṬAWĀḤĪN AS-SUKKAR AND KHIRBAT ASH-SHAYKH 'ĪSĀ, IN GHAWR AṢ-ṢĀFĪ

Effie Photos-Jones, Konstantinos D. Politis, Heather F. James, Alan J. Hall, Richard E. Jones and Jerry Hamer†

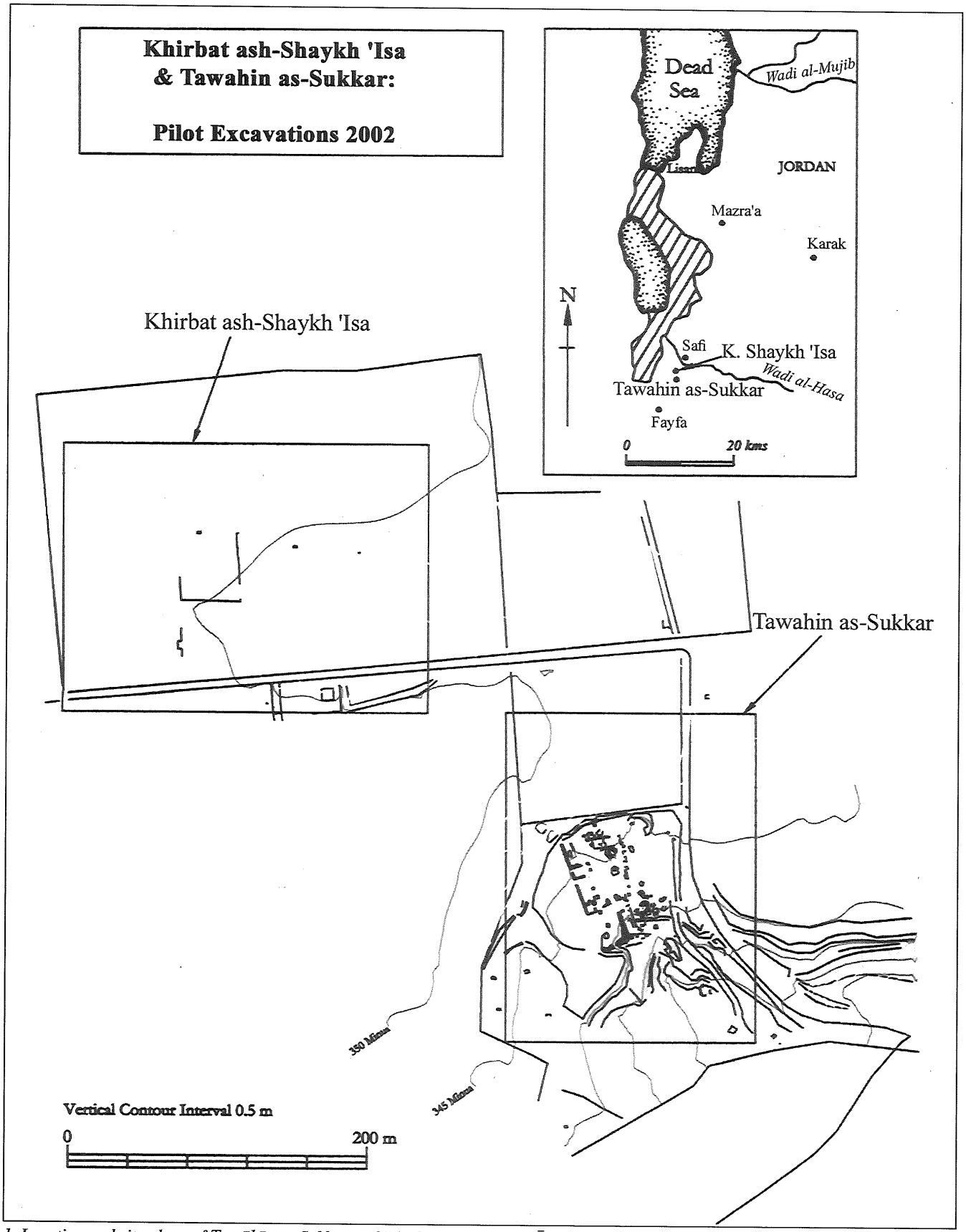
1.0 INTRODUCTION

1.1 Setting the Scene

In January 2002, a pilot season of excavations accompanied by a limited geological survey took place at and around the neighbouring sites of the Ṭawāḥīn as-Sukkar طواحين السكر (TES) and Khirbat ash-Shaykh 'Īsā خربة الشيخ عيسى (KSI) in the Ghawr aṣ-Ṣāfī غـور الصـافي, southern Jordan (**Fig. 1**). The general aim of the pilot phase was to assess the level, quality and state of preservation of the material evidence at key areas within the sugar mill and the KSI, and to place the sugar industry in the context of the landscape that generated and sustained it. Prior to January 2002, two seasons of geophysical survey were carried out, one in April 1999, the results of which have already been published (Jones *et al.* 2000), and a second in April 2000, the results of which are presented here. A general assessment of the surface evidence had been carried out in the late 1990s (Politis 1998). A detailed account of the excavations has been submitted to the Department of Antiquities (James 2002).

Our current research into the organisation of the sugar industry in the Jordan Valley during the Ayyubid/Mamluk (12th-15th centuries) or earlier periods is focused firmly on two sites: TES, the industrial complex proper, with standing remains, one of a number operating in the Jordan Valley between the 12th and 15th centuries AD (Hamarneh 1977-8; Khouri 1988; Stern 1999) and KSI, a settlement site, originally a mound, but now levelled, known since the 1930s, and for which it has been stated that "there is little doubt that (it) ... was Byzantine-Early Islamic Zoar(a)/Zughar or Sughar" (MacDonald 2000: 57-58); this is the fortified 'city' depicted on the Mādabā floor mosaic map, surrounded by date palms and labelled in Greek, namely 'Valak and/or Zoora'. Given the proximity of the two sites (KSI lies 150m to the NW of TES) and the large collection of sugar industry-related pottery recovered at both, we are presently assuming they were linked to each other as an industrial complex with its associated settlement during one or more chronological periods. However, it is possible that at some point in the future, depending on the nature of the emerging evidence, the incentive for a full-scale excavation at KSI may be directed towards establishing whether it was indeed the site of the biblical Zoar, Byzantine Zoara or Islamic Zughar rather than its capacity either as a settlement for the workers at the *ṭawāḥīn* or a pottery manufacturing centre within a market town. Therefore 'the industrial complex with associated settlement' model is merely a working scenario, almost certainly to be refined or altered as the investigation progresses.

This research project has been driven by two motivating forces: on the one hand, the benefits of integrating scientific analysis into the examination of the building materials, artefacts and the products and waste of the industrial processes; and on the other, the realisation that an industrial complex is more than the sum of its parts, and in particular the parts referring to issues of technology. Therefore, parameters, both natural and human-made, contributing to the industry's development in the Jordan Valley are considered. These include soil suitability and water availability, the planting and irrigation of sugar cane crops, the management of the water-power needed for the milling of the harvest, the methods developed for the processing of the product(s), the ancillary industries (pottery, iron working) necessary for its smooth operation, the nature, extent and social stratification of the labour force required in the fields and within the mill, the location, nature and extent of the settlement supporting the industry both as a home for the workers, as well as a market for their product, the trade routes and the markets for which sugar was destined, to mention only a few. All these parameters are expected to be recovered to a greater or lesser extent from the archaeological record, deduced by the application of the combined methodologies of excavation, documentary research and scientific analysis and complemented by similar information derived from other sites. Archaeological evidence — even at this initial stage — points indisputably



1. Location and site plans of Ṭawāḥīn as-Sukkar and Khirbat ash-Shaykh ʿĪsā, January 2002.

to an industrial complex which would have required a substantial initial outlay of capital for its establishment; it would also have needed a 'large' workforce — slave or freeman — for its running,

and have required a well-established trade network for its products. Regarding KSI, it is clear that the size and layout of the walls exposed so far, the complexity of its stratigraphy and the richness of the finds point to a substantial settlement with a long history of occupation. There is also evidence for pottery manufacture on site, but its relation to the main phases of occupation is at this stage unclear. Nevertheless, the elucidation of this relationship may form the starting point for future excavation.

This report presents the results of three weeks of excavation, one week of geological and two weeks of geophysical surveys, each section of the work being carried out by a specialist team. A brief introduction into the general principles of sugar manufacture is included while the discussion section focuses on a selection of the themes outlined above.

1.2 Sugar Production: some general principles

It is suggested that sugar may have been refined with the use of wood ashes in southern Iraq as early as the eighth century AD (Hamarneh 1977-8) before it became an important industry in the Near East between the 11th and 15th century in Egypt, the Syrian Coast, Palestine, the Jordan Valley and later moved westwards to Cyprus, Venice and beyond. In reference to the sugar mills in the Jordan Valley, a substantial number have been recorded although with varying degrees of archaeological evidence. A total of thirty-two sites are thought to belong to the Ayyubid/Mamluk periods (Hamarneh 1977-8; Abu Dalu 1995; Khouri 1988; Stern 1999).

It is almost certain that the sugar cane was cultivated well before that period in Persia and India and it is important to note that knowledge and cultivation of sugar cane does not necessarily imply knowledge of sugar manufacture. This is because of the versatility of this tropical grass which can be sucked raw or it can be cooked; the juice can be drunk or boiled to produce a syrup out of which red, brown or yellow sugar crystals can be extracted; and finally refined to produce sugar crystals.

Sugar cane, *saccharum officinarum* often reported as the "Middle-Eastern variety" is only one of the many cultivars presently available. It requires abundant water and sunlight, making the Jordan Valley and areas near the southern Jordan wadis particularly suitable for crop plantation. The chemical formula of sugar is essentially sucrose ($C_{12}H_{22}O_{11}$), a saccharide like glucose and fructose, which belong to the family of carbohydrates. The plant manufactures sucrose from carbon dioxide in the atmosphere and water from its roots and stores it as energy. The proportions of the constituent parts of sugar cane vary considerably, not only according to climate and soil, but also upon other parameters such as ripeness of the cane at the time of harvest. But for purposes of reference they can be summarised as follows (after Jones and Scard 1909: 11):

Water	69-75%
Sucrose	8-16%
Un-crystallisable sugar	trace to 2%
Fibre	8-16%
Ash	0.3-0.8%
Organic matter other than sugar	0.5-1%
Containing nitrogen	0.005-~0.02%

From the above it is clear that about 85-90% is waste material only, an average of 10% being sugar. Although most of the plant constituents are water soluble, it is expected that some like fibre and other inorganic matter may be retrievable in the archaeological record (see Trench VI, *The Mill Room*).

Overall, the same general processes applied in the past are still followed today in cane sugar manufacture. These include: a) crushing the sugar cane to extract the juice, a process originally carried out in two steps, pulp formation and subsequent pressing of the pulp to extract the juice; b) boiling of the juice to evaporate the water and produce syrup; c) syrup clarification to remove both colour and non-sucrose substances using different types of 'reagents'; d) sugar crystallisation from the melt and draining of excess liquor originally by gravity — with the use of the conically shaped sugar moulds inserted and draining within molasses jars, used in the Near East and Europe — and later, in the 19th century, centrifugal force where the contents were spun.

There is ample documentary evidence both in European and Arab sources during the period between the 11th and the 15th centuries regarding the incentive by Ayyubid/Mamluk rulers to promote sugar crop plantation in the Jordan Valley by undertaking major irrigation schemes (Hamarneh 1977-8; Khouri 1988; Stern 1999). However, it seems clear that an understanding of how to carry out and control steps (b) and (c) must have been in place prior to that period before sugar manufacture could expand on an industrial scale. With an average of 10% sucrose in the sugar cane, the process needs to be carefully monitored both in the type of clarifiers used and the temperature at which the juice is to boil, as 19th century industrial reports amply testify (Bremner 1869). Overheating destroys the crystallising properties of sugar and converts it to a sticky mass or treacle. In reference to Palestine, Stern (1999) rightly suggests that it was

development/invention of mineral clarifiers that were added to the syrup, facilitating the production of pure crystals of sucrose, which spearheaded the transition to industrial level. These clarifiers included wood ashes, lime, alum and even certain herbs (Watson 1983; Clow and Clow 1952: 519; Peled 1999). Present-day clarifier is lime, CaO, which apart from removing the non-sugar components, dehydrates the melt and neutralises the acidity of the juice. Regenerative charcoal, which returns to its original state when heated, from animal bone is used to remove the colour resulting in white crystals of sugar. The level of technological know-how practiced at the Ṭawāḥīn will be assessed with the scientific analysis of the recovered industrial waste (see Trench II).

1.3 Site Location and Topography

The two sites of Khirbat ash-Shaykh ʻĪsā and Ṭawāḥīn as-Sukkar are located approximately 150m apart, and about 0.5km from the present location of the village of aṣ-Ṣāfī to the southeast of the Dead Sea (**Fig. 1**). They are situated near the mouth of Wādī al-Ḥasā (وادي الحسا), a major channel bringing water and sediment to the southeast corner of the Dead Sea from the high plateau area that lies to the east (see **Figs. 2, 3**). A large (ca. 20km^2) alluvial fan has developed near the mouth of the wadi raising the ground level by a few metres above that of the saline flats, which extends southwards in the Dead Sea basin. The gently undulating topography of the alluvial fan with its agricultural development realised by irrigation, is in stark contrast to the barren saline flats to the west and north and to the high ground lying immediately to the east. Although the pebbly sands and silts of the alluvial fan provide good drainage and evidently a fertile soil, it is irrigation that makes it presently agriculturally viable for cash crops like bananas and tomatoes.

TES is situated on a convenient steep slope at a topographic 'corner' where the general N-S trend of the eastern side of the Dead Sea Basin meets the E-W trend of the southern mouth of the Wādī al-Ḥasā (**Fig. 2**). TES was built on compact pebbly to bouldery alluvial sediments that drape over the sedimentary rocks outcropping along the eastern side of the Dead Sea Rift valley.

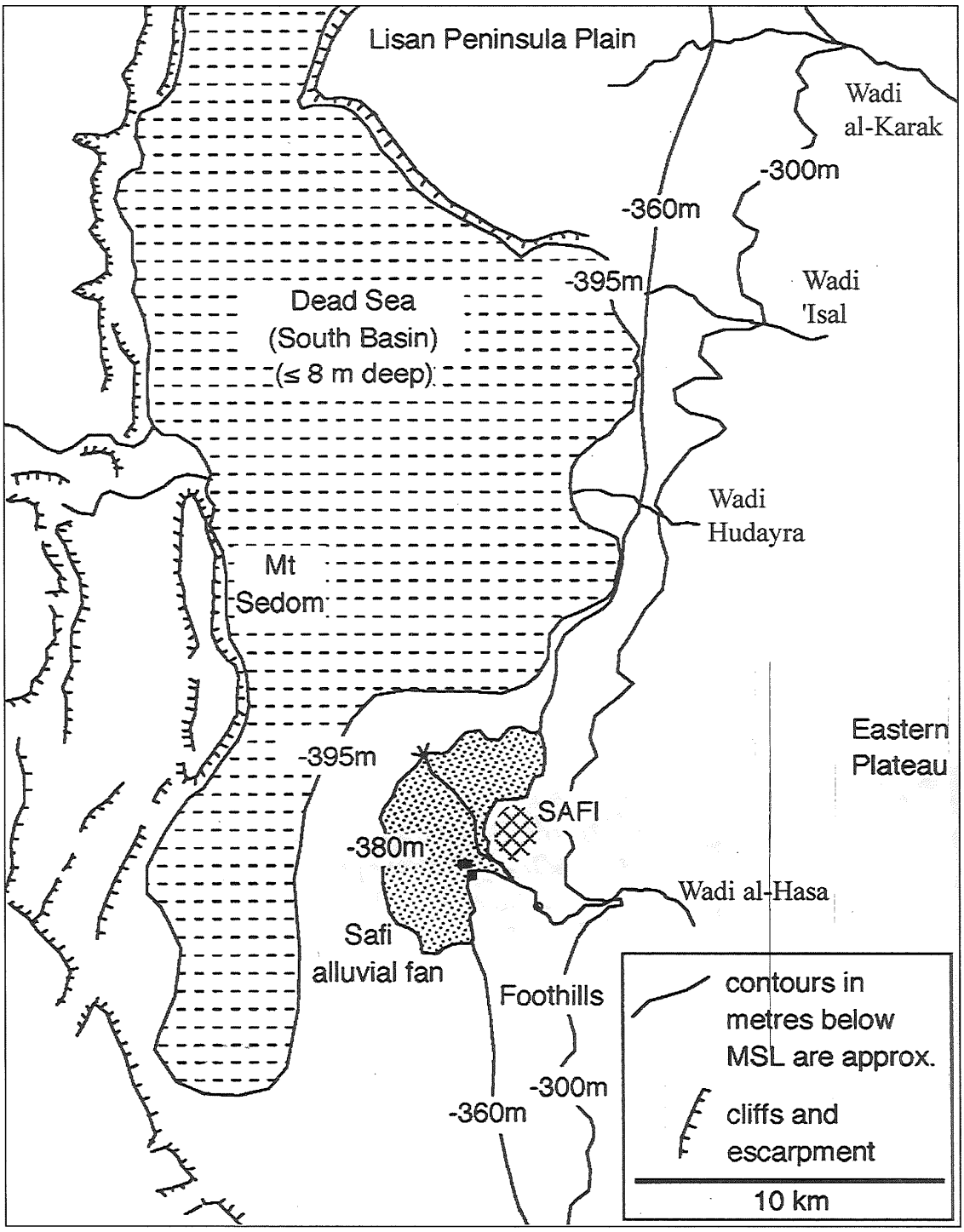
There must have been ample space for plantations of the sugar-crop, presumably cane sugar, all around the KSI including the fields between the KSI and the TES. TES lies to the SE of KSI and to the NW of an extensive Early Bronze Age cemetery (Waheeb 1995; Papadopoulos *et al.* 2001) now much robbed. The upstanding remains at the site consist of stone walls, a set of two parallel aqueducts and their associated water chutes at varying levels of preservation, subsurface water channels as well as adobe brick walls belonging to a later fort. These remains extend over an area of approximately 100m N-S and 50m E-W and are partly hidden beneath varying depths of wind-blown sand. Damage to these remains has been caused by natural erosion and by several deep robber trenches. The site, open until recently to goat and pedestrian traffic, was enclosed in 2000 by a wire fence on three sides and an adobe brick wall to the east (**Fig. 4**), which has subsequently been broken through. A preliminary phase of wall consolidation had started then and continued after the excavations of January 2002.

KSI appears to be situated on a broad raised area on the fertile alluvial fan, but it is impossible to say how much of the topography is natural and how much is human-made. The site is a rectangular area of uncultivated ground measuring about 140m (N-S) by 200m (E-W) and is approximately 340m below sea level. The topographic survey revealed that the southern part of the site forms a slight mound that straddles the road marking its southern boundary. It is surrounded by cultivated fields and is seasonally inhabited by Bedouins.

2.0 PREVIOUS ARCHAEOLOGICAL WORK

2.1 Surveys

There is a long history of archaeological survey in the region of Ghawr aṣ-Ṣāfī, both TES and KSI being included in those surveys (Albright 1924; Frank 1936; Glueck 1935; Rast and Schaub 1974; King *et al.* 1987; MacDonald *et al.* 1992). Ṭawāḥīn as-Sukkar was surveyed and planned by Frank in 1934. There has been limited excavation at KSI (Albright 1924: 4; Kyle and Albright 1924: 283-291; Waheeb 1995: 555). The 1924 excavation by Albright consisted of a single sounding, presumably a small trench up to 3m deep. In 1995 Waheeb (1995: 555) undertook a limited excavation (20 x 4m), which exposed a length of walling in the SW corner of the site (Wall 1 in **Fig. 5b**). Modern surveys have involved surface collection of sherds and artefacts (MacDonald *et al.* 1992: 104, 249; King *et al.* 1987: 448, 456; Politis 1998). The majority of the artefacts recovered from KSI were dated to the Byzantine period (4th-7th century AD) or later. Bulldozing of the site and the installation of underground irrigation channels in the early 1980's revealed "columns, capitals and even mosaic floors" at a depth of "several metres" below the current road that could also belong to the Byzantine period (Politis 1998). There is as yet no definite archaeological support for KSI being the



2. Sketch map of the aṣ-Ṣāfī alluvial fan and its physiographic setting at the mouth of Wādī al-Ḥasā on the eastern scarp of the Dead Sea graben. Topographic features based on fig. 8 of Neev and Emery (1967) and a satellite map (Hall 2000) of the southern Dead Sea area. The topographic boundaries and their contour values in the E/SE of the map are approximate. The shore of the Dead Sea has been receding northwards due to salt extraction and the entire southern basin of the Dead Sea is now subdivided into large salt pans. TES and KSI are indicated by black rectangles.

biblical Zoar, but this may be due to the lack — so far — of systematic excavations. Its proximity to the archaeological remains of the 6th-7th century Monastery of St. Lot (Politis 1999), also depicted in the Mādabā floor map, cannot be underestimated.

2.2 The Geophysical Surveys

An exploratory geophysical survey with a FM36 fluxgate gradiometer at the western end of the mound at KSI, close to the previously excavat-



3. Topographic map of area around the sugar mill (TES) and the settlement site (KSI). The northern line shows the most likely route for a canal to take water from the wadi in the east to the aqueduct of the sugar mill. The southern route shows an alternative possibility but only if they had a reservoir to control it.

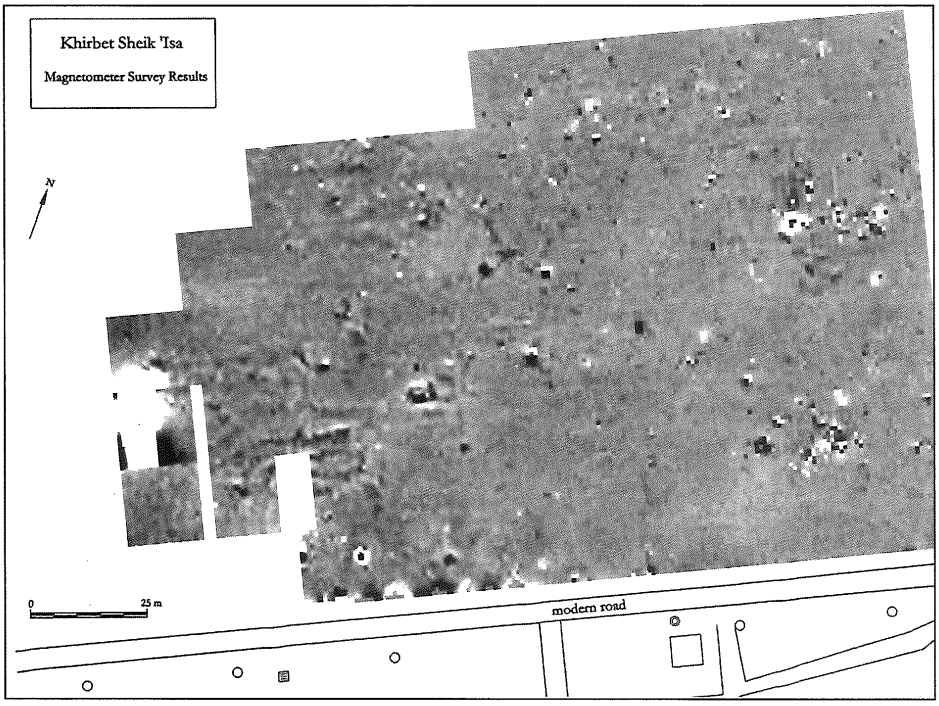


4. View of TES prior to fencing (May 1997); view from southeast, with robber trench in the foreground.

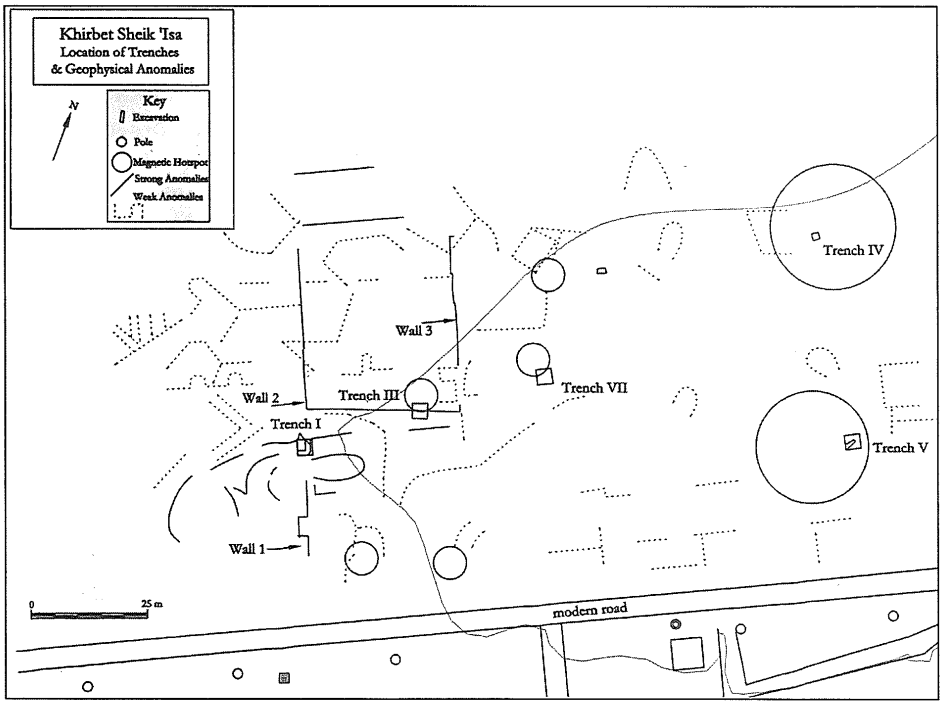
ed area, was carried out in 1999 and reported by Jones *et al.* (2000). Since the results were encouraging if not straightforward in interpretation, the survey was considerably extended in April 2000 by R.E. Jones and J. Hamer† using a Geoscan FM36 fluxgate gradiometer to encompass most of the mound, ca. 2.7ha in total. The purpose of the survey was, as before, to locate buried building structures and, in view of the surface scatter of industrial waste, possible furnaces or kilns; the depth of penetration of the magnetometer was not greater than 1m. It was the results of the 2000 survey that guided the selection of targets for excavation in January 2002 (see Trenches I, III, IV, V and VII in the following sections), although the detail within these results did not emerge until after the excavations. They are presented here as a guide to future work on the site.

