

OCCIDENT & ORIENT

Newsletter of the German Protestant Institute of Archaeology in Amman



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CONTENTS

• Gadara church	2
• Copenhagen conference	3
• Site conservation	4
• Watershed management	6
• Petra church	7
• Fellows in residence	9
• Petra Great Temple	10
• Manfred Lindner, 80	11
• Tell el-Hammeh	12
• Yitim, Maqass digs	14
• Tell Deir Alla	16
• Baptism site project	19
• Umm Ratam	21
• Al-Baseet site	22
• Feinan smelting	23

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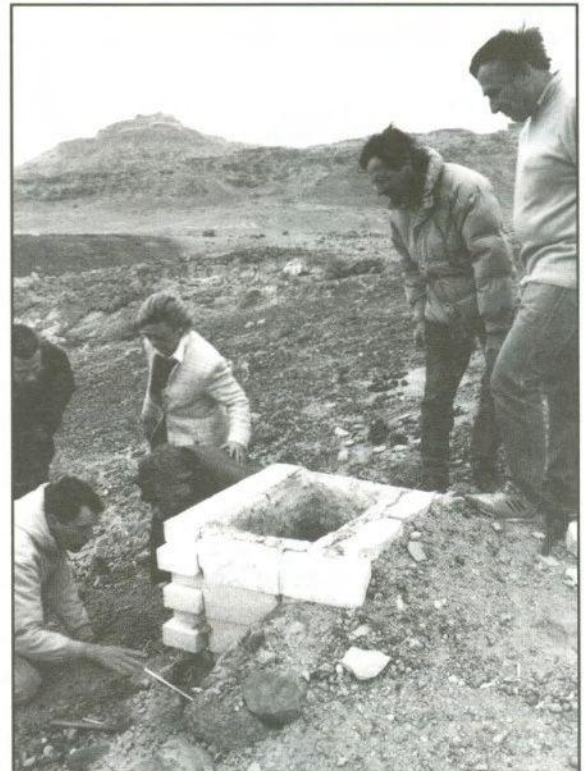
Archaeology and the Year 2000

The forthcoming events celebrating the turn of the millennium are beginning to impact on the tourism sector in Jordan. Archaeological sites are being developed for the Year 2000, especially sites with a religious tradition. The excavations of sites along the Wadi Kharrar, in the Jordan Valley, which are associated with the life of John the Baptist, are one focus of that policy. It is emphasized by the Ministry of Tourism's slogan for the year 2000: "Bethlehem to Bethany Beyond the Jordan, from Birth to Baptism". The excavation of a nearly square-shaped Byzantine church at Umm Qais turned out to be the first five-aisled basilica ever found in Jordan. The design of the church, which also incorporates an underground Roman mausoleum, may have commemorated Jesus' miracle of the Gadarene swine, which is mentioned in Matthew 8:28.

Furthermore, archaeological excavations at Aqaba revealed a structure that could be the oldest church in the world. So, archaeology and recent discoveries are turning out to be profitable resources for touristic development.

The past months have also been a very active time for the institute, whose future seems secure, thanks to

the support of the Crown Prince, H. R. H. El Hassan bin Talal, the German Embassy, and many other institutions and people. With the support of the



German ambassador to Jordan Peter Mende (far right) and Dr. Hauptmann next to him watch the preparation of the Early Bronze Age smelting simulation in Feinan.

institute, archaeological investigations and excavations have taken place in Wadi Feinan (see contribution by Hauptmann) and Umm Qais (see contribution by Weber). Further fieldwork is planned for August, September, October and November. A number of lectures, in cooperation with the German Speaking Congregation in

(continued on page 20)

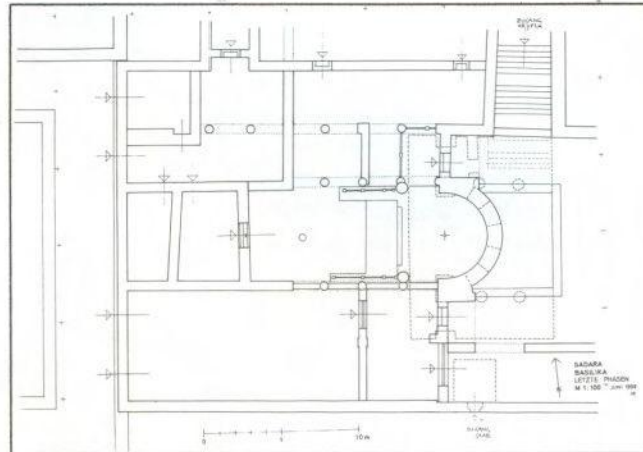
Gadara 1998: An Early Christian Pilgrims Complex Uncovered

By: Thomas Weber, University of Mainz (Germany)

An early Christian Church of unusual five-aisled type has been uncovered by German archaeologists from Mainz University, within the lower city of Gadara. This sacred building was erected during the first half of the 4th Century A. D., on top of an underground early Roman mausoleum. This sepulchral structure had been enlarged during the early Byzantine period in order to receive the shaft tombs of the christianized Gadarene nobility. The whole complex is situated in the immediate vicinity of a city gate dating to the early 1st Century A. D. This gate spanned the road between Gadara and Tiberias, its circular towers probably originally serving as offices for publicans. In accordance with previous archaeological research at this site, both the gate and the underground tomb mark the western city border at the time of Christ.