Superficially, the site appeared well suited to survey: flat, smooth terrain, sloping gently to the

north to an area where there had been some recent shallow tilling. As mentioned in the previous section, at the western end of the site was visible a stretch of wall (Wall 1 in **Fig. 5b**) exposed by Waheeb (1995). The transient nature of Bedouin encampments affected the terrain only superficially. However, the presence of modern metallic rubbish on or close to the surface proved to be problematic in interpreting the magnetic data; furthermore, a large partially-buried iron drum at the western extremity of the surveyed area prevented measurements being taken in sectors of two potentially very informative grids. As in 1999, readings were taken at 1m intervals along traverses 1m apart in 20 x 20m squares, and the data were processed with Geoscan's Geoplot 3.0. The survey baseline was the line of a former metal fence running parallel to, and ca. 2m from the modern road, and its relation to the topographic plan given in Jones *et al.* (2000: fig. 3) was determined manually with tapes and compass; as a result, there is a probable error of up to +/- 2m in transposing the geophysical sur-



5a. Results of the magnetometer survey at KSI in the form of a grey-scale plot (Geoplot 3: shade plot (clip), black and white tones are +17 nT and -17 nT respectively).



5b. Interpretation plan showing the locations of strong (continuous line) and weak (dotted line) magnetic anomalies. The medium and large-sized circles represent magnetic hotspots; poles for power lines are indicated by small circles to the south of the modern road. Walls 1, 2 and 3, which are visible close to the ground surface, and Trenches I, III, V and VII are shown.

vey area onto the topographic plan.

Fig. 5a shows the composite graphic from the magnetometer survey in the form of a grey-scale plot with high positive and negative values in black and white respectively superimposed onto the site plan. There is a remarkably rich mosaic of anomalies, most of which are of low intensity, distributed across the site. These anomalies are more abundant in the western half of the survey area where the soil is often dark and there are slight surface undulations; furthermore, this sector forms a slight mound with respect to the eastern sector which is flatter and whose surface consists for the most part of compacted earth. The major task of securely identifying all the anomalies in **Fig. 5a** is on-going, but for present purposes the emphasis is on drawing attention to a majority of them, and these can be conveniently, if subjectively, classified into major (full line) and minor (dotted line) in **Fig. 5b**.

Starting with the *western* half of the survey area, the main point to make is that the anomalies, all of them lying up to a depth of 1m, belong to at least three groups on the basis of their shape and orientation:

(a) Those that are essentially on the same orientation as the excavated sector of wall (Wall 1 in **Fig. 5b**). They are best represented by the substantial rectangular sequence of walling composed of Walls 2 and 3 that are visible close to the surface. Other walls of different length but on the same orientation are observed to the north and west. None of the anomalies in this group is strong in intensity, suggesting poor magnetic contrast between the sandstone masonry and the sandy soil.

(b) Those whose orientation is closer to east-west and which are likely to be walls varying in length up to 10m. In a few places they seem to overlie those of (a). Like those in (a), the anomalies are weak.

(c) The remainder which include those due east of Trench I that were first discovered in the 1999 survey (Jones *et al.* 2000: fig. 6c), and the bipolar ones, such as that at Trench III, which should be thermoremanent representing furnace-type structures. The very large bipolar anomaly at the western extremity of the survey area is, as explained above, due to a modern iron drum. Note that the haloes in **Fig. 5a** along the southern edge of the survey area by the main road are associated with the remains of the (modern) metal fence.

One preliminary interpretation of (a) and (b) is that they represent two grid plans of differing orientation superimposed one upon the other but belonging to different phases of the settlement. The curving nature of some of the stronger anomalies in **Fig. 5a** is puzzling, and the number of bastion-like features is intriguing since they correspond in shape if not in scale to those already excavated.

The *eastern* sector is no less interesting. Its most notable aspect is the host of hotspots of differing size and intensity, some of them connected by weak positive anomalies. Given the greater concentration of surface scatter of sherds, 'furnace' linings in this area of the site in comparison with the western sector, it is tempting to interpret the large hotspots at the eastern end (Trenches IV and V) as a series of ovens/furnaces/kilns and therefore to consider this sector, if simplistically, as an industrial quarter, notwithstanding the difficulty that remains in excluding the likelihood that some of the hotspots are due to modern metal or indeed modern bread ovens (*ṭawābīn*). Of the latter, there was plenty archaeological evidence (Trench V, James 2002). Attempts to relate the distribution of surface finds with the main anomalies proved unrewarding owing to its distortion introduced by modern presence at the site. At the southern and south-eastern sides of this sector are very faint anomalies, probably representing fragments of wall whose orientation is akin to (a) above. They seem to form a complex of related buildings. The remaining magnetic anomalies are less coherent and must for the present be regarded as miscellaneous.

2.3 The Geophysical Surveys: future work

Given the wealth of potential detail in **Fig. 5a**, there is a case for re-surveying particular areas of the site with the same instrument but at a smaller sampling distance, that is 0.5m rather than 1m. Furthermore, magnetometer survey should be continued to the north and west of the presently surveyed area in order to determine the limits of the site in the form of a wall or otherwise; the large oil drum whose presence has seriously distorted the western extremity of the survey area should be removed. Turning to the detection of more deeply buried levels, there are two options: either resistivity survey at 2m or greater electrode spacing, or ground-penetrating radar (GPR). The former would only be feasible in the season of maximum potential rainfall and even then would be slow, arduous work owing to the sandy soil conditions. The alternative, GPR, is attractive because it could combine the necessary depth of penetration with relatively rapid speed of survey, and using the time slice method could give 'images' at different depths [as for instance carried out recently at Petra by Conyers *et al.* (2002)]; on the debit side would be the

difficulty of interpretation in areas of complex stratigraphy. GPR would also be valuable in identifying, in tandem with the magnetometer, the limits of the site. Wherever possible, geophysical survey should be combined with trial trenching.

3.0 EXCAVATIONS

3.1 Methodology

The excavations took place between January 12th and the 30th, 2002. For reasons of safety the areas of the underground channels at TES were not examined, and so only the chute base and waste heap were investigated (Trenches VI and II respectively). The emphasis was on revealing the building remains associated with milling (Trench VI) and on the recovery and characterisation of waste heap materials (Trench II); subsequent seasons will target other stages of the industrial process. At KSI five locations were selected based on the interpretation of the geophysical map available at the time. These included Trenches I, III, IV, V and VII, whose distribution (**Fig. 5b**) reflects what was thought at the time to be the civic buildings area of the site (Trenches I and III), the industrial quarters (Trench IV and V) and the area of the kiln and pottery wasters (Trench VII).

The trenches were laid out and each layer (context) was carefully excavated by hand with small picks and trowels. All the material removed from the trenches was sieved through a 5 x 5mm mesh and all finds were kept (James 2002). Only significant artefacts were recorded as registered objects, the remaining finds being recorded by context. A topographic survey was carried out using a Pentax model PCS2S total station to allow the locations of the excavation trenches, robber trenches and city walls to be placed on the overall site plan.

In the following sections the numbers in brackets refer to the context numbers assigned to the deposit in the field. Assigning of features to archaeological periods is provisional at this stage, until the pottery has been analysed and radiocarbon dates returned.

3.2 The Excavations at TES

3.2.1 Trench VI

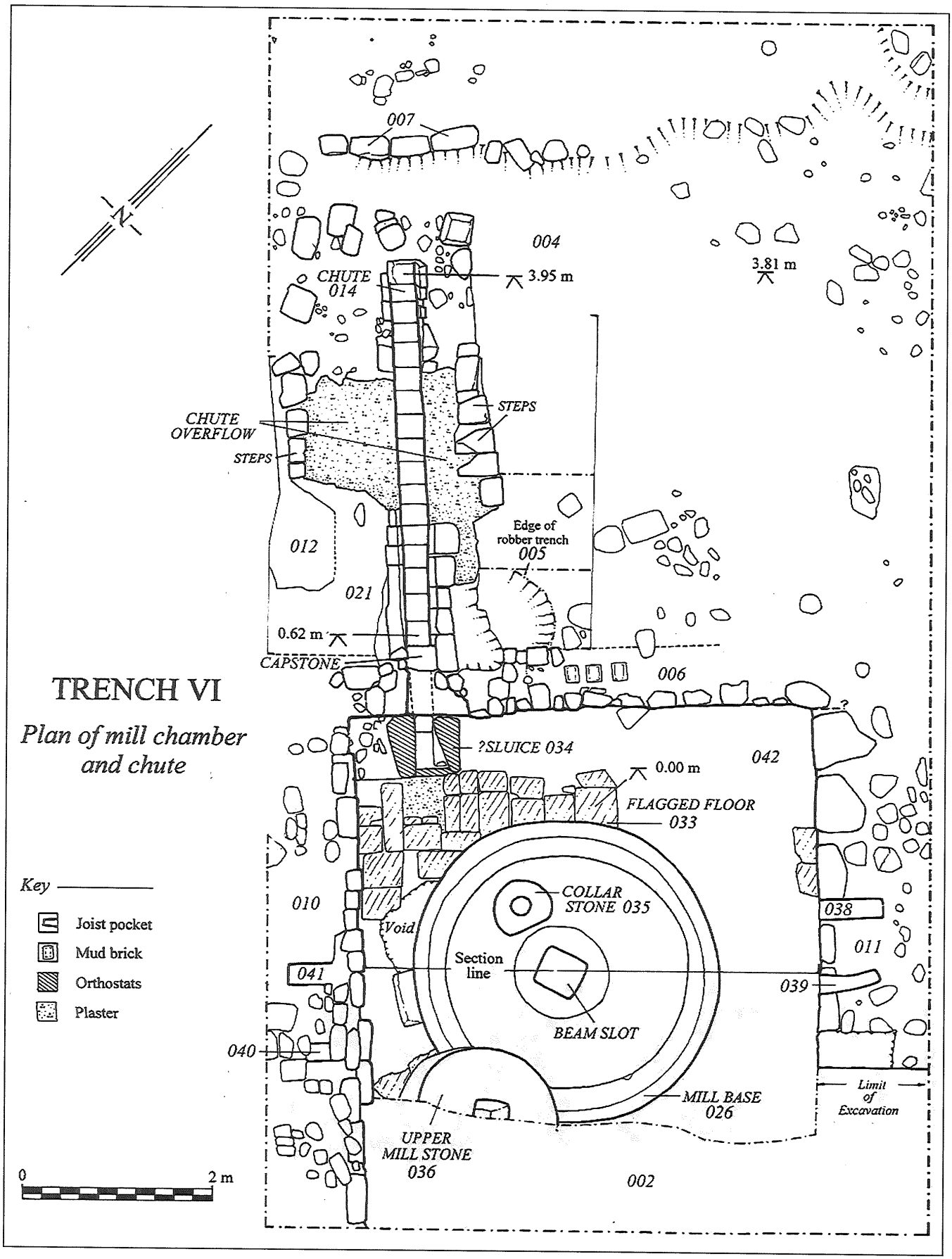
Trench VI roughly straddled the area to the NW of the space between the two aqueducts. The ground surface here sloped down steeply towards the NW. The trench measured 7 x 13m and was excavated to a maximum depth of 3.6m over a period of 17 days. Once the loose material was removed from the trench it became clear that its lower, NW, part consisted of deep, in-filled deposits enclosed by three stonewalls. These deposits were excavated down to the floor of the mill room (see **Fig. 7**). The higher, SE, part of the trench consisted of deposits associated with the construction and use of the mill, and excavation was concentrated in the NE half of the trench in the vicinity of the water chute (**Figs. 6, 7**).

The Mill Room (**Figs. 7, 8, 9, 10, 11**)

A mill base stone (026) was found to be lying *in situ* sitting on a partly flagged floor (033), within



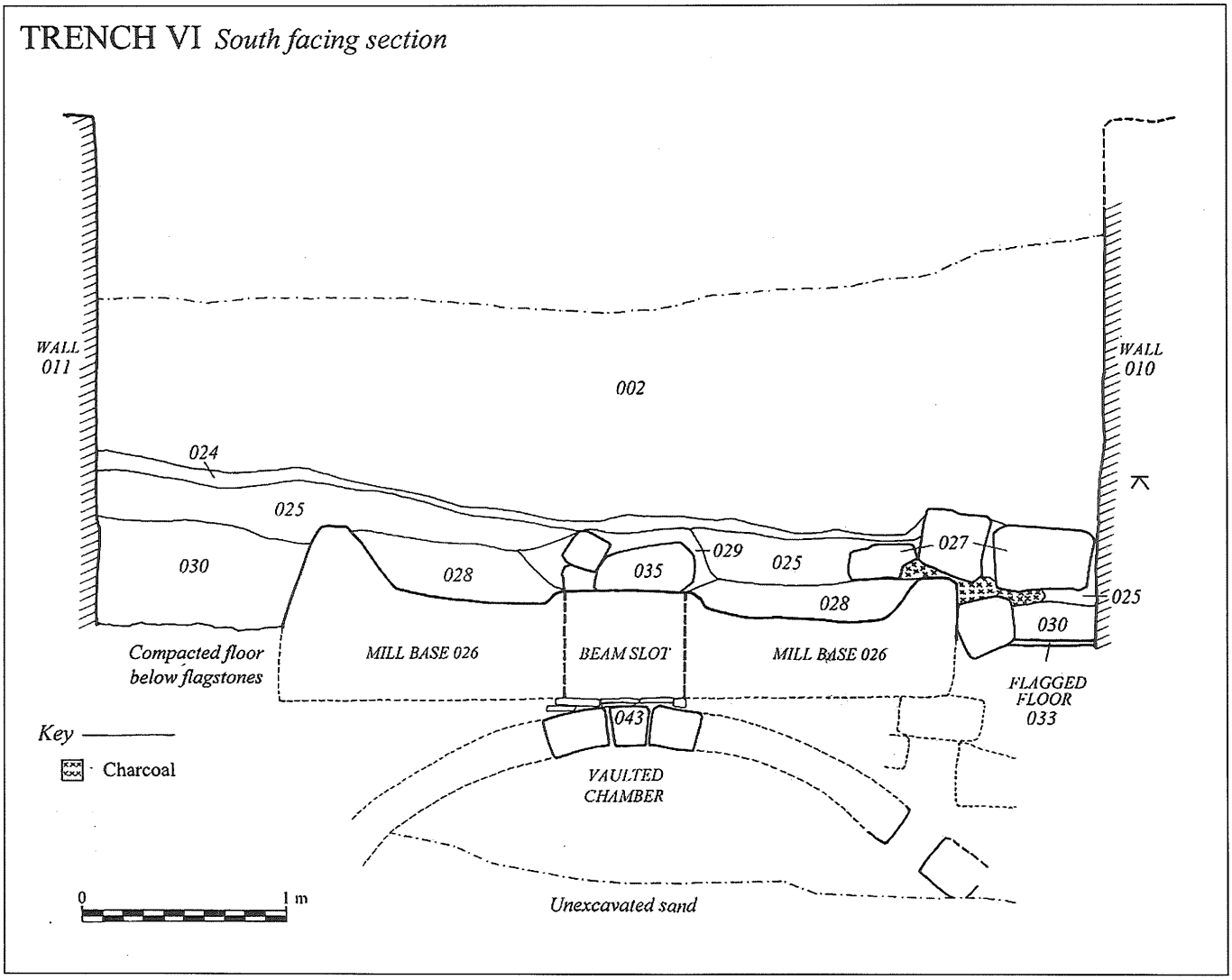
6. TES Trench VI. View from the northwest; the eastern and western aqueduct with the western wall of the room with the millstones.



7. Plan of the mill room and chute in Trench VI, TES.

the mill room (**Fig. 7**). The infill from the mill base was sampled but there was no obvious evidence for large fragments of botanical (charred or other) remains. The upper mill stone (036) lay on its side, resting on the edge of the mill base. The mill room had three walls, the back wall (006), E wall (010), W wall (011) and a floor (033 and 042). The NW end of the upstanding water chute (C3) had been truncated, but excavation revealed that, after a gap of ca. 2.5m, the stone-built chute (014) continued further on in the same direction, dropping down steeply to meet the back wall of the mill room (006). The chute continued through the wall, but the area where it entered the mill room was below the level of the floor (033). The mill base was supported by the vaulted ceiling (043) (**Fig. 8**) of a lower room into which the water chute would have entered. The lower room was full of sand and no workings within this wheel chamber were visible.

The mill base (026) was made from a single piece of limestone and measured 3.3m in diameter and the crushing base was 0.5m thick. There was a central square hole ca. 0.5m wide around which was a circular raised section that had several small holes, some with evidence of metal still within them. One half of a broken, 'donut-shaped' stone was found immediately above the square hole, and the other half had fallen through the hole in the mill base. This was retrieved so that the two pieces could be laid together. The 'donut-shaped' stone was interpreted as a collar stone that was slightly flattened on one side, and could have been attached to the mill base with metal. The flat crushing area of the mill base was 0.7m wide and the sides sloped up 0.2m forming a rim. There was a circular hole through the rim about 0.12m in diameter in the W side, which would have allowed the sugar pulp/syrup to drain out for collection. The mill base was tilted slightly towards the N where the upper millstone sat. The upper millstone (036) was



8. South facing section of Trench VI, TES.



9. Trench VI, TES, mill base (026), upper mill stone (036), collar stone (035), and the stone feature (034) in the top right corner.



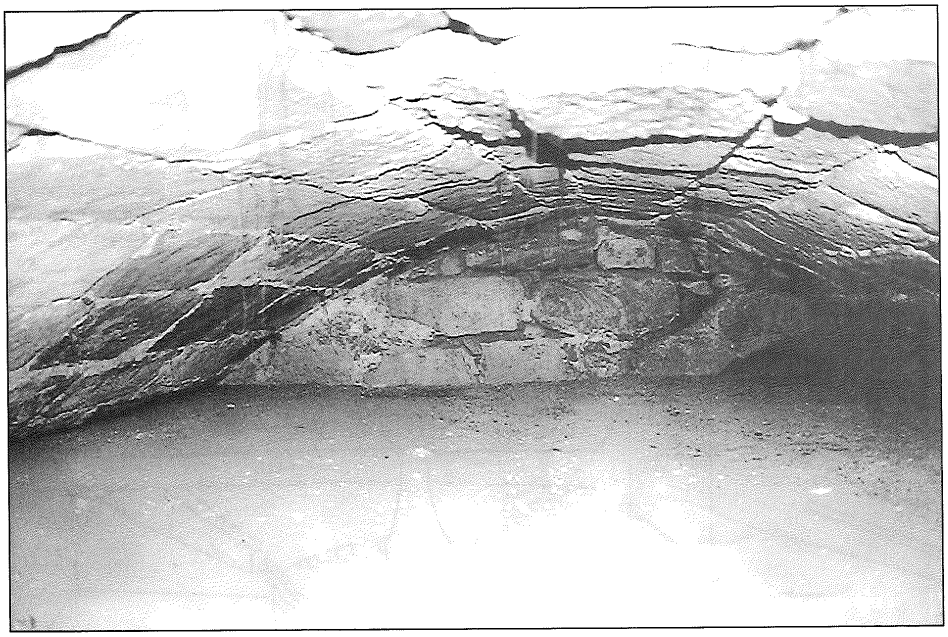
10. Trench VI, TES,. western wall of the room with upper and lower millstones.

not revealed fully during the excavation. It measured 1.4m in diameter and was 0.4m thick. It also had a central square hole 0.5m wide.

The mill base was sunk into a partly stone flagged floor (033) that had partly collapsed in the area immediately over the water chute. These stones were seen in the E side of the room, and the rest of the floor was a compacted brown silt (042).

The Mill Room had three plastered walls constructed of large ashlar stone blocks. The walls survived to about 3.2m high and the room was 4.8m wide. Both sidewalls (010 and 011) abutted the back wall (006), but this was thought to be a construction technique rather than evidence of a later phase. Wall (011) was 4.0m long and was butt ended. Wall (010) continued beyond the end of the trench and was therefore at least 5.5m long. No wall was seen on the fourth side at this level. Patches of plaster were noted on the inside walls, some of which carried small fragments of charcoal, potentially providing dates for plaster manufacture and indirectly the building *per se*.

In the eastern corner of the upper room there was a stone feature (034) sitting on the flagstone floor directly over the water chute. It was 1.2m long, 0.7m wide and 0.65m high. Two upright stones, with a gap between them of 0.2m, sat directly over the open chute and solid masonry filled the corner. This may be a secondary feature inserted into the corner of the room. To the NW of this feature there was a square-shaped gap in the stone floor that had been filled with compact plaster, which may have been the primary aperture, providing access to the water chute below. The reason why this aperture was blocked is uncertain at this stage. These features may have acted as some kind of sluice controlling the flow of the water (Mario Rizos pers. comm.) or to provide access for cleaning debris from the chute.



11. Trench VI, TES. The vaulted room below, with arched passage in the northern wall (044), right hand corner.

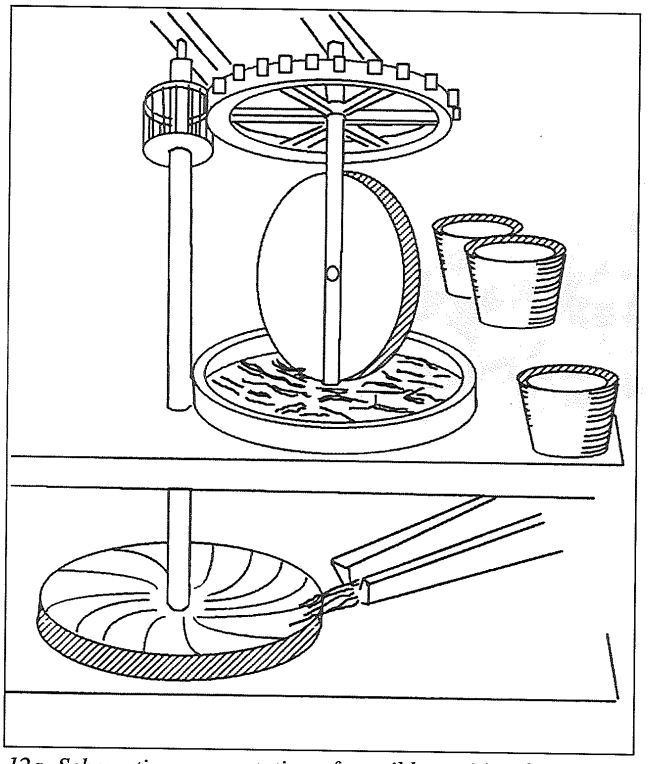
There are four probable beam slots within the sidewalls (038 and 039 in wall 011 and 040 and 041 in wall 010). These slots were 0.8 and 1.0m apart respectively and were about 2.8m above the flagged floor. They were in-filled with plaster that left cylindrical-shaped hollows extending back into the walls between 0.6m and 0.9m. At the back these were blocked by stone and plaster and so could not have been a water chute. The slots were not the same distance from the back wall 006 on either side of the room. Yet when a line was drawn from (041) to (039) and from (040) to (038) they passed directly over the centre of the beam slot. These features were therefore interpreted as beam slots that could have been used to support a bracing structure for the vertical mill-driving beam similar to the ones shown in **Figs. 12a and 12b** adapted from von Wartburg (2001: figs. 14 and 15) and deriving from two separate accounts dating to the late 15th and 16th centuries respectively. The hole in the flagged floor described as 'void' and originally thought to have been the result of robber activity, may actually have served as a passage for a beam rising from the Lower Room. However, until this is excavated (see below) this has to remain a conjecture. In brief, what **Figs. 12a and 12b** represent is two different positions for the gearing mechanism, one above the mill base and the other below the mill base. Gearing mechanisms are necessary if the revolutions/min. of the vertical stone are to be kept at a steady rate. Edge runner mills operating with the above gearing mechanism seem to have been the norm in sugar mills (von Wartburg 2001).

There was no evidence for water being supplied into the upper room, water being channelled under the flagged floor. However, this possibility cannot be ruled out because the section of the wall (006) had been destroyed by a robber's trench.

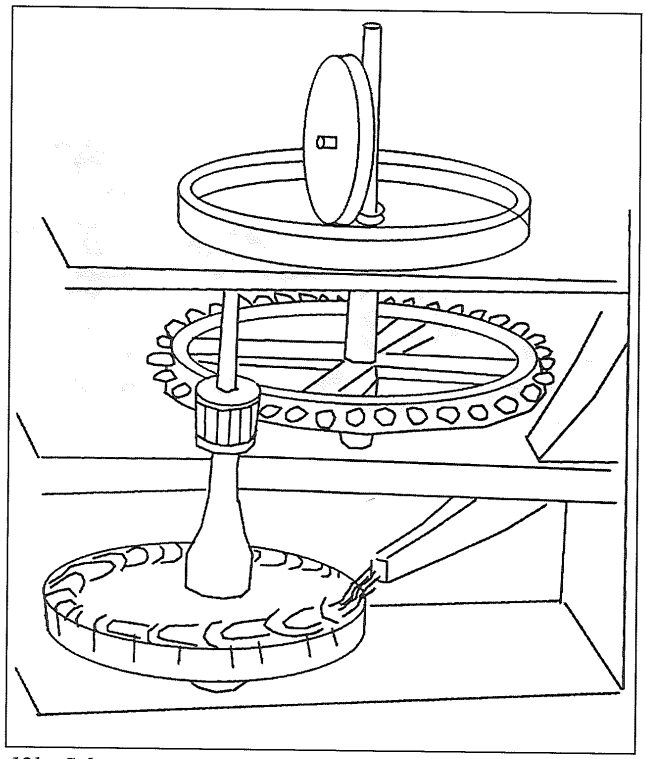
The Lower Room

The vaulted lower room was examined through the square holes in the mill base (**Figs. 8, 11**). This room had become filled with sand that had gradually fallen through these holes so that the entry of the water chute was not visible. The back wall (006) could be seen continuing down on the SE side, and to the NW another similarly built wall (044) could be seen, thus forming a lower room about 6.0m long. The top of an arch could be seen within wall (044), in line with the water chute, but could not be examined safely. There were two other gaps within the vaulted roof, both above the line of the chute. One was beneath the corner feature (034), but again it could not be examined safely. It perhaps related to the sluice above. The other gap, nearer to the mill base, measured 0.3 x 0.45m and was clearly part of the original vaulted structure. Although the roof of the vault was intact, the floor above this area had either collapsed or been destroyed.

It is clear that this vaulted room would have housed the wooden mill wheel, driven by water supplied through the chute. The mill wheel would turn a vertical beam, via a gearing mechanism. The vertical beam would have passed up through the central hole in the mill base and, in turn, driven the upper mill stone. The details of this mechanism will have to await further excavation to remove the sand and reveal any remains of the lower mill mechanism and gearing system. It is possible that all the wooden elements have been removed from



12a. Schematic representation of possible position for gearing mechanism lying above the mill base and driving the vertical wheel (adapted from von Wartburg 2001: fig. 15). This diagram accounts for the presence of two or more beams slotting in walls (010) and (011) respectively.



12b. Schematic representation of an alternative position for gearing mechanism lying bellow the mill base within the Lower Room (adapted from von Wartburg 2001: fig. 14). No overlaying beams appear to be necessary in this set up.

the site, but the stone floor, metal fixings, entry of the water chute and some indication of the architecture of the mechanism should be still intact.

The Water Chute

While the lower room housed the mill wheel mechanism, the water chute provided the water that drove it. The water chute (014) was constructed of a flat base and upright side slabs and plaster completing the channel (**Figs. 7, 10**). The chute was about 0.3m wide and 0.6m high (in cross section) and extended 4.2m from the back wall of the mill. There were no capstones over the chute except within the thickness of the wall (006). The central area of the chute was flanked on either side by two sloping areas of plaster about 1m wide and these were interpreted as overflow slipways. Up to five stone steps had been built into the sides of both slipways. A series of compact sand and gravel deposits (012, 021, 023, 022, 020 and 018) formed a wedge shape on either side of the chute, up against the wall (006). These may have been part of the construction of the mill or perhaps material deposited during the periods when water was running out of the chute over the slipways. The steps on either side of the chute would have provided access to the upper parts of the chute to deal with any blockages.

It is not clear the extent to which the combined drop of the chute from the top of the aqueduct to the mouth of the jet would be sufficient to drive the mill wheel.

Deposits post-Dating the Mill (**Fig. 8**)

Within the upper mill room a layer of compacted sand overlay the floor to a depth of about 0.4m (030) and in-filled the mill base (028). The hole through the mill base was packed with broken stones (including the half collar stone) and gravel (029). These layers were sealed by an extensive layer of sand and charcoal (025) that filled the room to a depth of up to 0.4m. A line of three stones (027) was seen above (025), in the N corner of the room. These stones, which appeared to be held together with compacted sand rather than being loose tumble, these may have formed the base of a small wall, or may be intentionally blocking the hole where the flagged floor had collapsed.

These deposits were then sealed by a thin layer of compacted sand containing mud brick and plaster (024). The surface of this layer sloped down slightly towards the N. The remaining deposit within the mill room consisted of a deposit of windblown sand (002) up to 2m deep. This sand contained dressed stones, plastic and foam pack-

ing. Two piles of collapsed dressed and undressed stones were found within the windblown sand (002) (008 and 009). The uppermost layer was a surface collection within the loose windblown sand (001) at a depth of between 0.1m to 0.5m. A large robber trench (005) about 2m wide and 3m long had been cut from the surface of (004) down through the deposits above the chute and removed much of the back wall of the mill (006) to just above the corner sluice (034).

A line of five rectangular stone blocks (007) were seen at the top of the excavated section of the chute which were thought to be the kerb of a modern path across the site.

The surface of the area between the kerb (007) and the surviving top of the chute (014) was strewn with collapsed debris consisting of sand, plaster, gravel, decayed mortar and sugar potsherds (003).

Burials

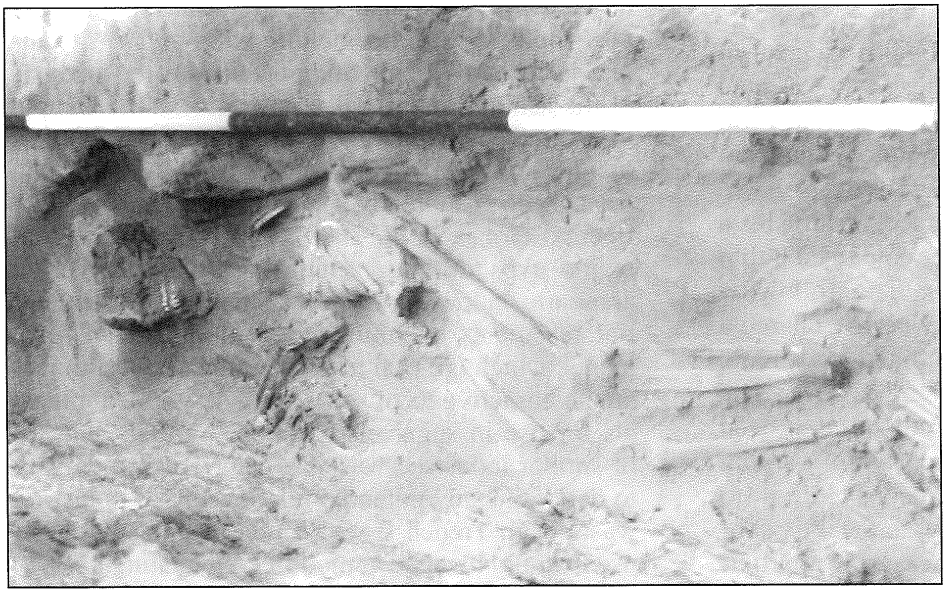
Burial (032) (**Fig. 13**): As the sand layer (030) was being removed from within the mill room an adult, probably female, skeleton (032) was discovered lying up against the back wall and over the floor (033). The body was extended, parallel with the wall, aligned SW-NE and with the head in the SW, facing SE. A broken flagstone had been used as a headstone and another broken paving slab was found beneath the knees. The body was adorned with five glass bracelets, three of which were complete (**Fig. 14**); several iron bangles, none intact; a finger ring and a bead necklace made up of several coloured beads of different shapes, including white, black, amber and green. This burial had to be excavated rapidly before the end of the day because of the threat of tomb robbers. The artefacts from this burial suggested that it might be 15th or 16th century in date (A. McQuitty pers. comm.).

Burial (031): The skeleton of a small child (031) was found within the sand (030) at the same level as burial (032), at a distance of 2.5m, to the NW. This skeleton lay parallel with (032) with its head against the side mill wall (011). Only a sherd of sugar pot accompanied the grave. This grave was broadly contemporary with burial (032).

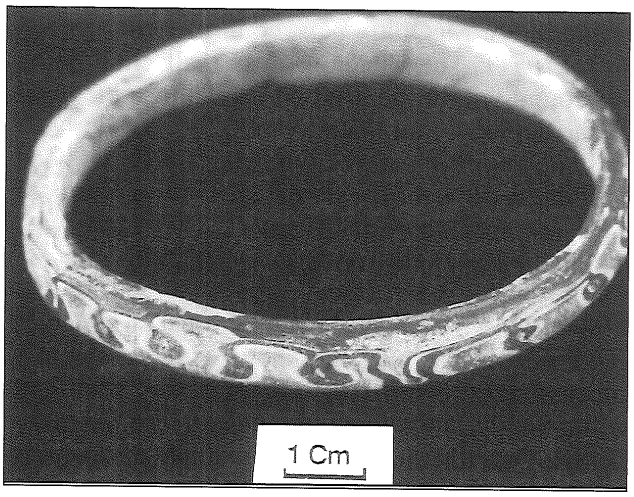
Burial (017): The partial skeleton of a small child was found to the S of the chute within a shallow cut made into layer (016). The body had been laid with a SW-NE alignment, the head to the SW, facing SE. Only the head and upper torso survived as it had been truncated below the third rib by a robber trench (005). The burial was sealed by layer (015), which contained charcoal and plastic and was thought to be fairly modern so it was re-buried nearby.

3.2.2 Trench II (**Figs. 15, 16**)

The purpose of Trench II was to investigate the nature and contents of the main waste heap in an attempt to shed light on the sugar production and refining stage. Trench II was located at the extreme northern end of a fenced off area around TES. The trench which extended an existing robber trench on the N-facing slope of a large waste mound with visible stratified remains, was orientated approximately N-S, measured 3.6m long by 1.2m wide and was excavated over 9 days. The depth varied from 1.7m in the S to 0.5m in the N because of the steep slope of the waste dump. Samples of pottery, charcoal, ashes and waste materials relating to refining were collected during excavation of the trench and also, once excavation was complete, from the east-facing trench section.



13. Burial (032), Trench VI; TES; skeleton of adult female.



14. Trench VI, TES; glass bangle from burial (032).

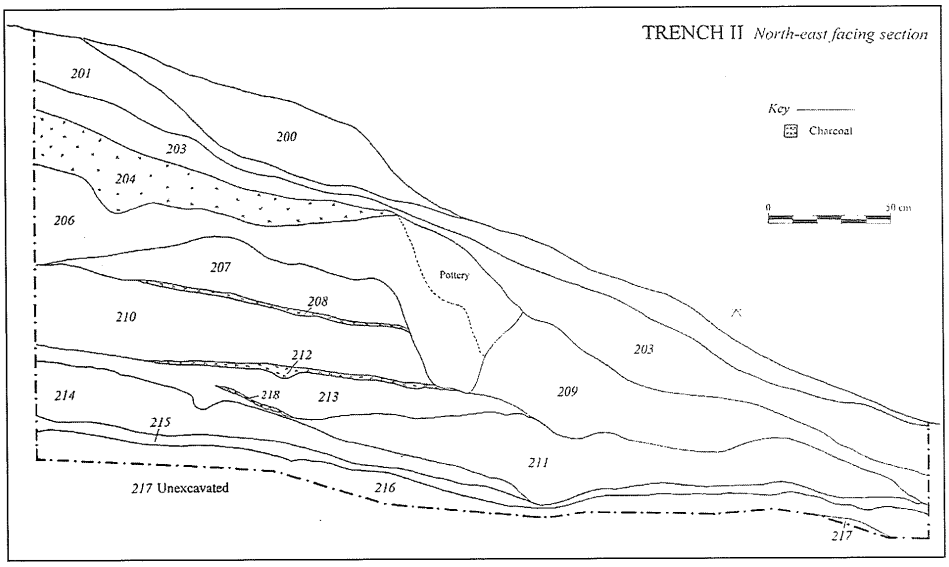


15. Trench II, TES; the waste heap. View from the northeast

In general, the layers within the waste dump sloped down from the S to the N following the slope of the surface (see **Fig. 16**). The basal layer within Trench II (217) consisted of sand and gravel with very dense vein-like patches running throughout and extended over the entire length of the trench. This layer was not fully excavated and so its depth is unknown. It was sealed by a relatively compact ash layer (216), a thin compact deposit of industrial waste (215) and another layer of sand and gravel (214), which thinned out about 1.4m from the N end of the trench. A dump of exclusively sugar-pot sherds (211) up to 0.35m deep sealed these layers. Layer (211) was sealed in turn by a layer of industrial waste (213) that contained a thin lens of charcoal and ash (218). The following layers alternated between thin layers of charcoal and ash with thicker layers of sand and gravel and sugar-pot sherds (212, 210, 208 and 207). The southern edge of these layers had collapsed or been truncated. Layers of adobe brick with varying amounts of pottery were then deposited up to depths of 0.4m (209 and 206). A large block of compact white industrial waste, measuring approximately 0.3m by 0.25m, lay on the surface of (206) and was then sealed by a layer of charcoal and ash (204) which was noted in the southern half of the trench only. Overlying this was a compact ash and sand layer (203) containing a circular patch of charcoal and ash (202), probably the remains of a small fire that did not extend into the section. The upper layers (201) and (200) consisted of loose topsoil and the spoil from the robber trench respectively.

Excavation of Trench II revealed the following general groups of deposits: a) charcoal and ash layers; b) sugar pot sherds; c) clay-rich (of the mud brick type) layers with or without pottery; d) sand and gravel; e) off-white powdery materials identified as industrial waste and distinct from charcoal and ash layers. The pottery that was recovered from Trench II was predominantly from pots relating to the sugar production process in the Near East and Western Europe well into the 18th century (**Fig. 17**), sphero-conical shaped pots into which sugar crystallised and excess liquid with uncrystallised matter dripping in the jars below (Lagro and de Haas 1990). Sherds were found in nearly all of the contexts but were recovered in largest numbers from the potsherd dumps (206) and (211). They appear to have been broken up after use. Apart from the well-recognised two types, fragments of bucket-like ceramic vessels were identified. There were very few domestic artefacts. The pottery, both domestic and industrial, will in due course, be the subject of a separate investigation.

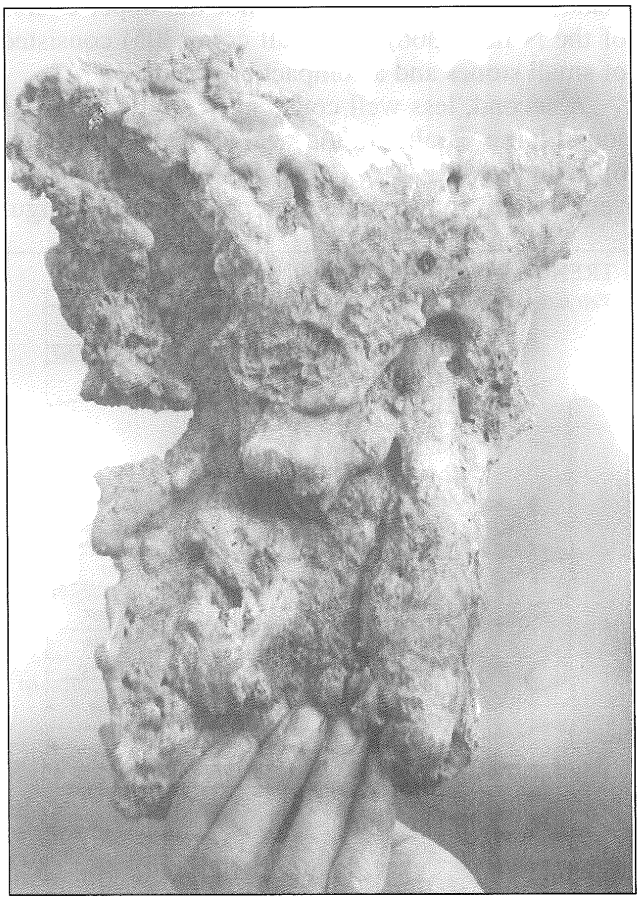
There was overall a large concentration of ashes and industrial waste confirming that this area of the site was being used primarily for dumping waste from the sugar production, or perhaps other industrial processes as well (a smithing hearth bottom was recovered as surface find from the waste heap in May 1997; see also **Fig. 18**). Analysis of charcoal (both for species identification and C-14 dating) is currently being undertaken as is the analysis of the ash and industrial waste contexts. A sample of unstratified white debris resembling the contents of (215) from a robber tomb to the south of the waste heap has already been analysed by X-ray diffraction (Jones *et al.* 2000), and found to contain major gypsum with minor bassanite, anhydrite, aragonite, calcite and quartz. This composite material resembles the mineralogy of the Lisān sediments, which are rich in aragonite and gypsum and are an attractive local source of fine-grained minerals for use in sugar clarification. Further analyses of similar industrial wastes are currently underway to determine any potential relationship of industrial waste from Trench II with Lisān sediments that, if used, would have been modified by heating.



16. *Trench II, TES; the waste heap . Northeast facing section.*



17. *Sugar industry related pottery fragments; surface finds, Trench II, TES.*



18. *Kiln wall waster, surface find, TES Trench II.*

3.3 The Excavations at KSI

3.3.1 The City Enclosure Walls

The substantial walls at KSI revealed by the excavations of Waheeb (1995), evident on the surface to the NW and N, were surveyed during Phase I of the project. In January 2002 a few days were spent clearing off loose sand and modern debris from these walls in order to expose more of their extent so that they too could be surveyed. These have been referred to in this report as Wall 1 and Wall 2 respectively (see **Fig. 5b**).

A corner was identified just east of Trench III and a new line of walling was uncovered approximately parallel with Wall 2 (Wall 3, see **Fig. 5b**). In the N part of the site the walls appeared to continue beneath an increasing depth of deposits and so could not be examined further. No substantial walls like those in Trench I and III have yet been found at the E end of the site, the walls within Trenches IV and V being much narrower and of less massive construction. So while Walls 1 and 2 may constitute external city boundaries, the east and northern extents of the city have not been defined.

3.3.2 Trench III

Trench III was located at the E end of a visible line of walling which corresponded with an anomaly noted in the geophysical survey. Trench III, measuring 4 x 4m, was dug to a maximum depth of 3.2m over a period of 17 days. Initially the whole

trench was excavated, but when the full width of a substantial wall (304) was revealed, the excavation continued on the S side of this wall, leaving the N side unexcavated. In order to reach the deepest layers possible within the time available, it was later decided to excavate the SW corner leaving the SE corner as a higher step.

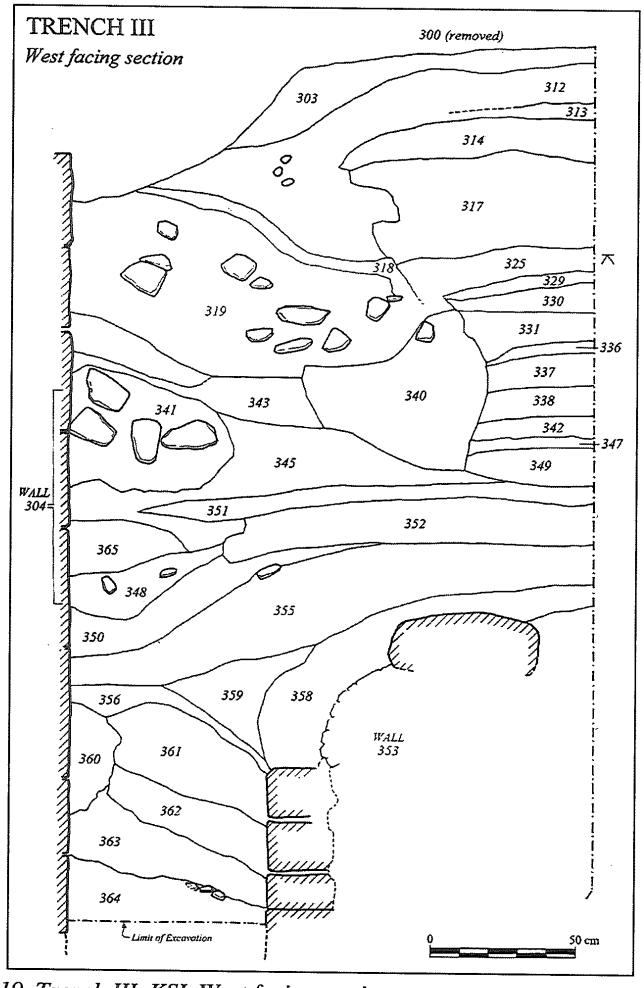
The most remarkable feature of this trench was the massive stone wall (304), 1.5m wide, that extended across the whole width of the trench equivalent to Wall 2. Wall 304 was constructed of large squared blocks, some up to 0.9m long, in nine well-laid courses, which were exposed to a maximum height of 2.95m. The face of the two basal courses of this wall was rougher than the upper courses, and they were covered with patches of plaster. There were no architectural features within the revealed face of the wall (304) nor the upper course of the N face (306). The wall core (305) consisted of small stones and a compact brown matrix.

A second, less well constructed, wall (353) was found lying parallel to the wall (304), at a distance of 0.7m (see **Fig. 19**). One face of the wall was revealed up to five courses high constructed of angular and rounded stones topped with rubble. This wall was about 1m high and at least 1.5m wide. It was seen for a length of 1.5m. The bottom of the wall was not excavated, and there was no evidence to suggest the relationship between these two walls.

The gap between the walls was filled with five layers of compact soil varying in colour from grey to yellow brown (364, 363, 362, 361) to a depth that varied from 0.5m in the W to 0.75m in the E. These layers abutted the walls on either side and sloped slightly towards the wall (353). Within layer (361) there was a linear feature, probably an animal burrow (360), consisting of a loose brown soil against the wall (304).

These deposits were sealed by a layer of dark brown and grey layer of ash and charcoal (356) up to 0.1m thick, which in turn was sealed by layers of compact yellow soil (358) and loose stones (359), which appeared to be spreading from the wall core.

The wall (304) is part of a more extensive line of walling (Wall 2), extending from what may be an entrance to the W, with an E-W alignment (**Fig. 20**). The wall was found to continue to the E of Trench III just beneath the surface. There were no architectural features that could help to date the wall, but it probably belongs to the middle Islamic



19. Trench III, KSI. West facing section.



20. Trench III, KSI: Wall 2 with ashlar masonry, view from the south.

period of the town, perhaps forming the north side of the main street through the city. This wall could be the outer wall of a substantial building, but because its interior has not yet been examined the nature of occupation remains unknown.

The relationship between the two walls (304) and (353) was not resolved within this trench. If the wall (353) predates the construction of the city wall (304), then it is possible that the surface (355) forms a street level, and the courses of wall (304) below this are foundation, with intentional infilling of the space between the two walls. The compact nature of the deposits between the walls does suggest intentional infilling rather than natural silting. However, if the wall (304) predates the wall (353), it would suggest an alteration to the original town layout, with the construction of a structure right across what would have been the street. It is also possible that these walls were in contemporary use, the gap forming a passageway only 0.7m wide.

The upper layers are likely to be deliberate deposition of occupation debris consisting of wood ash, charcoal, carbonised seeds and midden material, especially mammal bone with some windblown element. These deposits are consistent with the use of this area as an open space, perhaps a yard, rather than the interior of a house. In particular the burial of disarticulated camel bones and the complete body of a small mammal, probably a dog, also supports this interpretation. The pottery will help to provide a chronological framework for this period of deposition. This trench has highlighted the excellent survival of the massive walls, which are of middle Islamic date and another less well-built structure at depths of up to 3.2m below the surface.

The trench did not uncover the anomaly produced by the geophysical survey. However, there was a wall constructed of rounded boulders just at the N edge of the trench, at a depth of about 0.6m below the surface. This wall contained plastic, which would suggest that it is relatively modern. All the deposits within the trench, above and below this wall, consisted of silt with pottery and small amounts of other domestic debris, which suggests that these are layers of occupation debris. All layers excavated within this trench are thought to be modern (i.e. post 1918).

3.3.3 Trench I

Trench I was located about 50m to the N of the main road (**Figs. 5b, 21**). The trench location corresponded to a geophysical anomaly and was also in line with Wall 1. The trench measured 4 x 4m and was dug to a maximum depth of 1.1m over a period of 17 days.

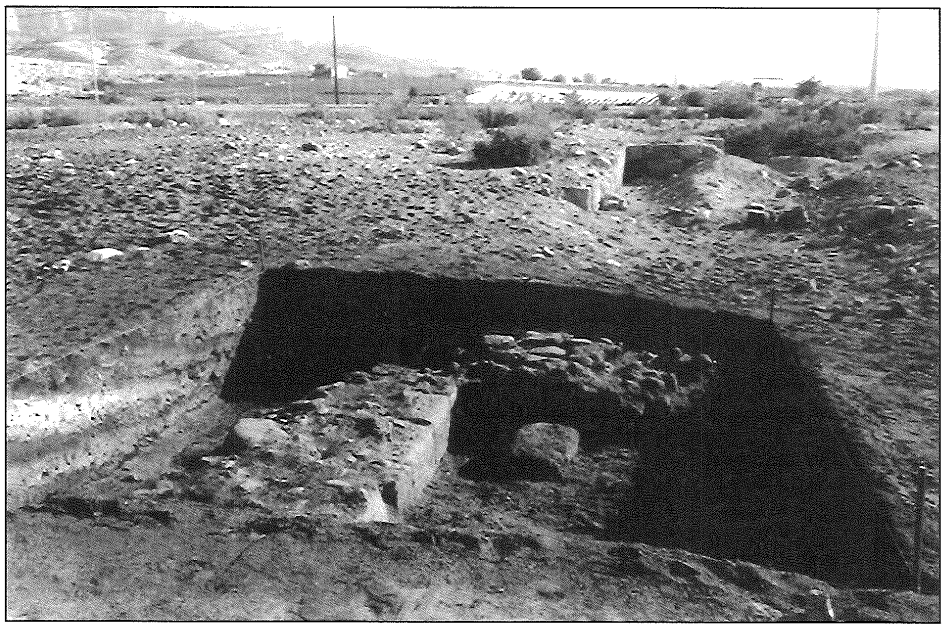
The earliest feature within this trench was a substantial L-shaped wall (109 and 108), the N-S element of which (109) continued the line of Wall 1. Its two outer faces consisted of two courses of rectangular stone blocks with a rubble and mortar core. It measured 1.5m wide and was exposed to a height of 0.7m. A single face of a perpendicular arm of walling (108) was exposed for at least 2.2m to the W of (109). The foundation levels of these walls were not exposed within this trench. This corner of walling formed by (108) and (109) could have been part of a square foundation for a bastion, tower or the entrance to a substantial building.

Several layers of ash had been deposited within the corner formed by (109) and (108). These layers sloped gently downwards towards the W part of the trench. The lowest layer excavated was a loose brown ash (114) with a circular bread oven (*ṭābūn*), on its surface (115). This oven was 0.6m in diameter and was 0.1m deep. The base of the oven consisted of small pebbles. These types of small quartz pebbles originate from the bottom of wadis and are chosen especially for bread oven construction as they do not crack when heated (H. Hijazeen, pers. comm.). The domed-shaped sides of the oven had collapsed. This feature was sealed by further ash deposits to a depth of 0.6m (113, 111 and 112). To the E of wall (109) a single layer of ash (105) was identified. These ash layers and the top of the wall (109) were sealed by a layer of brown ash and plaster fragments (107). Further layers of ash then sealed both ash layers and the wall up to the present ground surface (110, 106, 104, 103, 102, 101 and 100). Two of these layers consisted of white/grey ash (102 and 104) while the rest were brown.

This trench has provided evidence that the line of Wall 1 continued further north beneath layers of ash. It has also shown that there is a possible bastion, tower or substantial entrance located here. A similar square feature was exposed during the earlier excavations of Wall 1 and this protruded about 2m W of the wall line and was approximately 5m long. Wall 1 and Wall (109) are not in line with the north-south Wall 2, which is located further N. Wall 2 is also aligned N-S but about 2m further E. Wall (108/109) here in Trench I was of the same construction and width to Wall 2 exposed in Trench III.

These excavations did not provide any direct dating evidence for the construction of these walls, as the foundations were not exposed and there were no distinctive architectural features, however it is thought that they are probably Islamic.

The presence of the oven within the corner of



21. Trench I, KSI,: corner of walls (108) and (109) with Wall 1 in the background.

the wall indicates a definite occupation horizon, probably dating from the middle Islamic to Modern times. This indicates that the massive walls were still being used within the later settlement. After the buildup of several layers of ash and occupation debris (layers 113, 111, and 112), there was an episode of destruction (107), perhaps when the walls were bulldozed in the 1980's. Further ash layers were then spread over the area from the NE, perhaps by bulldozer, in order to level the site for agricultural use (layers 110, 106, 104, 103, 102, 101 and 100).

3.3.4 Trench VII

Trench VII was excavated at KSI approximately 60m north of the main road to investigate a surface spread of kiln wasters and an anomaly noted by the geophysical survey. Trench VII measured 4 x 4m and was excavated to a maximum depth of 0.9m. The presence of the dumps of sugar pottery fragments at the W end of the trench are interesting as this material is associated with the sugar processing and it is likely that they were dumped here after use. It is possible that they are wasters that were never used, however the excavators did not notice any particularly misshapen or badly fired sherds to support this. Closer examination of the sherds and comparison with the sugar pot recovered from Ṭawāḥīn as-Sukkar will help to resolve this. Of equal importance were the kiln wall wasters recovered in association with the sherds suggesting that a demolished kiln had been somewhere in the vicinity, but unfortunately, the site was not located within this trench.

Two more trenches (Trenches III and IV) were excavated at KSI, and the results presented in the Data Structures Report (James 2002).

4.0 DISCUSSION

Having set forth the results of this pilot season of excavations and those of the geophysical surveys, a select number of themes relating to the industry are now explored.

a) Energy Resources and Water Management

Assuming that there has been no significant climate change in the last few thousand years, the only viable source of water for power and irrigation would have been Wādī al-Ḥasā, which provides the present-day source of water for domestic and irrigation purposes. Assuming that the wadi was tapped, probably with the aid of a reservoir at about the same altitude as the present reservoir, the water would have to have been conducted in a channel that followed the contours of the southern slopes of the broad mouth of the Wādī al-Ḥasā westwards to the sugar mill. This is possible, via two routes whose channels are nowhere evident in view of the extensive road, housing and water management development in the area, not to mention tomb robbing.

The water from the wadi would have been required to arrive at the same elevation as the two aqueduct channels. It could have come around the small knoll to the south of TES on either side (the south or the north aqueduct channel), but the northerly route seems to be more likely unless there was a reservoir required to control the flow rate, in which case the water would have been better provided around the southern side of the knoll (see **Fig. 3**). Accurate surveying of elevations at key po-

sitions will be required to assess the route of the channel and the hydraulic head. In any case it is unlikely to be more than a few metres. The waterpower for the mill would presumably have depended almost entirely on the drop between the top of the aqueduct at the mill and the horizontal wheel that was water-driven. Assuming there was an ample supply of water in the channel or canal from the wadi, the feed down the aqueduct chute could have been controlled by diverting the water at the top (inlet) of the mill.

b) Soil Parameters Affecting Crop Cultivation

The sitting of the sugar mill was evidently influenced by the topographic break occurring close to an area on the alluvial fan, with soils rich enough and well drained for sugar plantation development and presumably close to an already established settlement site at KSI. But other considerations would have been the availability of waterpower and other natural resources required for the sugar industry.

Regarding agricultural potential in the area, this can be assessed in relation to three distinct physiographic sub-divisions corresponding to those recognised in the area of the southeast Dead Sea by Shammoot and Husseini (1969): Upland or Old Alluvial Fans; Recent Alluvial Fans and Flood Plains; and Basin.

The higher ground especially to the south of the present-day aṣ-Ṣāfī plantations is underlain by bouldery/pebbly alluvium of 'Old Alluvial Fans' and is either wasteland, burial grounds for the Early Bronze Age cemetery or currently used for building development. The soils here, of the Grey Brown Desert Soil Group, are loose and permeable but in general not suitable for agriculture because of the steep topography.

The large 'Recent Alluvial Fan' on which the irrigated plantations of aṣ-Ṣāfī are currently situated (**Fig. 2**) has soils that are also of the Grey Brown Desert Soil Group. These are medium to light textured, well drained with fair to moderate water holding capacity and are the best agricultural soils in the area (Shammoot and Husseini 1969). The topography is slightly undulating and gently sloping. We can therefore assume that the extensive area of the alluvial fan was available for agriculture at the time of the sugar industry but plantations would have required an ample water supply. Lower ground closer to the wadi would therefore presumably have been more convenient for development of the plantations. The plantations could have been situated conveniently, near the wadi to the east and north of the mill, their precise location being decided by the irrigation pathways existing at the time.

Finally the 'Basin' soils range from loamy sand to heavy clay, with permeability from slow to rapid; they are strongly saline, alkaline and black and they are not suitable for current irrigation procedures (Shammoot and Husseini 1969). The low ground between the large alluvial fan developed at the mouth of Wādī al-Ḥasā and the Dead Sea shore (**Fig. 2**) belongs to this category. This flat shore of the Dead Sea has increased in area due to exploitation of salt to the extent that the southern Dead Sea basin is now almost entirely composed of human-made salt pans. The proximity of the Dead Sea shore to the fertile alluvial fan during the lifetime of the sugar industry is currently unknown.

c) Industrial Minerals Potentially Used in the Sugar Industry

The fine-grained gypsiferous and calcareous Lisān sediments provide a substantial source of minerals with industrial potential. X-ray diffraction analyses of several samples confirmed major aragonite, $CaCO_3$, with minor calcite, $CaCO_3$, gypsum, $CaSO_4.2H_2O$ and quartz, SiO_2. Calcium carbonates and sulphates have a use in sugar processing as well as in wine clarification. Furthermore, gypsum is a natural anti-caking agent and is used in cement for example to prevent setting. Sugar probably also would have benefited from an anti-caking agent during transport if in powder form. Gypsum was observed to occur in small veinlets but is also reported to occur in distinct beds in the Lisān sediments. Salt from the Dead Sea was obviously readily available for local use, but we do not know of any special use of salt in the sugar industry.

d) Clay for the Pottery Industry

Clay for the large amounts of specialised pottery and building stones for the sugar mill and related structures are obvious important requirements for the establishment and functioning of the sugar industry in Ghawr aṣ-Ṣāfī. Regarding clay resources, there was an ample convenient source of alluvial soil for pottery and bricks in the main channel of Wādī al-Ḥasā, that would usually have been occupied by a small stream or isolated ponds of standing water replenished during flash floods. This type of clay deposit can still be seen in the wadi in places and is also likely to have been available within the al-Ḥasā alluvial fan whenever major irrigation channels were produced, as these would have allowed ponding of floodwater and accumulation by settling of fine sediments. One such deposit lying one kilometre due west of TES and favoured

by the local inhabitants for constructing bread ovens was sampled.

e) Kiln and Hearth Wall Wasters and Sugar Industry Pottery Wasters

Two trenches (II at TES and VII at KSI) produced most of the pottery wasters. Trench VII not only revealed a substantial amount of sugar mould pottery fragments (James 2002) but also intriguingly, kiln wall wasters. A distinction should be made between the kiln wasters in Trench II, which derive from the lining of the hearths in which the juice boiled and those from Trench VII at KSI, which appear to belong to a proper pottery manufacturing kiln. The raw materials used for the two different structures are expected to be similar.

f) Building Stone Source

The sugar mill and the stonework of the buildings of KSI required building stones of a substantial size. Boulders of a convenient size for building, though rather rounded and hard, appear to be scattered through the sediment of the alluvial fan of the al-Ḥasā but are abundant and readily available in the dry riverbed itself. Larger blocks of sandstone and limestone, more convenient for shaping into dimension stone are also present in the alluvial sediments. The reddish 'Nubian' sandstone outcrops in the walls of the Wādī al-Ḥasā and would have been easy to quarry if shaped and dressed blocks were required. Limestone for mortar is available in the higher areas to the east as well as in blocks washed down the wadi. However, the calcareous Lisān sediments outcrop not far away at the southern end of the Lisān peninsula and probably elsewhere even closer along the eastern shore of the Dead Sea. These are easily worked soft, fine-grained, homogeneous sediments providing a supply of calcium carbonate that would have been suitable for producing lime for mortars and plasters. Since the sediments also contain gypsum, they may have been particularly suited to this purpose.

g) Sulphur and Geothermal Energy

Since other minerals could well have been required, consideration has been given to materials known historically to be associated with the southern Dead Sea or were potentially locally available such as sulphur, bitumen and evaporitic minerals. Elemental sulphur has had a long historical association with the Dead Sea area and was found as pellets evidently weathering out of the Lisān sediments of the Lisān plateau. The pellets were not observed *in situ*. They probably occur scattered through certain layers rather than as substantial concentrations, and so only small amounts of such sulphur would have been available for exploitation. The sulphur could have been used for lighting and medical applications, and it may have been employed in sugar refining. Bitumen is similarly well known historically to have occurred as seepages into the Dead Sea, but we did not observe any signs of bituminous seepages or residues. The Dead Sea graben is geothermally active with warm springs and rocks exposed along the eastern coast show localised evidence of hydrothermal alteration. These areas are potential sites of small deposits of sulphur and sulphates including alum group minerals: yellow crystals of tamarugite, sodium-alum, $NaAl(SO_4)_2(H_2O)_6$ was recovered from one locality and identified using powder X-ray diffraction.

h) Mill Construction

It is with the excavation of the Lower Room that the mechanism of operation of the vertical mill stone will be clarified. "Blueprints" from 15th and 17th century plans of sugar industry establishments provide a frame of reference for the possible location of the gearing mechanism. This could have been placed either above (**Fig. 12a**) or below (**Fig. 12b**) the mill base. Both options are presently viable for TES although the former may be favored on account of the beam slots in walls (010) and (011). The waterpower available to drive the wheel will be assessed once the total drop can be measured, from the top of the mill chute to the floor of the Lower Room.

i) City Boundaries and Type of Buildings

Geophysical survey revealed the location of a number of wall sectors at potentially two different orientations, E-W and NW-SE. The examination of the rich artefactual evidence from KSI with particular reference to the pottery, metal, glass, botanical and animal bone remains will be studied in the post-excavation phase. In setting in perspective the archaeological evidence, KSI has certainly produced evidence commensurate with the famed importance of historical Zoara/Zughar. Perhaps it is important to remember that in medieval times the Dead Sea was called the Sea of Zughar.

j) The Sugar Mill

A materials oriented industrial archaeology approach to one of the most important industries in the Near East, i.e. sugar manufacture, is undertaken here for the first time. The results of the pilot season of excavation revealed very good state of preservation of the 'Mill Room' and potentially of the

Lower Room as well. The aim is to excavate and study each stage in the sugar making process in a stepwise manner, as outlined in the introduction. The sugar refining stage is tackled by the scientific analysis of the stratified contents of the waste heap (work in progress). However, apart from the study of the industry, a number of other issues have to be taken into consideration. The upstanding adobe brick walls of the later Ottoman fort are in need of consolidation, while the numerous robber trenches need to be filled in since they undermine the foundations of both stone and adobe brick upstanding walls. A parallel course of consolidation, excavation, study and restoration is therefore advocated and, assuming funding and relevant permits are in place, will be set in place. A preliminary phase of conservation work has started with the filling-in with windblown sand of robber trenches within TES. The locations of all robber trenches had already been recorded on the site plan in the course of the excavations, for future reference. A preliminary phase of experimenting with materials to be used for adobe brick wall conservation is already implemented; a summary is given below.

Conservation Programme

The conservation of the substantial standing remains at Ṭawāḥīn as-Sukkar was undertaken immediately after our excavation season. First, robber trenches that undermined foundations of both stone and adobe structures, were filled in with the top layer of wind-blown sand cleared from Ṭawāḥīn as-Sukkar. Most vegetation growing, and consequently damaging the site, was also removed.

The second, more long-term work begun was the consolidation of all standing and/or exposed structures (as a result of archaeological excavations). Adobe brick and mortar samples were taken, and after a series of experimental mixtures made by conservator Stephania Chlouveraki, they were tested and finally chosen to be used on Ṭawāḥīn as-Sukkar. Four local workers trained at the Sanctuary of Lot project were employed to carry out the consolidation work during 2002. The costs for this were covered were covered jointly by the Department of Antiquities and our project.

Acknowledgments

The authors are indebted to the following organisations for their financial support: Society of Antiquaries of London, The Carnegie Trust for Scotland, Glasgow University Department of Archaeology, Scottish Analytical Services for Art and Archaeology, The Seven Pillars of Wisdom Trust, the Hellenic Society for Near Eastern Studies and Messiers Fadi Ghandour and Mohaned Malas. We would like to thank the Department of Antiquities and in particular Dr. Fawwaz al-Kraysheh, Dr. Ghazi Bisheh and Dr. Mohammad Najjar for their support and the Department's representative Mr. Husam Hijazeen for his invaluable assistance in the field; also Ms. A. McQuitty, Mr. M. Rizos, Ms. E. Stern and the late Jerry Hamer for their contribution in the form of discussions and comments. The trench supervisors were: Husam Hijazeen (Trench 1), David Sneddon (Trenches II and VII), Arwa Badran (Trench III), Sarah Phillips (Trench IV), Amanda Kelly (Trench VI) and Ghassan Nasser (Trenches VI and VII), and J. Arthur, R. Ruiz Nieto, S. Chlouveraki and G. Tompsett also provided technical support. Figs. 7, 8, 16 and 19 were drawn by C. Evans.

E. Photos-Jones
Scottish Analytical Services for Art and Archaeology
Glasgow - UK

K.D. Politis
Hellenic Society for Near Eastern Studies
Athens - Greece

H.F. James
Glasgow University Archaeology Research Division
Glasgow - UK

A.J. Hall
R.E. Jones
Department of Archaeology
University of Glasgow
Glasgow - UK

J. Hamer†

References

Abu Dalu, R.
1995 The Technology of Sugar Mills in the Jordan Valley during the Islamic Periods. Pp. 37-48 in *SHAJ* 5. Amman: Department of Antiquities (Arabic).

Albright, W.F.
1924 The Archaeological Results of an Expedition to Moab and the Dead Sea. *BASOR* 14: 1-12.

Boas, A.J.
1999 *Crusader Archaeology: the Material Culture of the Latin East*. London: Routledge.

Bremner, D.
1869 *The Industries of Scotland: their Rise, Progress and Present Condition*. 1969 reprint. Wiltshire: Redwood Press Ltd.

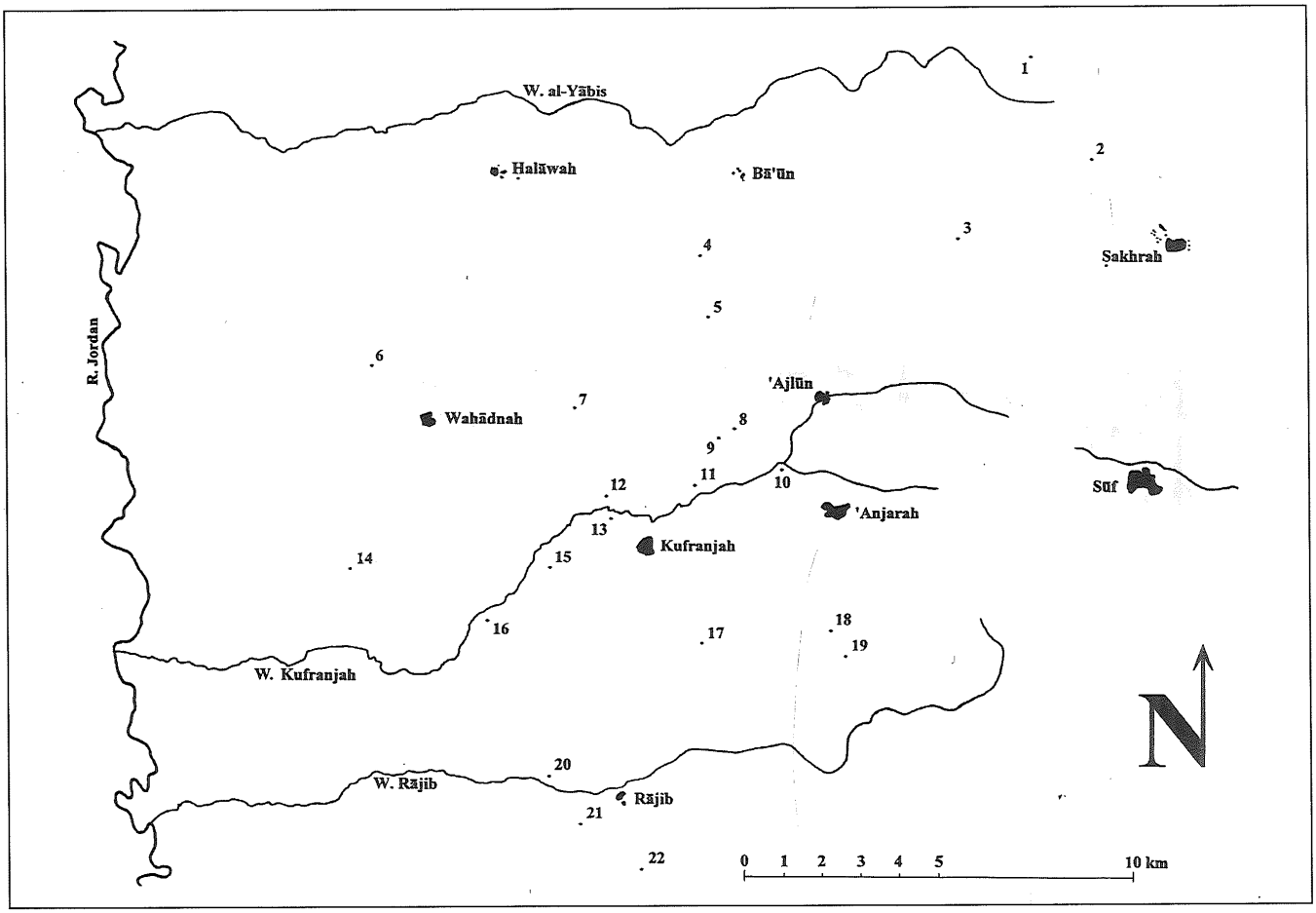
Clow, A.C. and Clow, N.L.
1952 *The Chemical Revolution: a Contribution to Social Technology*. London: Batchworth Press.
Conyers, L.B., Ernenwein, E.G. and Bedal, L.A.
2002 Ground-penetrating radar discovery at Petra, Jordan. *Antiquity* 76: 339-40.
Frank, F.
1934 Aus der 'Araba I Reiseberichte. *ZDPV* 57: 213-280.
Glueck, N.
1935 *Explorations in Eastern Palestine II. AASOR* 15 (for 1934-35).
Hall, J.K.
2000 *The Holy Land Satellite Database Project. Geological Survey of Israel Report* GSI/15/2000
Hamarneh, S.
1977-8 Sugar Cane Cultivation and Refining under Arab Muslims during the Middle Ages. *ADAJ* 22: 12-19 (Arabic).
James, H.
2002 *Tawahin as-Sukkar & Khirbat ash-Shayk 'Isa: The Excavations in January 2002, A Data Structures Report*. SASAA 17.4. Glasgow.
Jones, L. and Scard, F.I.
1909 *The Manufacture of Cane Sugar*. London: Edward Stanford.
Jones, R.E., Tompsett, G., Politis, K.D. and Photos-Jones, E.
2000 The Tawahin as-Sukkar and Khirbat ash-Shaykh 'Isa Project Phase I: The Surveys. *ADAJ* 44: 523-534.
Khouri, R.G.
1988 *The Antiquities of the Jordan Rift Valley*. Amman: Al-Kutba.
King, G.R.D., Lenzen, C.J., Newhall, A., King, J.L. and Deemer, J.D.
1987 Survey of Byzantine and Islamic Sites in Jordan. Third Season Preliminary Report (1982), The Southern Ghor. *ADAJ* 31: 439-459.
Kyle, M.G. and Albright, W.F.
1924 Results of the Archaeological Survey of the Ghor in Search for the Cities of the Plain. *Bibliotheca Sacra* 81: 276-291.
Lagro, H.E. and de Haas, H.
1990 *Sugar Pots: a preliminary study of technological aspects of a class of Medieval industrial pottery from Tell Abu Sarbut, Jordan*. Newsletter, Department of Pottery Technology, vol 7/8 - 1989/90, University of Leiden, The Netherlands.
MacDonald, B., 'Amr, K., Broeder, N., Skinner, H.C.W., Meyer, C., Neeley, M.P., Reese, D.S. and Whitcomb, D.S.
1992 *The Southern Ghors and Northeast 'Arabah Archaeological Survey*. Sheffield Archaeological Monographs 5. Sheffield: Collins.
MacDonald, B.
2000 *East of the Jordan: Territories and Sites of the Hebrew Scriptures*. Boston: American Schools of Oriental Research.
Papadopoulos, T.J., Kontorli-Papadopoulou, L. and Politis, K.D.
2001 Rescue Excavations at an-Naq' and Tulayat Qasr Musa Hamid. *ADAJ* 45: 189-193.
Peled, A.
1999 The Local Sugar Industry under the Latin Kingdom. Pp. 251-257 in S. Rozenberg (ed.), *Knights of the Holy Land, the Crusader Kingdom of Jerusalem*. Jerusalem: The Israel Museum.
Politis, K.D.
1998 Survey and Rescue Collections in the Ghawr As-Safi. *ADAJ* 42: 627-634.
1999 The Sanctuary of Agios Lot, the City of Zoara and the Zared River. Pp. 225-227 in M. Piccirillo and E. Alliata (eds.), *The Madaba Map Centenary (1897-1997): Travelling through the Byzantine Umayyad Period*. Proceedings of the International Conference Held in Amman, 7-9 April 1997. Jerusalem.
Rast, W.E. and Schaub, R.T.
1974 Survey of the South-Eastern Plain of the Dead Sea 1973. *ADAJ* 19: 5-53.
Shammoot, S. and Husseini, K.
1969 Part I: Soil and Land Resources in Jordan. *Land and Water Use in Jordan*, paper submitted to the Near East Land and Water Use Meeting, Amman, May 1969: 89-94. Amman: Al-Hurieh Printing Press.
Stern, E.J.
1999 *The Sugar Industry in Palestine during the Crusader, Ayyubid and Mamluk Periods in Light of the Archaeological Finds*. MA Dissertation. The Hebrew University.
von Wartburg, M.-L.
2001 The Archaeology of Cane Sugar Production: a Survey of Twenty Years of Research in Cyprus. *The Antiquaries Journal* 81: 305-335.
Waheeb, M.
1995 The First Season of the an-Naq' Project, Ghawr as-Safi. *ADAJ* 39: 553-555.
Watson, A.M.
1983 *Agricultural Innovations in the Early Islamic World*. Cambridge: Cambridge University Press.

AYYUBID/MAMLUK ARCHAEOLOGY OF THE 'AJLŪN AREA
A PRELIMINARY TYPOLOGY

Neil D. MacKenzie

This project began as a survey of the water mills of Wādī Kufranjah (وادي كفرنجة), and a study of their Ayyubid/Mamluk contexts. It was later extended to include the Ayyubid/Mamluk sites of an area centered upon 'Ajlūn castle and extending, roughly, north to Wādī al-Yābis/ar-Rayyān (وادي اليابس/ الريان) and south to Wādī Rājib (وادي راجب) (**Fig. 1**). While not a comprehensive survey, principle archaeological sites with Ayyubid/Mamluk associations were examined, primarily for their social, economic and religious associations. Virtually all of these sites — apart from the water mills — have earlier Islamic and pre-Islamic phases, and some have significant structures from the Ottoman period. Concentration, however, centered on those sites with significant indication of the Ayyubid period as evidenced by standing remains, sherd cover, and epigraphical and textual sources.

The survey was conducted — periodically — between January and July, 2000.[1] Many of these sites had been previously surveyed, especially by Mittmann and Greene, but not with emphasis on Islamic remains with particular reference to the provincial aspects of the Ayyubid/Mamluk period (Mittmann 1970; Greene 1995). Although some



1. Map of 'Ajlūn area showing sites described (adapted from Mittmann): 1: 'Uṣaym; 2: Sāmtā; 3: Dayr al-Luyūs; 4: Listib; 5: Kufr ad-Darrah; 6: Shaykh Rāshid; 7: Shaykh 'Alī Mashhad; 8: Qal'at ar-Rabaḍ; 9: al-Khaḍr; 10: al-Qidādī; 11: Khirbat Qarāqūsh; 12: al-Mushayrfah; 13: al-Manṣūrah; 14: Qafṣah; 15: Khirbat al-Ḥammām; 16: Khirbat an-Nimr; 17: Khirbat al-Badiyah; 18: al-Ḥanīsh; 19: Sarābīs; 20: Tall al-Kharābah; 21: Maqām Ḥājah Amīrah; 22: Mughārat al-Wardah.

eighty sites were examined, I shall concentrate here on those which are a) prototypes and b) those which supply the most valuable reference tools for pursuance of further study. These sites can be divided into five categories: major village/town sites; wadi hill sites; smaller sites with mosques/ *maqāmāt*; standing monuments, and agricultural/ industrial sites.

Major Village/Town Sites

'Ajlūn Castle and al-Khaḍr (قلعة عجلون والخضر): This area is an anomaly due to the overriding presence of Qal'at 'Ajlūn, or Qal'at ar-Rabaḍ (قلعة الربض) built in 1184-85 to oppose Crusader attacks from both the west and south. The term "ar-Rabaḍ" is questionable. An Arab word with the general meaning of 'suburb', this could apply to 1) the immediate surroundings of the castle, including Maqām al-Khaḍr (مقام الخضر); 2) the castle and its surroundings as a suburb of the town of 'Ajlūn; 3) the village of Bā'ūn (باعـــون) some six kilometers to the north, which Abū al-Fidā' describes as the castle's suburb (al-Quddah 1988: 29) and, finally, a local tribe known as ar-Rabaḍiyah (Augostinovic and Bagatti 1951-2: 301-302). Whatever the case, the castle and its surroundings appear to have functioned as a separate entity from the town of 'Ajlūn, which was centered on the Ayyubid congregational mosque.

Qal'at 'Ajlūn was reputedly built on the site of a monastery, a theory enhanced by the recent discovery of a Byzantine mosaic within the castle. Major remains occupy the eastern and western slopes of the castle. Two massive cisterns — one of cut stone and partly above ground (**Fig. 2**), are dug into the eastern slope. Here too are many fieldstone building foundations on successive terraces and, most importantly, a ubiquitous ground cover of slag suggesting a major iron industry, almost certainly supplied by mines at Mughārat al-Wardah (مغارة الوردة), some ten kilometers to the south. To the west of the castle, a major settlement site — generally known as al-Khaḍr — extends about a kilometer along a gentle slope above Wādī Kufranjah. This site consists of fieldstone building foundations, cisterns, a quarry, and a ruined Christian shrine, Maqām al-Khaḍr, probably associated with Saint Elias. Ceramic ground cover on both sites include Byzantine/Umayyad painted pottery and various Ayyubid/ Mamluk types, including hand made painted wares, and glazed monochrome, sgrafitto, and molded wares. C.M. Johns, in his seminal work on the castle during the late 1920's, excavated an Ayyubid/Mamluk housing site in what he considered the "suburb"; unfortunately its exact location is uncertain (Johns 1931: 30).

Khirbat Qidādī (خـــربة قـــدادي): Khirbat Qidādī lies some 2km southwest of 'Ajlūn, immediately to the south of the 'Ajlūn-Kufranjah road. A terraced hill site, its Byzantine/Islamic remains include many stone lined pits and/or cisterns, oil presses, fieldstone foundations, and iron slag. Ceramic evidence consists of Byzantine/Umayyad and Ayyubid/ Mamluk sherds. Of particular importance is a ruined mosque, 10.2x4.5m, its walls of fieldstone with lime mortar, except for cut limestone in the *miḥrāb* area.



2. Cistern, eastern slope of 'Ajlūn castle.

1. This survey was funded by a NMERTP/ACOR grant. I wish to thank both ACOR and the Jordanian Department of Antiquities for their support, especially my inspector Zakaria al-Quddah.

The *miḥrāb* itself is plastered, and ceramics (handmade painted and monochrome glazed wares) suggest an Ayyubid/Mamluk date. The mosque was barrel vaulted with a central door, and it would appear that there was a *ziyādah,* (literally: extension; here probably a platform or portico) in front of the entrance.

Sarābīs (سرابيس): About 3km south of 'Anjarah (عنجرة), this site is remarkable for its continuity. Partly exposed foundations of cut stone — of several periods — are superimposed by fieldstone foundations, possibly of Mamluk date, and by the standing ruins of an Ottoman village. The fieldstone barrel vault of an underground storage is of very similar construction to the late Mamluk/ Ottoman mill houses along Wādī Kufranjah. On the eastern edge of the site lie the remains of a 10x7.7m mosque, largely destroyed. The sherd cover of the site suggests a general sequence from the Byzantine through the Ottoman period, but lower foundations might well be of an earlier date.

Al-Badiyah (البدية): About 3km west of Sarābīs, the site of al-Badiyah is currently under excavation by Yarmouk University. In addition to major Byzantine remains and a small mosque thought by the excavator to be Umayyad, this major townsite includes a sherd cover of various Ayyubid/Mamluk ceramics, including sgrafitto, other monochromatic glazed, and handmade painted pottery.

Listib (لستب): Located 5km northwest of 'Ajlūn, and 1km northwest of Mār Iliās (مار الياس), Listib consists of a hill site with Byzantine remains (cisterns, graves, etc.), covered by a late Ottoman village, largely abandoned. At the foot of the hill to the southeast lies a ruined mosque, excavated by the Ministry of Awqaf. This structure, 14x9m, is built of cut limestone — possibly reused — and is divided by columns into nine bays. The partially exposed northern wall suggests that the mosque was built over a substantial earlier structure. Ceramics in and around the mosque included Byzantine/ Umayyad pottery and handmade painted Ayyubid/ Mamluk wares.

Qafṣah (قفصه): 5km southwest of al-Wahādnah (الوهادنه), Qafṣah lies in a fertile plateau area overlooking the Jordan Valley. A major townsite, Qafṣah does not appear to have any pre-Byzantine remains, and is particularly remarkable for the large quantities of surface cover of both Byzantine/ Umayyad and Ayyubid/Mamluk ceramics. The domestic building foundations — fieldstone without obvious lime mortar — do not represent the almost ubiquitous later Ottoman structures on similar sites, and the sherd cover within the houses (mostly Ayyubid/Mamluk) suggest an earlier abandonment. Other features include millstones, cisterns, and an extensive cemetery of rock-cut tombs, some with vertical shafts. At the southern end of the site lies a ruined fieldstone mosque, 11.2x10.6m. This was built in several stages; the walls have been doubled, and the arched windows of the northern side are blocked. The ground plan is unclear, but the placement of fallen columns suggest a similarity to Listib. The mosque has a central entrance, leading out to a *ziyādah.* Adjoining the mosque to the south are the remains — in outline — of another formal building, probably a church.

Shaykh Rāshid (شيخ راشد): Somewhat similar in topography, Shaykh Rāshid lies about 5km north of Qafṣah. Also a Byzantine/Islamic site, it takes its name from a ruined *maqām* of indeterminate date; its foundations (4x5m) are on top of a ridge which descends to the north with ruined walls and rock-cut tombs. Atop the ridge itself — in addition to the *maqām* (which is surrounded by Muslim graves) — are several abandoned stone structures of relatively recent date, as well as a major compound with stone construction including barrel vaults, suggesting an Ottoman or even late Mamluk date. Ground cover includes ceramics of Byzantine/Umayyad and Ayyubid/Mamluk date. The latter consist of handmade painted pottery, as well as glazed monochromatic, splash, and sgrafitto wares.

Wadi Hill Sites

The best examples of these for the Ayyubid/ Mamluk period are Khirbat an-Nimr (خربة النمر), Khirbat al-Ḥammām (خربة الحمّام), Khirbat al-Mushayrfah (خربة المشيرفة), and Khirbat Qarāqūsh (خربة قراقوش), all on Wādī Kufranjah, and Tall al-Kharābah (تل الخرابة), on Wādī Rājib. These are minor village sites on small hills/ridges overlooking the wadi. Although often with surface pottery of great antiquity, the visible structural remains are generally Byzantine and early Islamic, with probable churches in several instances. Ayyubid/ Mamluk ceramics, while present, are minimal, suggesting a possible squatter presence during this period.

Smaller Sites with Mosques /Maqāmāt

These sites consist of smaller mosques and/or *maqāmāt,* usually associated with Byzantine remains, but without the presence of obvious village sites, although such may have once existed.

Al-Ḥanīsh (الحنيش): Located midway between al-

Badiyah and Sarābīs, al-Ḥanīsh consists of a ruined mosque of cut limestone, immediately north of a quarry with cuts suggesting unfinished Byzantine tombs. The mosque, largely destroyed, is 12x10m with a central entrance. Sherd cover of the surrounding area includes various Byzantine/ Umayyad and Ayyubid/Mamluk wares; pottery from the mosque was largely Ayyubid/Mamluk, including handmade painted and monochromatic green wares.

Dayr Luyūs (دير ليوس): Located about 1km northwest of 'Ibbīn (عبّين), this site includes a small (6x9m) mosque, built of fieldstone and probably barrel vaulted. Two open rectangular cisterns, one stepped, lie nearby. I found no sherd cover, but Mittmann noted Byzantine through Mamluk pottery (Mittmann 1970: 73).

Sāmtā (سامتا) : 3km northwest of Ṣikhrah (صخره), this site consists of a ruined mosque of probable Ayyubid/Mamluk date (**Fig. 3**) with nearby Roman/Byzantine rock-cut tombs. Other ruins were probably eclipsed by the modern village. This mosque, 7.1x5.5m, is built of cut limestone with entrances in the centers of its eastern and western walls. The *miḥrāb* is flanked by simulated engaged columns carved into the limestone. This mosque was cleared and partially restored by the Ministry of Awqaf, and Ayyubid/Mamluk ceramics were noted in the fill.

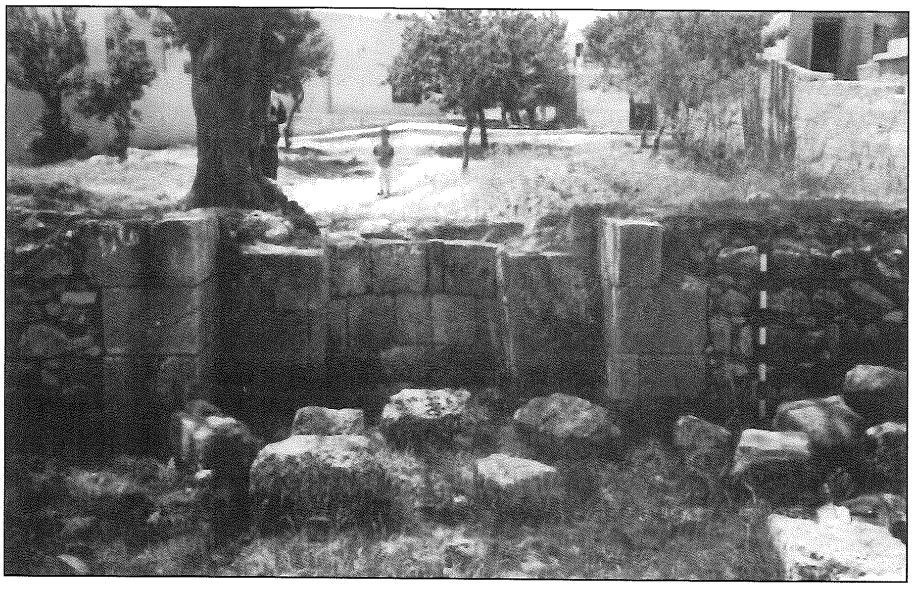
'Uṣaym (عصيم): About 11km northeast of 'Ajlūn, 'Uṣaym boasts a barrel vaulted mosque of probable Ayyubid/Mamluk date, which was excavated and partially restored by the Ministry of Awqaf. Evidence for the dating includes both ceramics and the carved decoration of lintels, the latter very similar to 'Ajlūn castle. The mosque abuts — and perhaps superimposes — arches of cut limestone of Byzantine appearance, possibly a cistern. Slightly to the west are abandoned stone houses of the late Ottoman period.

Shaykh 'Alī Mashhad (شيخ علي مشهد): Shaykh 'Alī Mashhad is situated about 6km west of 'Ajlūn. A hill site, this *maqām* contains the shaykh's grave as well as a few wall remnants. Schumacher noted an inscription from 1287 (Augostinovic and Bagatti 1951-2: 305). On the southern escarpment are two cisterns and evidence of quarrying, probably from the Byzantine period.

Maqām Ḥājah Amīrah (مقام حاجة أميرة): About one kilometer southwest of the village of Rājib, this *maqām* consists of the fieldstone walls of an 8x8m sanctuary, with a central entrance and a *miḥrāb.* This *maqām* has no pre-Islamic associations. Locally thought to be Ayyubid, surface ceramics include Ayyubid/Mamluk glazed wares, handmade painted wares, and possibly Ottoman unglazed ware. The shrine is abutted by several Muslim graves.

Major Standing Monuments

There are five standing religious buildings which may date to the Ayyubid/Mamluk period, although only two can be dated with certainty. These are the Friday mosque of 'Ajlūn, Maqām Badr (مقام بدر) (within 'Ajlūn), the Raymūn (ريمون) mosque, the central mosque of Sūf (سوف), and an abandoned mosque in the village of Ḥalāwah (حلاوة). The first three have been studied by Yusuf Ghawanmah, and for plans and inscriptions the reader is referred to his work (Ghawanmah 1986). However, certain points should be made relevant to this survey.



3. Miḥrāb, Sāmtā mosque.

'Ajlūn Mosque (مسجد عجلون): The focal point of both the medieval and modern town, this mosque was built by the Ayyubid al-Malik aṣ-Ṣāliḥ, with additions and renovations during the Mamluk period. A second mosque from the Baḥrī Mamluk period no longer exists (al-Quddah 1988: 77). During the Mamluk period, 'Ajlūn — along with the nearby "suburbs" surrounding the castle — represents not only the hub of a major agricultural/commercial area but also a center of religious scholarship and Sufism (Ghawanmah 1986: 72). This mosque is probably the oldest standing congregational mosque in Jordan.

Maqām Badr (مقام بدر): This building, also in the center of 'Ajlūn, is without inscriptions. Ghawanmah believes that this is a Mamluk *khānqāh*, due to the plan, the architectural features, and the presence of Sufis in the 'Ajlūn area during this period (Ghawanmah 1986: 71-82). Although the building is heavily restored, his thesis is tenable.

Raymūn Mosque (مسجد ريمون): The earliest inscription from the Raymūn mosque dates the minaret to 1277, during the reign of the Mamluk sultan Baybars. The cross vaults and pillars are very similar to the 'Ajlūn mosque, and the plan (six bays) and style resemble the central mosque at Sūf and the abandoned mosque at Ḥalāwah. Both of the latter are anepigraphical. While the Sūf mosque is allegedly built over an earlier (Umayyad?) foundation, the Ḥalāwah mosque **(Fig. 4)**, although smaller (13.4x9.6m) than that of Raymūn, resembles the latter both in plan and in the pillars and cross vaulting. There is no minaret, although an outer flight of stairs (a later addition) against the entry facade leads to the roof. The Ḥalāwah mosque is possibly of Mamluk date, but may be later, and bears further study.

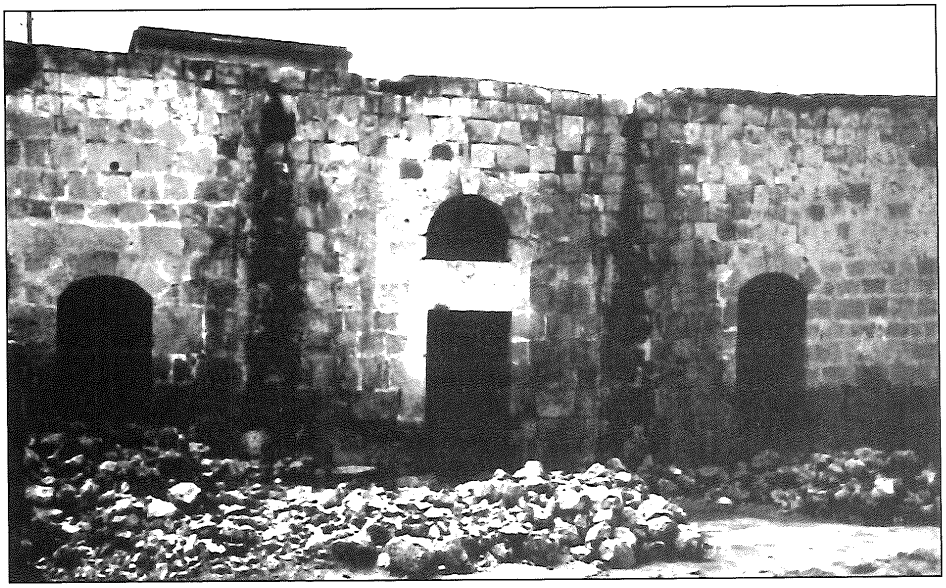
Agricultural/Industrial Sites

The most conspicuous — and ubiquitous — remnants of the late medieval agricultural activity in the 'Ajlūn area are the water powered grain mills, especially in Wādī Kufranjah **(Fig. 5)**, but also in Wādī Rājib and Wādī al-Yābis. Although of uncertain date, some of these mills were in use, at least, until the middle of the last century. This writer examined some eighteen mills in Wādī Kufranjah, as well as comparative mills in Wādī Rājib and Wādī al-Yābis, and elsewhere in southern Jordan. Those of Wādī Kufranjah are most important to this study, as they represent a) the heart of the 'Ajlūn area and b) the most numerous sequence of mills in a relatively small area from which to make a comparative study. At a later date, I intend to pursue these mills in a separate study. However, several points can be made. The water mills of Wādī Kufranjah are similar in plan, operation, and architectural particulars. There is no sherd cover in the immediate area of the mills. However, Muhammad Malkawi, in a master's thesis for Yarmouk University, studied the technological aspects of these mills (Malkawi 1994). Part of his work included excavations in five of the mill houses to bedrock, producing pottery of the late Mamluk/Ottoman period, and I concur with his opinion that these buildings date from that time.

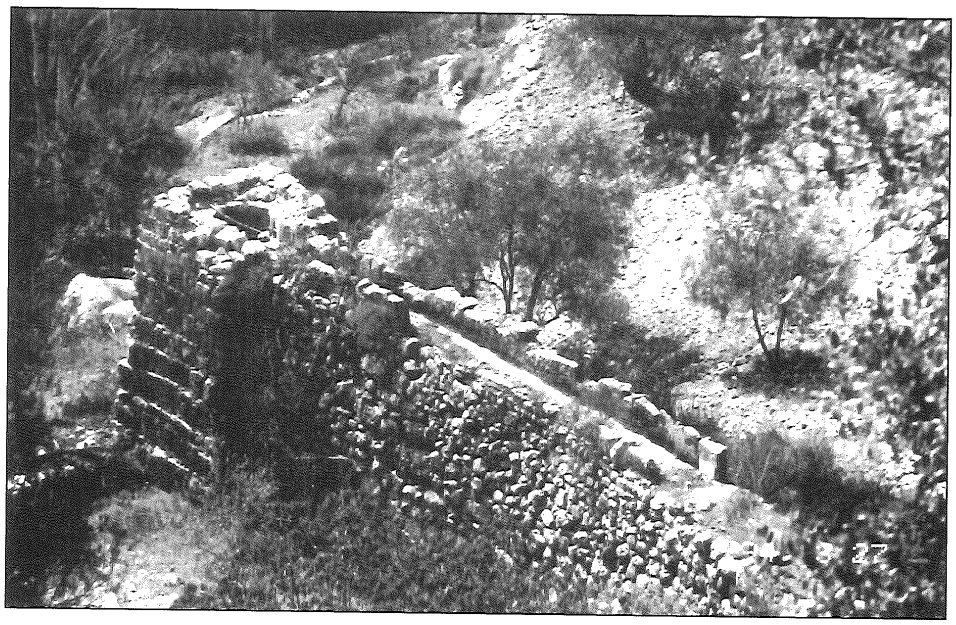
Iron slag, as mentioned earlier, was a common find on the eastern slope of 'Ajlūn castle, and was noted at the nearby site of al-Qidādī as well. The source for this iron, as far as is known, were the mines of Mughārat al-Wardah, about 10km to the south of 'Ajlūn.

Ceramics

The vast majority of sites examined included Byzantine-Umayyad and Ayyubid/Mamluk remains,



4. Abandoned mosque, Ḥalāwah.



5. Water mill #7, Wādī Kufranjah.

and often standing Ottoman structures as well. Byzantine/Umayyad ceramics include, beside crude unglazed utility wares, fine red and cream wares, often ribbed and/or painted externally. Ayyubid/Mamluk ceramics, in addition to the ubiquitous handmade painted wares, included glazed wares: monochromatic, splash, and sgrafitto. A major problem in the Islamic archaeology of northwestern Jordan is the lack of definition of ceramics during the Abbasid/Fatimid period; although Walmsley has identified pottery up to ca. AD 800 at Pella, the period 800-1150 is very murky indeed. Hopefully the current work of Stephen McPhillips at Pella, as well as controlled excavations elsewhere, will help to fill in this gap. In addition, the ceramics of the Ottoman period warrant further study.

Summary and Proposals

This, then, is a summary of the typology of sites for the 'Ajlūn area. Further work is warranted in several aspects. More Islamic sites need examining or reexamining. This is especially true of several existing villages near Wādī al-Yābis, particularly Bā'ūn, which is mentioned repeatedly in medieval chronicles concerning its relationship with 'Ajlūn. Abū al-Fidā' refers to Bā'ūn as the suburb *(rabaḍ)* of 'Ajlūn castle (al-Quddah 1988: 29); 'Ajlūn and Bā'ūn are both known as residences of religious scholars. Additional research is required on the relationship between 'Ajlūn castle, its immediate surroundings, and the town of 'Ajlūn. An apparent hiatus in both architecture and ceramics between the early Abbasid and Ayyubid/Mamluk period needs to be studied both in historical texts and by suitable excavation. The best site I have seen for this purpose is Qafṣah, for two reasons: first, the rich ground cover of ceramics, and second, the apparent Ayyubid/Mamluk residential structures without obvious Ottoman rebuilding. Finally, a corpus of rural/village mosques and *maqāmāt* for the medieval period in the 'Ajlūn area will make a significant contribution to the history of Islamic architecture in the Levant.

N.D. MacKenzie
320 S. Hughes Rd. # 97
Howell, MI 48843
U.S.A.

Bibliography

Augustinovic, A. and Bagatti, B.
1951-2 Escursioni nei dintorni di 'Ajlun. *LA* 2: 227-314.
Ghawanmah, Y.
1988 *Al-masājid al-islāmiyah al-qadīmah fī minṭiqat 'Ajlūn*. Amman.
Greene, J.A.
1995 The Water Mills of the 'Ajlûn-Kufranja Valley: The Relationship of Technology, Society, and Settlement. Pp. 767-765 in *SHAJ* 5. Amman: Department of Antiquities.
Johns, C.N.
1931 Medieval 'Ajlūn I: The Castle (Qal'at er-Rabad). *QDAP* 1: 21-33.
Malkawi, M.
1994 *The Water Mills of Wadi Kufranjeh during the Period between Late Mamluk and Early Ottoman; A Technological Study*. M.A. Thesis, Yarmouk University.
Mittmann, S.
1970 *Beiträge zur Siedlungs – und Territorialgeschichte des Nördlichen Ostjordenlandes*. Wiesbaden: Otto Harrassowitz.
al-Quddah, A.M.
1988 *Ṣafaḥāt min jibāl 'Ajlūn*. Amman.

ISLAMIC SETTLEMENT IN UMM QAYS (GADARA)

Dia'eddin A. Tawalbeh

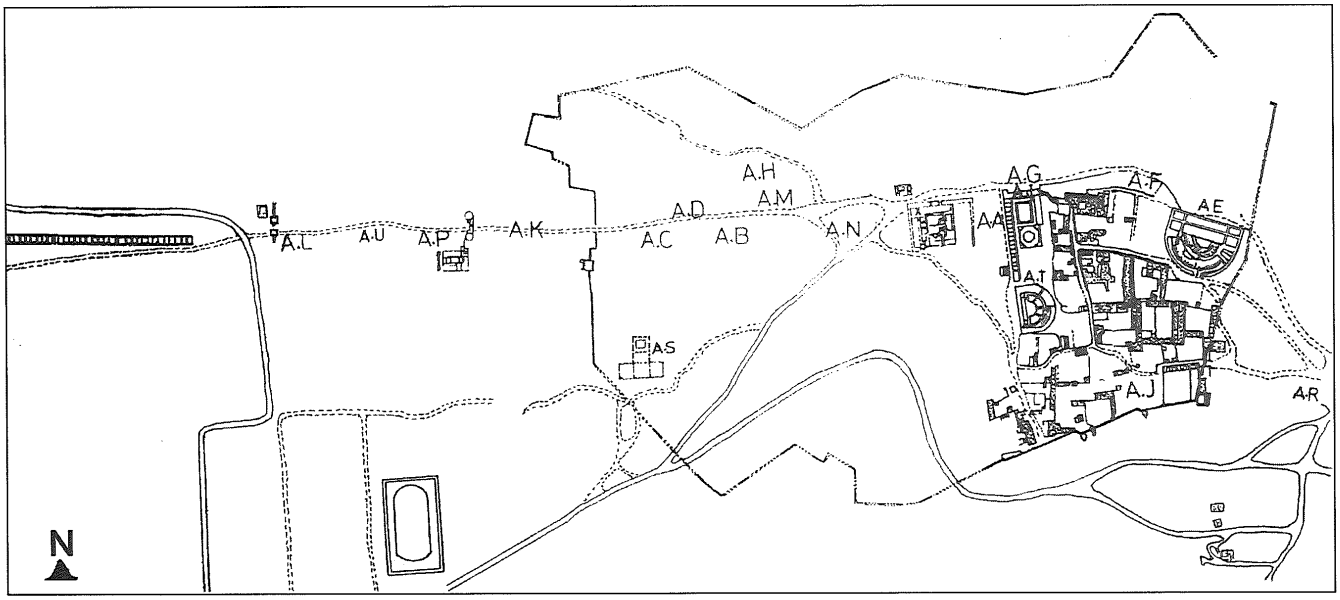
All the major cities of the Roman period in Jordan continued to flourish during the Byzantine period, and the major Byzantine sites such as 'Ammān (عمّان), Jarash (جرش), Umm al-Jimāl (أم الجمال), Umm Qays (أم قيس), Ṭabaqat Faḥl (طبقة فحل), and Umm ar-Raṣāṣ (أم الرصاص) continued to be occupied into and through the Umayyad period (Sauer 1982).

Elsewhere in the north of Jordan, four towns were mentioned by the Arab geographers as existing during the Islamic period: Umm Qays (Jadar جدر), Quwaylibah (Abīl أبيل قويلبه), Bayt Rās (بيت راس) and Jarash. Each of these towns is better known as a Classical site with continuation into the Byzantine and Umayyad periods (Whitcomb 1992: 387).

Classical Muslim historians refer to Jordan in the seventh century as "*Jund al-Urdun*" (جند الاردن). By order of Prophet Muḥammad, two campaigns were waged against this *Jund* which was mostly inhabited by Arab tribes. Although these two campaigns failed to conquer any part of the land, they paved the way for the coming expedition at the time of the first caliph Abū Bakr, who sent an army under the leadership of Shuraḥbīl b. Ḥasna and achieved complete success (Al-Bakhit 1982: 361).

The Muslim conquests of Jordan and Palestine lasted from AD 630 to 640, while Jordan was completely annexed in AD 636, after the Byzantine armies were defeated at the Battle of Yarmūk (معركة اليرموك). This was followed by a brief period of Arab rule prior to the establishment of the Umayyad dynasty in Damascus in AD 661. During the Umayyad period (AD 661-750), Jordan was close to the center of power, and was also positioned on the pilgrimage route to Arabia, so Jordan continued to prosper. Judging from the archaeological evidence, the Umayyad period was one of widespread activity in Jordan. Many Byzantine sites seem to have continued to be occupied or have been reoccupied during the Umayyad period, and a number of new sites were founded (Sauer 1986: 304).

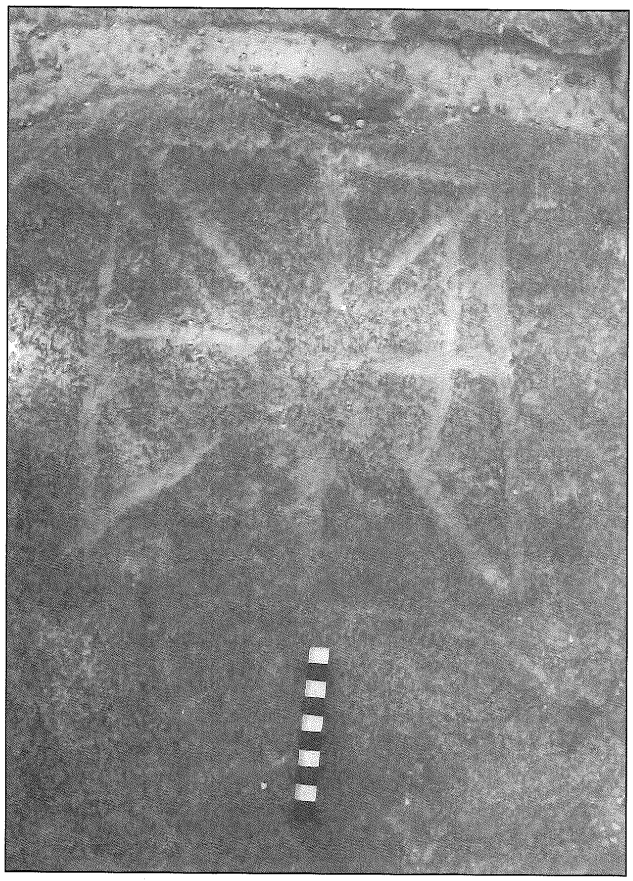
At the end of the Umayyad period, Jordan was rocked by a strong earthquake in AD 749. Archaeological field surveys of different regions of Jordan show similar variations in settlement numbers throughout the Islamic centuries. The number of sites peaked in Byzantine times, and declined by more than 50% under the Umayyads. Abbasid sites are completely absent from some survey areas, and in others declined by more than 50%. In all regions, the number of Ayyubid/Mamluk sites increased. For the Ottoman period, there was considerable variation from region to region (Johns 1992: 363).



1. Umm Qays city plan.



2. *A small Umayyad mosque in area (B).*



3. *Sun clock (mazwala) in the middle of the sanctuary.*

The Umayyad Period (AD 661-750)

The recent excavations conducted by the Department of Antiquities at Umm Qays (on-going since 1999; **Fig. 1**) indicate that the site continued to be occupied into the Umayyad, Abbasid, Ayyubid/Mamluk and Ottoman periods.[1]

The excavations uncovered a number of domestic structures of the Umayyad period. Several isolated structures were situated just above the *Decumanus Maximus,* most of which rested on a layer of compact soil (ca. 20-60cm thick) that separated them from the pavement. This indicates the cancellation of the street function in the Umayyad period.

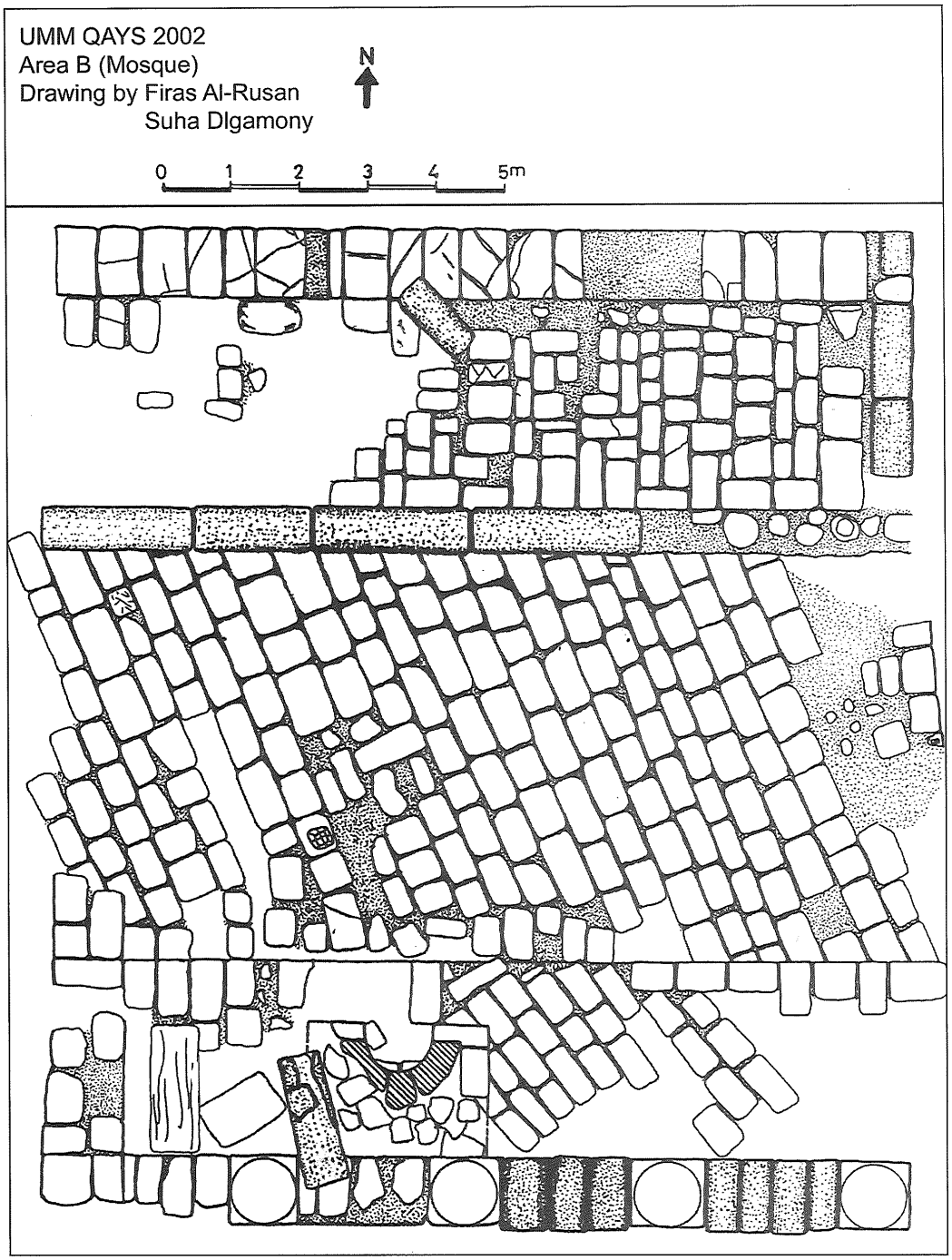
The structures were made primarily of stones taken from the colonnaded street. They extended from the western area to the Tiberias Gate. The plans and the building techniques are very simple, indicating it was most probably a popular area.

A mosque was part of the Umayyad complex in area (B), near the temple. The plan of this mosque is rectangular, measuring approximately 10x15m. It consists of a sanctuary with a semi-circular *miḥrāb* in the middle of the *qibla* wall. It is possible that the *miḥrāb* was taken from the Nymphaeum and reused in this mosque (**Fig. 2**).

In the middle of the sanctuary, a sun clock (*mazwala*) that was used to show prayer times was found carved on the pavement (**Fig. 3**). The mosque was built with reused stones from the colonnaded street. It is possible that the mosque was without a roof, built in an open area (**Fig. 4**). Most of the collected pottery sherds are Umayyad in date.

On the opposite side, there is a semi-circular church that dates back to the sixth century AD. There is evidence for the continuation of use of the church during the Umayyad period, as Umayyad pottery was found on top of the mosaic floors.

1. See unpublished report in Arabic (the work of excavations and restorations in Umm Qays 2000-2001) by Obydat, Taw albeh, Malkawi, Fayad and Owysi. On file at the Department of Antiquities/'Ammān and Umm Qays Antiquities Office.



4. Top plan, area (B).

The Byzantine baths were also reused as dwellings during the Umayyad period. An inscription from one of the Roman baths of Hammat Jadar (الحمّة السورية) in the Yarmūk Valley gives details of the refurbishment of these facilities under the Caliph Mu'āwiyah in 42 AH/AD 662 (Green and Tsafrir 1982: 77; Johns 1992: 368).

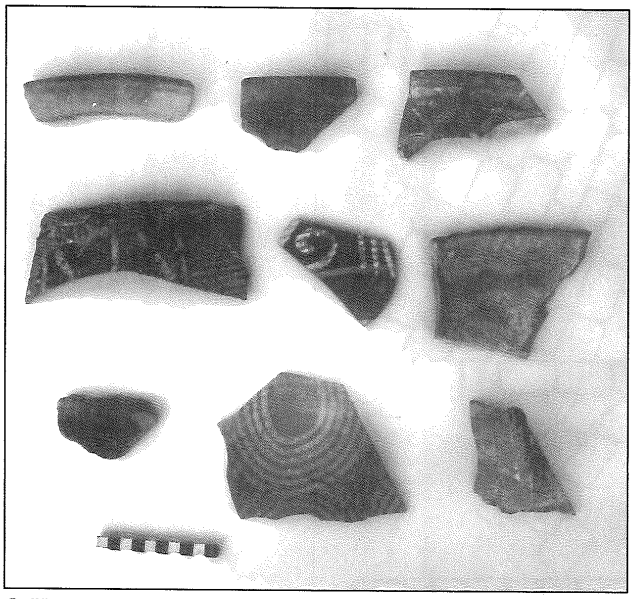
During the excavations at Umm Qays, a large collection of Umayyad pottery sherds was found together with coins in the domestic complex structures located on the colonnaded street (area K), the semi-circular church (area M), and the large bath building (area S) (**Fig. 5**). Umayyad pottery from various areas at Umm Qays was attested in large quantities, thus indicating the widespread activity at this site. The pottery from the lowest levels consisted of a mixture of Roman, Byzantine and Umayyad sherds.

During excavation at the large bath building in area (S), a fine collection of complete Umayyad pottery vessels was found together with Umayyad coins in sq. (15) loc. (004) (**Fig. 6**). As Umayyad pottery was found beneath Roman and Byzantine remains, it is possible that the loci and walls date to

the Byzantine period and were resettled through Umayyad period.

Umayyad pottery from Umm Qays is very distinctive: ribbing is found on cooking pots, jars, and jugs; the exteriors of jars and jugs are often decorated with red painted loops, spirals, and wavy and crossed lines. White paint is also found on black ribbed large jars. Incising and wavy line combing are common on basins and large jars, and zigzag incising on black basins.

As for the Umayyad coinage (**Fig. 7**), the early Caliphs contented themselves with the foreign coinage already in circulation in the empires seized by them. Shortly after the Muslims conquered Bilād ash-Shām, a group of anonymous copper coins were struck bearing varied inscriptions, some in Greek, others in Arabic, and some bilingual (Goussous 1996: 43). Numerous Umayyad coins were found at Umm Qays in different areas (B, K, M), dating from the early as well as the late Umayyad period.



5. Umayyad pottery sherds.

The Abbasid Period (AD 750-969)

Several scholars who wrote about the Abbasid period did not give a clear idea about it, and postulated a sharp decline following the Umayyad period (see for example Sauer 1986: 304; Johns 1992: 363 and re-evaluation by Whitcomb 1992).

These hypotheses changed in the recent decades, due to excavations at various sites in Jordan. The Islam cultural heritage of north Jordan has received belated recognition in the last two decades. Excavations at Ṭabaqat Faḥl, Bayt Rās, Jarash and Umm Qays have identified a continuous urban tradition into the second and third centuries AH (eighth and ninth AD) (Walmsley 1982: 379), while the evidence from written archaeological sources attests to the continued settlement of Faḥl, Jarash, Bayt Rās, Abīl and Jadar through the Abbasid and Fatimid periods (Walmsley 1982: 382).

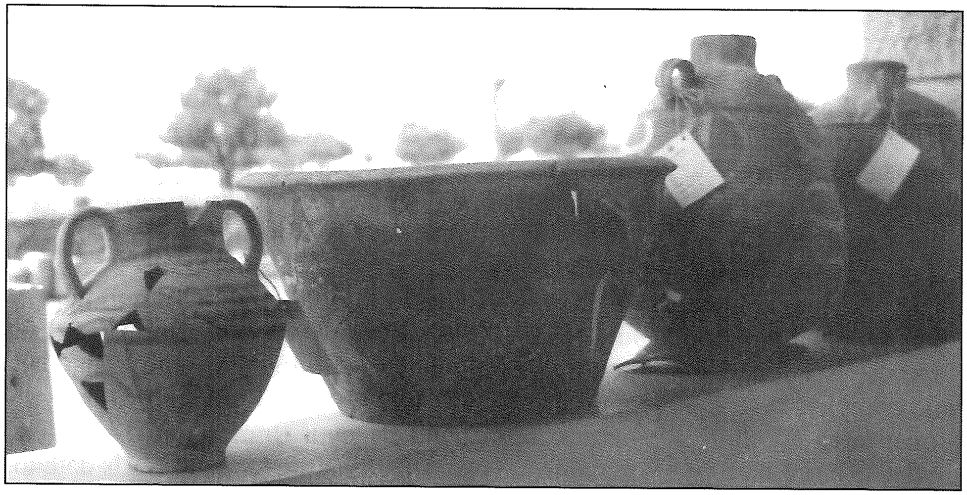
The recent excavations at Umm Qays, areas (B, C, K and S), revealed a few Abbasid pottery sherds mixed with Byzantine and Umayyad (**Fig. 8**), thus giving evidence of continued settlement during the Abbasid period, and negating abandonment at the end of the Umayyad period (after the earthquake of AD 749). However, the Abbasid settlement was limited in extent.

The Abbasid pottery sherds include distinctive forms in a white ware. Among the decorative types are elaborate cut-wares, and raised rouletted or molded geometric patterns. The Abbasid pottery is thinner and smoother than the Umayyad pottery in its surface incised band combing.

The Ayyubid/Mamluk Period (AD 1174-1516)

In 1187, the Ayyubid leader Ṣalāḥ ad-Dīn defeated the Crusaders at the Battle of Ḥiṭṭīn, and from that time Jordan was again in Arab hands.

Although several old classical sites remained uninhabited, a large number of Ayyubid/Mamluk sites



6. A collection of restored Umayyad pottery, from area (S).

testify to the high level of activity throughout Jordan during this period (Sauer 1982: 334).

The fall of the Crusader states led to a renewed link between Syria and Egypt and a new era of prosperity under the Ayyubids and Mamluks, so that from ca. 1200 there was a great increase in population and density of settlement (Whitcomb 1992: 385).

Ayyubid/Mamluk remains have been found at Umm Qays at areas (P, U, and L), in the western sector between the Tiberias Gate and the Monumental Gate (**Fig. 9**). Both the Ayyubid and the Mamluk periods are represented, and continuity of development characterizes the two periods. Numerous Ayyubid-Mamluk coins are attested from the various excavations, but more important is what was found in area (P) sq. (11) loc. (002): a small jar that contained 533 coins, 528 of them are silver and the five others are gold Crusader coins (**Fig. 10**).



7. Arab-Byzantine copper coin from area (P), sq. 2 loc. 00. Obverse: standing caliph bearing the name of 'Abd al-Malik; reverse: shaft with globe on top, Kufic script "bismillah lā ilaha illā Allah waḥdahu".

Stratigraphically, the Ayyubid/Mamluk remains were found above the Roman street, set above the pavement. The excavations provided stratified evidence of Ayyubid/Mamluk occupation in areas (P) and (U) in the form of *ṭawābīn* pits and ash, thus providing evidence for domestic occupation in the Ayyubid/Mamluk period.

In area (P), there is evidence for the reuse of the church above the underground mausoleum during the Ayyubid Mamluk period, which was converted to a mosque.

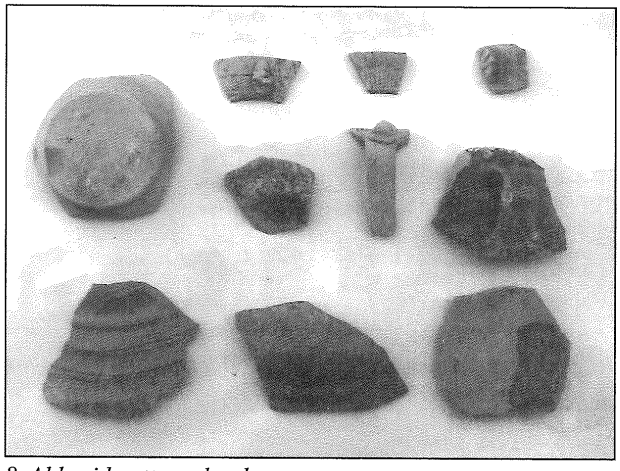
Ayyubid/Mamluk pottery is very different in character from the Umayyad and Abbasid. A large percentage of Ayyubid/Mamluk pottery is handmade, sometimes using pieces of cloth in the production process. Some of the vessels are wheel-made, and the glazed wares are made of well-prepared clays (**Fig. 11**). Much of the handmade pottery is decorated with dark brown or black painted geometric designs covering large areas of the vessels. Sugar pots are often widely ribbed (**Fig. 12**).

The glazed wares are often monochrome glazed in green, yellow or brown, and moulded designs are often present under the glaze.

The Late Ottoman Period

In AD 1516, the Mamluks were defeated by the Ottoman Turks and Jordan become part of the Ottoman Empire (Mousa 1982: 385; Yassine 1988: 272). The decisive battle took place on August 24, 1516, when the whole of Syria fell into Ottoman hands (Al-Bakhit 1982: 362).

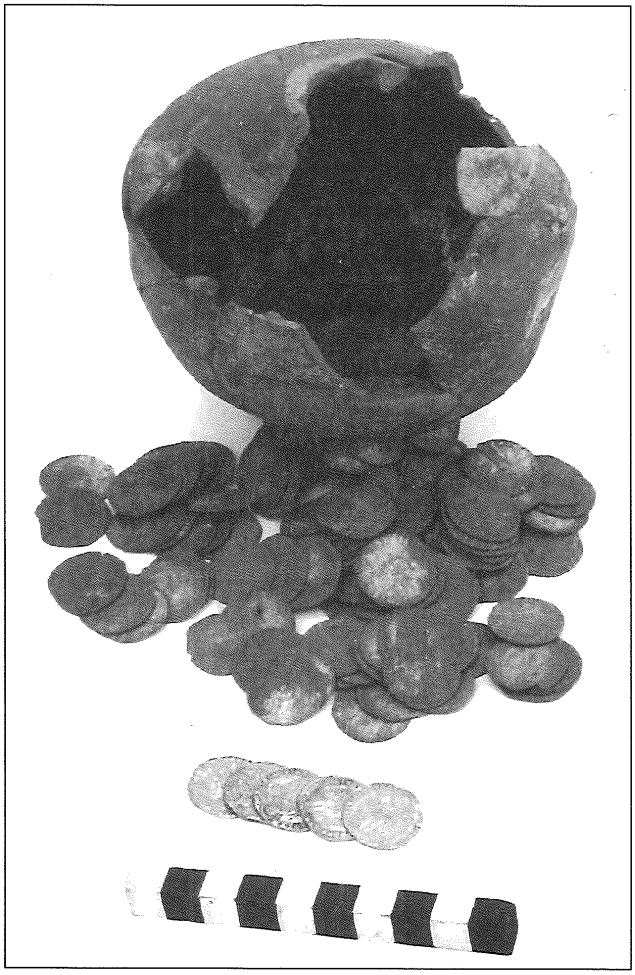
The Umm Qays acropolis hill is covered by the most complete Ottoman village in Jordan (**Fig. 13**).



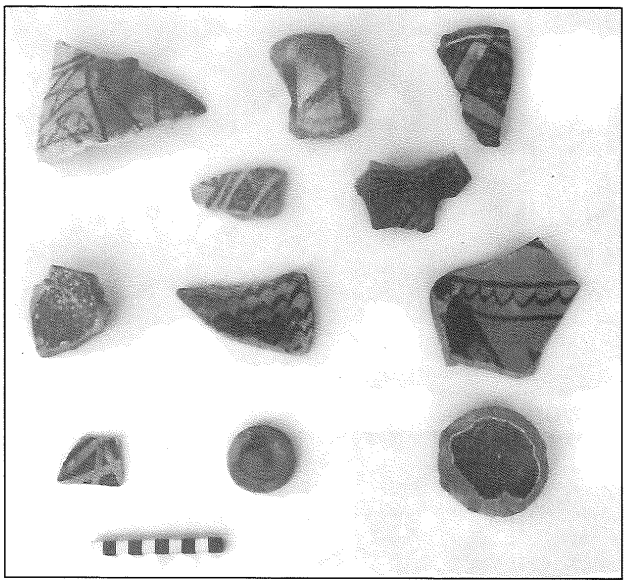
8. Abbasid pottery sherds.



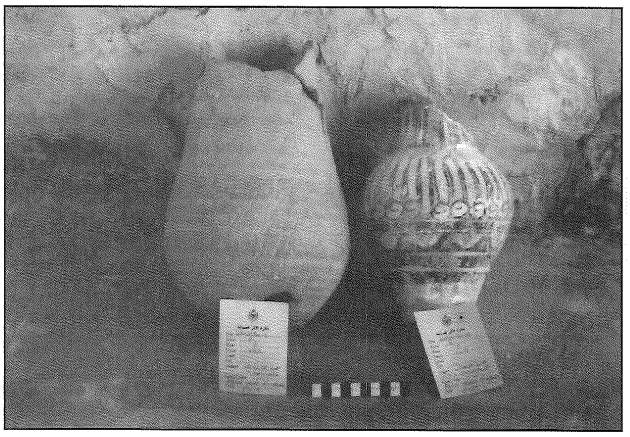
9. Domestic structure of the Ayyubid/Mamluk period in area (L), above the Decumanus Maximus.



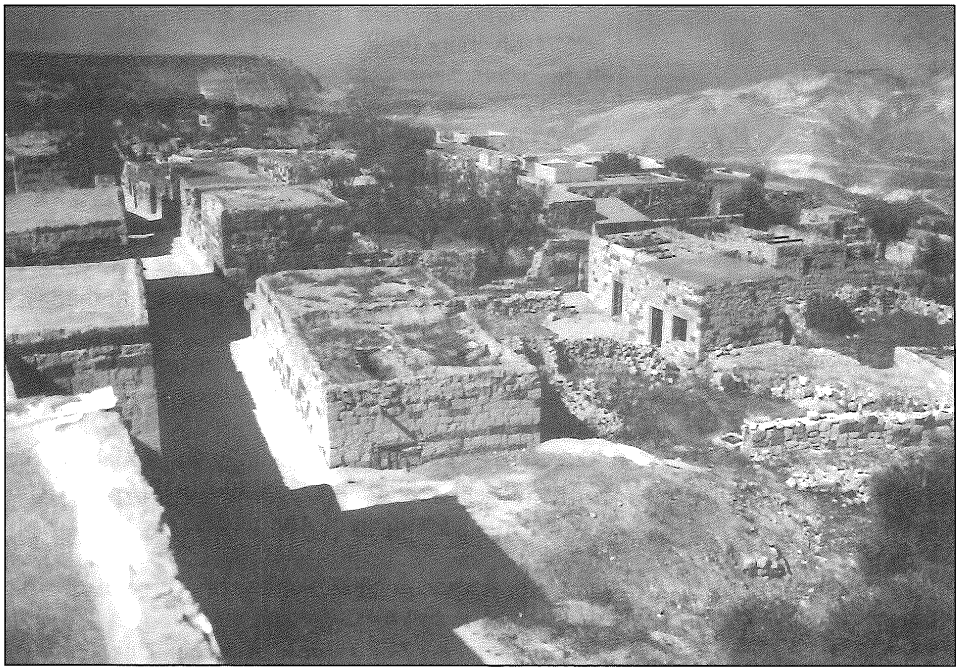
10. Small jar that contained Ayyubid-Mamluk coins, from area (P) sq. (11) loc. (002).



11. Ayyubid/Mamluk pottery sherds.



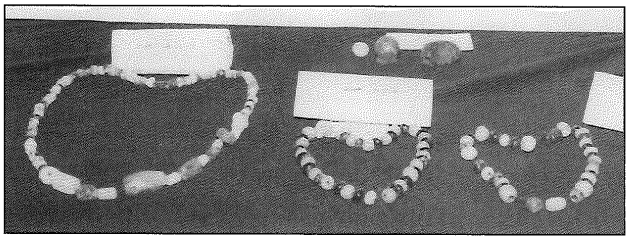
12. Ayyubid/Mamluk jars (sugar pot and glazed jar), area (S).



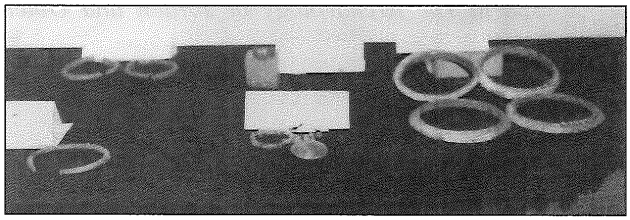
13. The village on the Umm Qays acropolis. Late Ottoman period.



14. Ottoman coins, areas (K, P).



15. Bead necklaces, areas (K, P).



16. Four glass bracelets, and metal bracelets, areas (K, P).

The prospects for analyzing the ancient city nucleus are rather limited, since the builders of the Ottoman village flattened large parts of the acropolis (Kerner 1994: 54).

The layout of the Ottoman village seems to follow the original urban plan. The Ottoman houses incorporate many re-used decorative stones from the Graeco-Roman cemetery, such as inscriptions, architectural ornaments and tomb lintels, and many house courtyards still preserve their *īwān* or reception room (Weber 1990: 16).

Trading activities are also evident in the late 19th century architecture of Bayt ar-Rūsān (بيت الروسان), particularly in the use of the crossvault rather than the more typical north Jordanian system of transversal arches carrying a roof of wood beams. The second storey was added to the house when it served as official residence of Ottoman government's district magistrate (the *Kaimakam*). It has recently been restored and now serves as the site's archaeological museum (Weber 1990: 16).

During the excavation at the Decumanus Maximus in areas (K, P), numerous Ottoman coins dating to 1223 AH were found (**Fig. 14**). Additionally bead necklaces, bracelets and rings (**Figs. 15, 16**) that were found in tombs at area (K) sq. 32, tomb (1); sq. 38, tombs (1, 2); sq. 39, tomb (1) and area (P) sq. 5, tomb (1), suggest that it was a common traditions to bury the deceased with their jewelry in the late Ottoman period.

D.A. Tawalbeh
Department of Antiquities
Umm Qays Antiquities Office

Bibliography

Al-Bakhit, M.
1982 Jordan in Perspective: The Mamluk-Ottoman Period. Pp. 361-371 in *SHAJ* 1. Amman and London: Department of Antiquities.

Goussous, N.
1996 *Umayyad Coinage of Bilad Al-Sham*. First edition. Amman: Arab Bank.
Green, J. and Tsafrir, Y.
1982 Greek Inscriptions from Hammat Gadara. *IEJ* 32, 2-3: 77- 101.
Johns, J.
1992 Islamic Settlement in Ard al-Karak. Pp. 363-368 in *SHAJ* 4. Amman: Department of Antiquities.
Kerner, S.
1994 The German Protestant Institute for Archaeology and other German Projects in Jordan. Pp. 42-49 in *The Near East in Antiquity*. Vol. 4. Amman: Al-Kutba Publishers.
Mousa, S.
1982 Jordan Towards the End of the Ottoman Empire 1841-1918. Pp. 385-391 in *SHAJ* 1. Amman and London: Department of Antiquities.
Sauer, J.
1982 The Pottery of Jordan in the Early Islamic Period. Pp. 329-336 in *SHAJ* 1. Amman and London: Department of Antiquities.
1986 Umayyad Pottery from Sites in Jordan. Pp. 301-328 in *The Archaeology of Jordan and Other Studies*. Berrien Springs, Michigan: Andrews University Press.
Tell, S.
1982 Early Islamic Architecture in Jordan. Pp. 323-328 in *SHAJ* 1. Amman and London: Department of Antiquities.
Walmsley, A.
1992 Fihl (Pella) and the Cities of north Jordan during the Umayyad and Abbasid Periods. Pp. 377-384 in *SHAJ* 4. Amman: Department of Antiquities.
Weber, T.
1990 *Umm Qais Gadara of the Decapolis*. Amman: Al-Kutba Publishers.
Whitcomb, D.
1992 Reassessing the Archaeology of Jordan of the Abbasid Period. Pp. 385-390 in *SHAJ* 4. Amman: Department of Antiquities.
Yassine, K.
1988 An Archaeological Survey of Three Reservoir Areas in Northern Jordan, 1978. Pp. 209-270 in *Archaeology of Jordan*. Amman: University of Jordan.

BOOK REVIEW

***Cromlechs, Dolmen und Menhire,* by Udo Worschech. Beitraege Zur Erforschung der Antiken Moabitis (Ard El-Kerak), Band 2. Vergleichende Studien zu Vor- Und Fruehgeschichtlichen Grabanlagen in Jordanien. Veroeffentlischungen des Insitutes fuer Biblische Archaeologie an der Theologischen Hochschule Friedensau. Frankfurt am Main: Peter Lang. 2002. 130pp., 3 main chapters, a conclusion, 4 appendices, 37 drawings and 10 photos. Price: SFR 44,00.**

Any new evidence for the fourth and third millennium archaeology in Jordan is greatly welcome, a fact that makes this volume especially valuable. This book is a final publication of several seasons of survey during the years 1983-1990, conducted in the area that extends between Wādī al-Mūjib (وادي الموجب) and Wādī al-Karak (وادي الكرك), overlooking the eastern shore of the Dead Sea.

This survey aimed at registering and studying graveyards, tumuli, stone circles and other stone formations in the area under study. To date, no parallel study of these installations has been made. Also, the function of these structures such as whether they had religious importance has been questioned. To do so, the author found himself obliged to include studies of similar archaeological remains that are already published from the Mesad 'Aluf, northern Negeb, Har Yeroham, Ramat ha-Nadiv in Palestine, Sinai, Rujm el-Hiri in the Golan Heights and the Dolmen Field in Haldenslebener in Sachsen-Anhalt/Germany.

On pages 13-21 the author discusses the burial customs during the prehistoric periods in Israel/ Palestine by studying the characteristics of the various and different characteristics of the Tumuli and dolmens found in the Negeb area. Based on this study, he came to the conclusion (p. 17) that the circular tumuli and stone platforms should have served as religious symbols and the whole dolmen or tumuli field was a holy place.

The methodology adopted by the author for his discussion shows that all reached conclusions are based on intensive surface studies, while no other modern surveying methods such as remote-sensing or geo-magnetic surveys were utilised. It may be argued that the discussed installations from Mesad 'Aluf, Har Yeroham, Sinai and the Golan Heights — included in this book — are not stratigraphically related and are located in different geographical and environmental regions. In my point of view this may help in identifying the exact architectural type of the tumuli, stone circles and the *nawamis*.

Also, this part of the book does not include any study of the dolmen fields found in other parts of Jordan. Unfortunately, the author does not include any map explaining the locations of the sites mentioned in his study. For example, the Golan Heights never belonged to Israel, although the discussion of the megalith stones found at Rujm el-Hiri (p. 20) appeared under the main title *Vor- und fruehgeschichtliche Grabstaetten in Israel* (p. 13). Moreover, the figure 11 (Tumulus 736 from Ramat ha-Nadiv) and figure 13 of the tumulus published from Rujum el-Hiri have similarities with those found in the Arabian Peninsula, especially in the Gulf Area (Ibrahim 1982). Thus, it may be suggested that the excavated tumuli found in the southern Levant may regarded as an extension of those found in Saudi Arabia and the Gulf area. In addition, stone circles were also recorded from the surveys conducted in Saudi Arabia, especially the northern part (Abdul Nayeem 1990: 70-88; Ingraham *et al.* 1981: 69-71).

The study presented on pages 22-55 of this book constitutes the backbone of this publication, it includes an intensive discussion of the prehistoric burials recognized in the areas of the al-Karak region, the Jordan Valley and Wādī 'Arabah and entitled "*Vor- und fruehgeschichtliche Grabstaetten in der Ard el-Kerak und den Agwar*". In this part, the author presents a comprehensive literature study. However, he does not explain why he only includes the study of the dolmens found at the sites of Dāmiyah and al-'Aḍaymah (el-'Ademeh), located in the Jordan Valley, and excluded the ones found at other regions of Jordan such as Irbid, Jarash, Nā'ūr and Tall al-'Umayrī (page 22, note 6). The inclusion of these sites would have offered more variations of dolmen types, and helped in explaining why those found at Dāmiyah and al-'Aḍaymah are of the so-called *box-like* type with a

small opening used as an entrance, meanwhile the others found elsewhere in Jordan have an open side/sides.

The presented discussion of the excavated tumuli at Bāb adh-Dhrā' in 1977 (pp. 25-28) is very useful. In order to study the uncovered tumuli at ar-Rahā and Jabal Jarra (Gebel Garra) in Arḍ al-Karak, the author found himself obliged to compare them with those found at Bāb adh-Dhrā'. The study of the burials uncovered in 1983 at the site of Jabal Jarra and in 1998 at ar-Rahā al-Mu'arrajah offers more scientific information about the fourth millennium burial customs in Jordan. For example, the discussion of the Tumulus No. 374 found at the southern side of Jabal Jarra includes important information (pp. 31-33) that the excavators noticed fire traces on the human skeletal remains buried in some of the tombs. This has been explained as a ritual practice (p. 32) and the writer traced it back to the Natufian and the Neolithic periods in Palestine.

The author (p. 50) agrees with U. Avner (1984) and other researchers in identifying the Chalcolithic and Early Bronze Age tumuli "*cairn tombs*" as cult buildings that probably not only had a relation to the worship of the dead, but they were also a religious inheritance from one generation to another. Additionally, it has been proposed that the stone circles should have the same function.

Since the presentation of the burial found in ar-Rahā is typological (pp. 34-47) and has implications for drawing conclusions about the tombs, it is worthwhile to raise some questions about the dating. In fact, this study does not include any publication of pottery sherds or other objects, either surveyed or excavated, at ar-Rahā. Moreover, in order to date the uncovered tomb installations, the author followed a parallel study with other similar installations found in the area, such as those uncovered at Mishor Har Uhot in Palestine (Haiman 1992: 38, fig. 15).

To study the so-called *Menhires* and identify them as *masseb Ot-Heiligtum* (open-sanctuary) by the author (p. 49) instead of explaining them as standing stones, an example is offered from the site of Adir, near the city of al-Karak, which were first published by Albright (1924) and dated to the Early Bronze Age. It should be pointed out that similar standing stones were also found at ar-Rajājīl in the Jawf region of northern Saudi Arabia (Abdul Nayeem 1990: 88, fig. 3.15).

To conclude, the author suggests a date for the Dolmens and Tumuli that extends from the Chalcolithic through the Middle Bronze Age. However, there are indications that the Dolmens were still in use even through the Byzantine period. This date is based mostly on the architectural types of these features. Also, it has been remarked that the Early Bronze Age dolmen fields were built very close to the settlements; meanwhile the Chalcolithic ones had no connection with any inhabited areas. These observations are important because, whereas Worschech is surely correct in noting that at al-'Aḍaymah (el-'Ademeh) no Chalcolithic settled area was recognized, in addition, as far as we know from the unpublished soundings made at the dolmen fields of Zahar located to the northwest of the city of Irbid, neither skeletal remains nor stratified pottery sherds were obtained, this may enforce the research method adopted by Worschech of considering the variations in the architectural types as a way of dating. However, I still think that this method may apply for identifying tomb/architectural types and not for dating purposes.

On pages 56 to 73 entitled *Archaeologische und religionsgeschicht Anmerkung zum Steinkult in der Ard el-Kerak*, Worschech presents a comprehensive descriptive study of the stone circles and menhires uncovered in Arḍ al-Karak. He proposes that the stone circles must have some kind of relation with the cult of death. He also adds that most of the collected pottery sherds from the areas of these circles and standing stones are mainly dating to the Chalcolithic, less to the Early Bronze Age and a very few to the Middle Bronze Age (p. 61). Additionally a study of the mile-stone types is presented. Unfortunately, in his study Worschech could not go beyond his background as a biblical archaeologist. Thus, he agrees with other biblical scholars in identifying the word menhir with the Hebrew name *mezbah* and tries to deduce the function of the standing stones from what was stated in the Old Testament (p. 62). Also, he sees that the standing stones and stone circles are holy symbols and tries to compare this with what was stated in the Old Testament (p. 65). In my point of view, this is speculation and there is no archaeological evidence that shows that the stone circle may represent a *haram*. However, it may be suggested that the standing stones were markers for the people who want to sacrifice something to the GOD. Thus, the stones themselves had no religious meaning but the places where these stone were put was the holy area.

On pages 70-71, Worschech considers the graveyards surveyed in ar-Rahā of great religious importance and tries to rely in his explanation on what was mentioned in the Old Testament (Gen. 31:45-46). It must be stated here, that such a research method does not help in understanding the uncovered archaeological remains but rather tries to prove what the biblical narratives say.

In spite of the biblical influence in interpreting

the cromlechs, dolmens and menhirs recorded in the Karak region, this volume contains a good number of useful observations and conclusions. It serves well as a detailed account of some studied archaeological evidence from southern Jordan. It is hoped that more work will be done on this subject to provide further understanding of the date and function of those archaeological remains.

Zeidan A. Kafafi
Institute of Archaeology and Anthropology
Yarmouk University
Irbid - Jordan
zeidank@yahoo.com
http://www.go.to/kafafi

Bibliography

Abdul Nayeem, M.
1990 *Prehistory and Protohistory of the Arabian Peninsula, Vol. 1 Saudi Arabia.* Hayder Abad: Hayder Abad Publishers.
Albright, W.F.
1924 The Archaeological Results of an Expedition to Moab and the Dead Sea. *BASOR* 14: 2-12.
Avner, U.
1984 Ancient Cult Sites in the Negev and Sinai Deserts. *Tel Aviv* 11: 115-132.
Haiman, M.
1992 Cairn Burials and Cairn Fields in the Negev. *BASOR* 287: 25-45.
Ibrahim, M.
1982 *Excavations of the Arab Expedition at Sar el-Jisr, Bahrain.* Ministry of Information.
Ingraham, M.L., Johnson, T.D., Rihani, B. and Shatla, I.
1981 Saudi Arabian Comprehensive Survey Program: c. Preliminary Report on a Reconnaissance Survey of the Northwestern Province (with a Note on a Brief Survey of the Northern Province). *Atlal* 5: 59-85.

COMMENTS ON SOME RECENT ARTICLES PUBLISHED ON GERASA/JARASH

Jean-Pierre Braun *et al.*: The town plan of Gerasa in AD 2000. A revised edition (*ADAJ* 45, 2001)

In the last issue of the *Annual of the Department of Antiquities of Jordan* (vol. 45, 2001, pp. 433-443), Jean-Pierre Braun presented an updated version of the plan of the archaeological remains of the antique city of Gerasa (modern Jarash جـــرش). Accompanied by a short article of three pages, this plan was intended to replace that published in 1938 by C.H. Kraeling (Kraeling 1938: plan I).

Since the Second World War and the excavations carried out by the members of the Anglo-American mission, the fortuitous discoveries, the more or less extensive digging and the programmed excavations carried out, in particular within the framework of the "International Jerash Project" (1982-1986) have considerably increased our knowledge of the ancient monuments of the city. An update of the overall plan of the site was essential.

In 1980-1981, a new general plan of the city was made by the members of the Italian mission in charge of the study of the sanctuary of Artemis. This basic topographical survey, with in particular the establishment of many fixed reference points, had made it possible to reposition very precisely the principal noteworthy elements of the monuments then visible, the topography being conveyed by contour lines. Unfortunately, details of the various uncovered structures were not reproduced on this document published in 1984 in *Mesopotamia* (Gullini 1984).

Carried out as "...an integral part of the Jarash Visitor Center Project..." (p. 433 note 1), the "Town plan of Gerasa in AD 2000" drawn up under the direction of Jean-Pierre Braun thus fills an important gap by offering for the first time for more than half a century a global and faithful vision of the whole site and its archaeological remains. Probably computerised, although the text accompanying it does not specify it, this document will be invaluable for the researchers working on antique Gerasa. Each monument known at the present time is drawn there with precision, and a reference number refers to an additional list of the 44 "numbered buildings". This list comprises the name of the monument, its nature, the type of document used for its illustration ("corrected plan", "new plan", etc.) and a bibliographical reference on the origin of the latter.

If the scientific interest and graphic qualities of the plan presented are undeniable, two minor remarks can be made:

- although they do not appear on the figure provided, probably because of the large element of reduction, the level lines were certainly integrated into the data base. Their absence on a document of such a quality would be surprising: the very particular topography of the site constitutes one of the fundamental factors governing the urban development of Gerasa, and a very precise topographic plan has existed since the work completed by the Italian team;
- more curiously, for a document that is "updated", it does not seem that the plan of current Jarash was updated. Documents used (land registers) go back at least about fifteen years. When one knows the profound changes that occurred in recent times in the modern city — with the con-

ceivable effects on the various buried ancient remains — one can only regret this gap in the "update", in particular at the area the Eastern Bath complex.

These remarks do not take anything away from the graphic qualities and the archaeological interest of the new plan. On the other hand, the text added to the figure holds a few surprises:

- The lack of definitions making it possible to understand precisely what the author meant by "corrected plan", "replaced plan", and "new plan", terms used to describe the graphic documents illustrating each monument, is extremely annoying. If one trusts the generally accepted definition given to these various terms, "corrected plan" would mean that the old document was simply corrected or modified on certain minor points; "replaced plan" would indicate a new plan replacing a document considered to be obsolete; and "new plan" would correspond to the drawing of a completely unknown monument at the time of C.H. Kraeling. Several examples illustrate these definitions well: the Hadrian Gate (n°1), whose plan would have been simply "corrected" since the architectural study carried out by A.H. Detweiler, the hippodrome (n°3), where the plan drawn up after the recent excavations replaces the old American document, or the "new plan" of the "House of the Blues" (n°10), are buildings completely unknown to the Anglo-Saxon excavators. Also perplexing are the "corrected plans" of the "Church of Bishop Marianus" (n°2), of the "Umayyad House" (n°12), of the "Chapel/Artemis Terrace" (n°23), of the "Roman villa/Umayyad mosque" (n°25), of "Bishop Isaiah Church" (n°29), all of which are buildings excavated or released recently and therefore were not reproduced on the Anglo-Saxon plans. In the same way, what to think of the "new plan" of the "Temple C" (n°18) or of the "Church of the Prophets, Apostles and Martyrs" (n°44), excavated in 1930 but today re-buried or completely destroyed and whose plans can certainly not be done "again". The imprecise and contradictory uses of the terms employed lead to multiple interpretations and errors.
- The "References", placed at the end of the article and supposed to give the origins of the illustrations appear in the form generally adopted for the bibliographies. However, most suffer from some interpretation and approximation by the author. Some examples are:
- from the first reference, p. 435, four of the five authors of the article are omitted (a contribution by Ball W., Bowsher J., Kehrberg I., Walmsley A. and Watson P. and not simply Ball W.) and the title of the article, is inaccurate ("The North Decumanus and North Tetrapylon at Jerash. General Plan of the area of excavations" in place of "*The North Decumanus and North Tetrapylon at Jerash. An archaeological and architectural report*"). The reference to "figure 15, page 380" does not correspond to the tetrapylon but to the northern decumanus. The figure mentioned is in fact on p. 372 and carries the n° 11;
- in the same way, "Goguel A. 1992 in *Diploma of Architecture*, Paris EAPB" does not exist as such: in addition to the fact that this diploma of architecture is not published (they rarely are), the work presented by A.-C. Goguel was entitled: "Gerasa Jerash, du cardo au minaret. Un héritage romain au Proche-Orient". The referenced plan of the East Bath (n°37), which is taken from that "diplome d'architecture" is an unpublished document. As for the copies visible at the D.A.J. and IFAPO Amman, that plan carries the following reference "IFAPO Mission Jerash, Jerash Thermes de l'Est, Etat existant et restitution partielle, J. Seigne, A.-C. Goguel, 25.12.90". A copy was made available to A.-C. Goguel within the strict framework of her diploma. The plan is reproduced here without authorisation;
- as for A.A. Ostrasz, if he signed the drawings illustrating the two articles mentioned under his name for 1986, these articles were written respectively by M. Gawlikowski and by M. Gawlikowski and A. Mussa. Let us also remember that the title of first of them is *A Residential Area by the South Decumanus*, not "The Umayyad House";
- in the same way, it is certainly with some surprise that G. Schumacher would see the plans of the "Roman Villa/Church" (39) and of the "Domestic Byzantine Baths" (41), published under his name. Contrary to quoted information, these buildings are not reproduced on plate 6 of the *ZDPV* 25 of 1902. And for a simple reason, they were only excavated in March and April-June 1986 respectively, during archaeological rescue operations carried out by the representatives of the D.A.J. The plans, drawn up by the members of the French archaeological team I directed at Jarash between 1982 and 1996, are unpublished. Left in the files of the IFAPO they are published here without my authorisation, with a pseudo reference going back to one century ago. As for the name of monument 39, it is unreliable and it is advisable to keep only the denomination "church" for this church which was never a "Roman Villa";
- strangely also, and despite a very thorough reading of the document published in 1902 by G.

Schumacher, since it enables J.-P. Braun to see on it monuments that are not mentioned or drawn, Braun gives an inaccurate site for the "House -of the mosaic- of the Muses and Prophets" (43), whereas the plan of the German archaeologist is the only currently known document that makes it possible;

- as for, P. Watson, F. Zayadine or myself, we never wrote articles entitled "A Byzantine House", "The House of the Blues", "Sanctuary of Zeus" or "general plan of sanctuary of Zeus";
- similarly, if I did write an article with Ibrahim Zu'bi, it was also signed by P.-L. Gatier and M. Piccirillo. This article was published in 1994, and not 1997, in *Liber Annuus* XLIV (pp. 539-546) and not in "*Les maisons dans la Syrie antique, du III° millénaire aux débuts de l'Islam*, C. Castel *et al.* (eds.), *BAH* 150". Its title was: "Note sur une mosaïque à scène bachique dans un palais d'époque byzantine à Jerash" and not "Roman Villa".

In my opinion: confronted by such a mass of inaccuracies on a scientific level, the work of J.-P. Braun *et al.* requires entire redoing.

What seems to me also very serious is that this work was used for the preparation of the "... permanent exhibition of illustrated panels - copyright IFAPO - explaining the ancient monument and history of Jarash" (p. 433 note 1). A visitor would then be astonished to see, for example, the photograph of the water canal of an Ottoman mill captioned "Roman aqueduct" (Jarash, Visitor Centre exhibition panel).

Fortunately, the plan remains. In the final analysis the only regret that one can have with the reading of this article is that the author saw fit to add a text to the plan published. These pages, with many errors, throw discredit upon the remarkable graphic document prepared by the team of architects, topographers and draftsmen.

Ina Kehrberg and John Manley: New Archaeological Finds for the Dating of the Gerasa Roman City Wall (*ADAJ* 45, 2001)

In the same issue of the *ADAJ*, pp. 437-446, Ina Kehrberg and John Manley present the first interpretations of a survey they carried out at the foot of the city wall of Gerasa, to the northwest of the South Theatre. The results obtained would be particularly interesting insofar as they would enable us, according to authors, to date the construction of this part of the wall encircling the city "...within the first quarter of the second century AD..." (p. 445). The importance of the dating suggested will not escape anybody insofar as it agrees neither with the assumption of C.H. Kraeling, who estimated the construction of the city wall some years after the first Jewish revolt (Kraeling 1938: 41), nor with the recent analyses attributing the construction of the wall to the turn of the third/fourth centuries (Seigne 1986). So, and as the authors emphasise in their text, the results of this survey would again raise the question of the urban development of Gerasa, in particular that of the date of the installation of its town planning, and that of the causes behind the construction of the wall.

However, the reading of the article, written by experienced archaeologists (J. Manley is Chief Executive of Sussex Archaeological Society, the U.K., and I. Kehrberg is IFAPO Fellow 1998-2000: excavation co-ordinator and ceramicist), is somewhat surprising.

First of all, it is advisable to recall that the city wall of Gerasa, even if it has suffered much these last years, remains perfectly recognisable on almost the whole of its layout, to the extent, as the authors emphasise once again, that it appears "...among the best preserved of any in the Graeco-Roman Empire". Except for the late repairs, of which much is dated by inscriptions, all later than the fourth century (Welles 273, 274, 275, in Kraeling 1938: 467-469, and F. Zayadine 1981: 346), the city wall appears completely consistent. The wall, on average 3m in width, consists of a mass of large stones mixed with earth, placed between two facings of large square soft limestone (known as *nari*) with large embossing. Regular rows, from 0.50 to 0.60m in height, present light constructive recesses of a few centimetres in width. Every 17/22m the curtain is reinforced by a tower of square plan (+6m in width), massive in its lower part. More than one hundred of them are attested along the 3450m length of wall.

Because of this homogeneity of construction, the observations carried out in one point of the enclosure can thus be extrapolated to the whole, at least for the determination of the phase of construction. This is naturally what the excavators propose.

On the other hand, in an article that focuses on stratigraphy and the archaeological material, the total lack of drawings is much more astonishing: not a stratigraphic section, not a drawing, not a single profile of ceramics. All are replaced by photographs, and those devoted to the ceramics are taken directly on an opaque support and thus with important cast shadows making the reading of the sherds somewhat random. The absence of the expected graphic documents and the poor quality of the photographs reveal a quickly undertaken work, at least at the level of the publication. In particular, the lack of reliable documents does not make it possible for the reader to get a precise idea of the exca-

vation and material discovered.

As for the text, it conceals other surprises in my opinion:

1. A first *a priori* can be noticed on the chronology suggested for the walls in large rectangular blocks of soft limestone with embossing: "...the rustic embossed blocks — of the city wall — are a common feature for massive supportive wall constructions in Roman Gerasa, best seen in their original state at the two theatres and the hippodrome, dating from the late first to about mid-second AD..." (p. 339). Contrary to what is written, this type of wall is witnessed in Jarash from the first half of first century onwards, at least (the retaining wall of the lower terrace of the sanctuary of Zeus dates back to 27/28). One also meets it in constructions of the third century like at the North Theatre whose walls supporting the *summa cavea*, in large rectangular blocks with embossing, would have been built in the first half of the third century (Clark, Bowsher and Stewart 1986: 229). As for the hippodrome it is not certain that it was fully completed when it was first used, in the first years of the third century (Ostrasz 1989: 51-77). This type of wall structure with large embossings is very common. It cannot be used as a criterion for precise dating. In no way does it make it possible to fix *a priori* the date of a construction.
2. In addition, when the authors write "...excavating the foundation of the city wall... was first done by three soundings, one in 1997, and two in 1998..." (p. 437), they miss the excavations — and not surveys — carried out in 1982 and 1983 between the South Gate and the sanctuary of Zeus, excavations partly published since 1986 and to which they refer elsewhere (footnote 2 and bibliography: Seigne *et coll.* 1986: 29-105). This oversight is incomprehensible since the remains of the city wall, including its foundations, are perfectly visible today. Restoration work that we completed in 1986 between the South Gate and the sanctuary of Zeus aimed in particular at presenting to the public the various preserved elements of the Roman installations discovered at the foot of the city wall as well as the structure of the latter. For more than 15 years, all the visitors have been able to see, under the foundations of the fortification, the olive crushing machine and the double screw press with direct action of an old oil mill. The majority of the guides show these restored remains to their groups of tourists. They are used by them to prove, materially, that the city wall was built only after the destruction and the abandonment of the oil mill and the artisanal district that was associated with it. In being limited to that excavation, the dating suggested for the city wall rested on the discovery, under the massive enclosure wall, of wide architectural structures, well preserved and perfectly understandable, associated with a very large group of archaeological material (several hundred objects) very often complete, such as ceramics, glass-making and metallic finds, objects coming from a level of destruction, perfectly sealed, datable to the end of the third/beginning of the fourth century by tens of coins, two hoards and a foundation deposit. This oversight would hardly be of importance if the results of the excavation of 1982/1983 had not had their origins in the complete re-examination of the fortifications of Gerasa and the critical analysis of the arguments put forward by C.H. Kraeling for their dating. It is this research, associated with the architectural studies and the cross-checking then carried out on the whole of the city wall, which made it possible for the construction of the enclosure to be set in the reign of Diocletian (Seigne *et coll.* 1986: 55-59).
3. Comparatively, the excavation carried out by I. Kehrberg and J. Manley corresponds to a simple and limited survey, in which the city wall constitutes the only true construction found to date. Moreover, this survey was done in an area that the "...Department of Antiquities had already cleared... of blocks from the city wall tumble...", which, with the statement of the excavators "... helped us reach archaeological levels almost from the onset of the excavation" (p. 438). This sentence implies that the authors did not regard the collapsed wall as archaeological levels, and the preliminary destruction (in what conditions and down to what level?) of one or several layers, probably undisturbed and sealing the underlying levels, was seen as an advantage. The simple reading of the report shows on the contrary how much it is regrettable that the excavators did not choose another site, sealed and still protected by the level of collapsed parts of the city wall. Indeed, the various photographs of the excavation, like the comments, reveal that no really stratified level, with superposition of well-marked floors of occupation, was encountered. Stratigraphy comes down to three fills: the first one, cut by the " foundation trench" to allow the construction of the wall (let us admit it in spite of the presence of several buried rows of blocks of the facing with embossing which, everywhere else on the site, appeared only on the level of the ground), the second corresponding with the filling of the foundation trench, the

third up against the wall and covering both the previous ones. There is no intermediate clear ground level, and no unquestionable layer sealing these massive contributions of material deposits. Most of all, the material coming from a fill can provide only one possible *terminus post quem* for its setting-up but no information on the date of its installation. In other words, a fill containing homogeneous material from the beginning of the Roman era and whose latest element would be a Trajan coin cannot have been formed before the beginning of the second century, but its installation could result from earth-moving carried out by means of a bulldozer a few decades ago.

In the same manner, the assertion according to which the presence in the fill of ceramic material ascribable to burials (which is not absolutely shown) would mean that "... this part of the city wall belonged previously to the south-west necropolis..." (p. 440) appears unjustified. It indeed supposes that the dumping was done on the spot, which is not proven. In the same way, the presence of a necropolis remains an assumption, one more *a priori*, without real foundation until the discovery of tombs. One can on the contrary wonder whether this "...deep wadi bed..." (p. 438), area at the same time of violent gully erosion and strong alluviation, was really favourable for the establishment of a necropolis: everywhere else on the site, the tombs were placed on or on the side of a hill; never in easily flooded areas.

Whatever it is, and even if the principal dump layer really had been created on the spot, and the "construction trench" really were a building trench, the only possible conclusion would be that the wall can only be later than the latest material contained in the fill. However, this fill would contain "... homogeneous first century BC and BC/AD ceramics with few types dating up to the end of the first century AD and possibly going into the early second century" (p. 440). This "homogeneity" of two centuries/two centuries and half, makes it possible to set the construction of the wall no earlier than the first half of the second century, but nothing prevents it being later, possibly much later. Only the most recent material coming from the filling of the foundation trench and that of the "post fill context" could possibly give the date of its construction precisely.

However, the first "Construction Context" appears very similar to the "Preconstruction Context", so much so that the excavators estimate that "much of the foundation fill in that spot derived from the excavated debris of the foundation trench" (p. 440). The second, "the Post-fill Context" — that nothing in the documents and information provided makes it possible to distinguish from the filling of the "Foundation Trench" — in the final analysis contained the same type of material supplemented by some fragments of "Gerasa lamps". The examination of the survey like the reading of the text of Kehrberg and Manley shows that the "Construction Context" and the "Post-fill Context" could only be considered a single level, to a large extent and perhaps entirely, composed of spoil from the foundation trench.

The absence of any really datable stratified level above these fills, following the clearance done by the Department of Antiquities, shows well the weakness of the arguments and the conclusions put forward by Kehrberg and Manley, more especially as the dating of the archaeological material discovered appears somewhat crude. Thus fragments of lamps whose "...forms originating in the second century..." and dated "...by Kehrberg until the mid second century..." are finally allotted to the beginning of the second century, just like the "pinched handle fragments" ascribed to the "Construction Context" and "...traditionally dated from the later second century in Jarash...". The latter are finally regarded as older only because of "...its paucity in Gerasa until it becomes common late in the second century AD..." which "...may also speak for an introductory phase of our fragments at the beginning of the second century AD".

In spite of these uncertainties, and in spite of the fact that knowledge on the typology and the chronology of local common ceramics is still in its infancy, the authors do not hesitate to conclude "...this puts the construction for the foundation of the city wall here firmly into the first half of the second century, and most probably in the first quarter due to the greater, even predominant, mass of first century AD pots and lamps, only very few of earlier second and lack of mid to late second century forms" (p. 443). Here lies the major problem raised by this article: Ina Kehrberg and John Manley insist on the most remarkable old material and on the relative number of found objects, losing sight, so it seems, of the fact that the only possible dating of an archaeological level, whatever it is, can be provided only by the latest material which it contains.

In a former publications of Kehrberg, an article devoted to the material discovered during the excavations of the "cathedral", she wrote about the ceramics found in the trenches of the foundation of the temple having preceded the church that "...due to the make-up of the deposits and the high percentage of first rather than second century wares and forms, the deposit should probably be dated to

the early second century AD rather than later, possibly even to the very beginning of the second century AD". This very personal interpretation came after the assertion, some lines above, that "...the nature of the assemblages from all loci (temple foundations) is similar to deposits of foundation trenches from other Roman buildings of Gerasa dated to the second century A.D. (e.g. the Temple of Artemis, esp. the great altar on the temenos, the Hippodrome, the North Theatre, both decumani and most recently the Upper Temple of Zeus)" (Kehrberg 1997: 311-320). However all the quoted monuments are dated, at the earliest, to the second half of the second century of our era, the majority by inscriptions.

4. Lastly, and even if their analysis had been correct, the authors seem to have forgotten that one archaeological indication, however disconcerting and precise it may be, is only one element of a study which must be total. Only the comparison of this evidence to the whole of the information available, pointing in the same direction or not, can make it possible to work out a conclusion, i.e. the most probable assumption at the time given. This comparison is not even outlined, the excavators took the results of their only trench as the only possible solution. The simple examination of the side faces of the North Gate, well dated to 115 by two inscriptions (Welles 56 and 57), would have shown the authors that the fortification could not be attributed to Trajan: the monument was designed as an independent arch, not as the gate of a city wall. Neither of its two side faces shows the least sign of connection with a wall. It is only later on that the fortification rested on it.

Several *a priori*, omissions, errors, dating of the material with variables that I see as systematically adapted to the sought conclusion, and unawareness of certain elementary bases of archaeological study, pack the article by Kehrberg and Manley. While to err is human, the accumulation and the repetition of errors and *a priori* by professionals should be commented on, especially when the interpretations given try to establish pseudo archaeological facts without a real comparative analysis of the whole of the data available being simply outlined.

This article, also published in a shortened form in the *AJA* (Braun, Kehrberg and Manley 2001: 446-447), is representative of a hastily produced announcement where the basic data retrieval and checking was not thorough.

In a world of excessive communication, where only the exceptional and the immediate counts, it is unfortunately symptomatic to note that some authors no longer even await the publication of such "results" before using them, without checking or cross-checking, in their own "evidence". Thus, for example, David Kennedy, on information Kehrberg provided for the surveys of 1997/1998, wrote: "...there is the recent observation made at Jerash after some clearance along the western wall. It was noted that dumps of pottery had been placed against the wall in one place and that this included material dated to the late 2nd/early 3rd century. In short, the pottery implies a date earlier than the late 2nd century AD for the wall" (Kennedy 1998: 58). It is regrettable that this information was not cross-checked, as in 1997/1998, the material coming from the "dumps of pottery" accumulated against the city wall was dated from the late second, beginning of the third century.

In spite of their "evidence", I believe that Kehrberg and Manley are really a long way from having produced proof of a date "... probably Trajanic..." for the construction of the city wall of Gerasa, even "... at least in that section" (Braun, Kehrberg and Manley 2001: 447).

Jacques Seigne
CNRS, Institut de Recherche sur l'Architecture Antique
Tours - France

Bibliography

Braun, J.-P., Kehrberg, I. and Manley, J.
2001 IFAPO Report. *AJA* 105/3: 446-447.
Clark, V.A., Bowsher, J.M.C. and Stewart, J.D.
1986 The North Theatre, Architecture and Archaeology. Pp. 205-302 in F. Zayadine (ed.), *Jerash Archaeological Project I.* Amman.
Gullini, G. (ed.)
1984 *Gerasa I, Report of the Italian Archaeological Expedition at Jerash. Campaigns 1977-1981.* Mesopotamia 17-19. Firenze.
Kehrberg, I.
1997 The Pottery and others Finds. Pp. 311-320 in C. Jäggi, H.-R. Meier and B. Brenk, New Data for the Chronology of the Early Christian Cathedral of Gerasa. *ADAJ* 41.
Kennedy, D.
1998 The Identity of Roman Gerasa: an archaeological approach. *MA* 11: 39-69.
Kraeling, C.H. et al.
1938 *Gerasa, City of the Decapolis*. New Haven.
Ostrasz, A.
1989 The Hippodrome of Gerasa: a report on excavations and research 1982-1987. Pp. 51-77 in *Jerash Archaeological Project II.* Lyons and Amman.
Seigne, J. *et coll.*
1986 Recherches sur le sanctuaire de Zeus à Jerash, octobre 1982 décembre 1983. Pp. 29-106 in F.

Zayadine (ed.), *Jerash Archaeological Project I.* Amman.

Zayadine, F.

1981 Recent Excavations and Restoration by the Department of Antiquities (1979-1980). *ADAJ* 25: 341-355.