The entire underground structure, consisting of the Roman tomb and the Byzantine crypt, had been overbuilt during the reign of Emperor Constantine I or his sons by a five-aisled basilica which was used for memorial worship and pilgrim processions. The main entrances to the rectangular building are in the western wall, where a huge courtyard with colonnaded halls has access to a street. The Christian veneration obviously focused on the old mausoleum, which occupies the space under the central nave of the church. In front of the entrance of the mausoleum, a holy person

was buried whose stone-lined tomb was framed by an apse of semi-circular plan oriented to the east. This structure supports the apse of the church, and



Groundplan of the five-aisled basilica at Gadara; the 4th Century A. D. original phase and the later occupations (plan by U. Hess).

the Byzantine tomb occupies the space underneath the altar-zone. Four arcades consisting of granite column shafts with marble bases and corinthian capitals divide the interior of the basilica into five aisles. Two doorways on both sides of the apse connected the two inner lateral aisles



View of the excavated basilica at Gadara, looking north-west (Photo by T. Weber).

with a balustrade which allowed processions around the sacred space of the mausoleum and the crypt.

The space around the altar was raised by a platform accessible via three flat steps towards the central nave, and it was screened by marble slabs. Traces of screens were also found around a column base of the southern arcade of the central nave. This feature indicates the presence of a tabernaculum of a reliquary attached to this column. The floor was found covered by a coloured mosaic dating to the early 6th Century and showing repairs at many spots — the latter possibly indicators of earthquake destructions or iconoclasm. The central nave and the two first lateral aisles show simple geometrical patterns framed by a narrow band of alternating lotus-buds. The outer aisles are adorned by mosaic panels with floral vignettes.

During the Umayyad period the church was reduced in size to the altar zone only, possibly a consequence of major damage caused by a severe earthquake. This limitation of space may also reflect a decline of the Christian community towards the beginning of Abbassid rule. Finally, the Christian structure was converted into a mosque during the time of the Crusades, indicating that the sepulchral cult of the site continued in the Islamic era.

Considering the plan of the Gadarene church, one should first point to the fact that this five-aisled type is

thus far unique east of the Jordan River. It finds closer parallels in the building activities of 4th Century AD Palestine. Outstanding examples are the Holy Sepulchre in Jerusalem and the Nativity in Bethlehem, both built with grants from the imperial house of Constantine and later renovated during the reign of Justinian. It is evident that the Gadarene basilica was built in order to commemorate an important event or saint. Regarding

the central position of the Roman tomb and the remains of the nearby city-gate, both integrated into the early Christian complex, one is tempted to connect this building with the New Testament episode of the demoniæ and the swine (Matthew 8: 29-39).

According to the comments of the Church Fathers, this miracle was of major importance for the Christian community of Gadara. Further

evidence for the cult of this church might be derived from some 300 fragments of a coloured wall mosaic with remains of a Greek inscription.

The newly excavated church at Gadara should be considered as an important example of early Christian architecture in Jordan, and a historical monument for the symbiosis of the world religions of Christianity and Islam.■

7th International Conference on the History and Archaeology of Jordan, held in Copenhagen, Denmark

By: George Findlater, British Institute at Amman for Archaeology and History, Amman (Jordan)

The 7th International Conference of the History and Archaeology of Jordan (SHAJ) was held in Copenhagen under the patronage of H.M. Queen Margrethe of Denmark and H. R. H. Crown Prince El Hassan bin Talal of Jordan. The week-long conference, June 14-19, 1998, was organised by the University of Copenhagen and the Department of Antiquities of Jordan. Entitled "Jordan by the Millennia", the conference opened, in the presence of Her Majesty and His Royal Highness, with a speech by Mr Kjeld Møgaard, Rektor Magnificus, University of Copenhagen, who welcomed all the delegates to Denmark and wished success to the conference. Dr. Ghazi Bisheh, Director-General of the Department of Antiquities, expressed his thanks on behalf of the delegates. Dr. Strange then thanked everyone who helped in the organisation. His Royal Highness delivered a speech emphasizing dialogue amongst scholars, urging them to explore themes of commonality instead of the differences between peoples.

Set in the maritime surroundings of the Eigtveds Pakhus, a converted

warehouse, the conference was structured by the millennia. Ten plenary sessions from keynote speakers introduced each millennium, from pre-8 mill. B. C. to 2 mill. A. D., which were followed by morning and afternoon sessions. Covering all aspects of the archaeological record, many sessions ran concurrently, as

speaker after speaker unfolded the long and complex story of Jordan's heritage. Central themes to the study of Jordan's past were further discussed in a series of workshops. Topics ranged from pottery and regionalism to second-millennium models for the Islamic centuries.



Group photo of the conference participants at Copenhagen.

One workshop of note, organised by a committee from the foreign institutes in Amman under the direction of Alison McQuitty, Director of BIAAH, focused on "Conservation, Heritage and Site Management". The workshop, opened by Dr. Bisheh, highlighted problems in the areas of conservation and heritage management, using particular case studies from Petra, Amman and Wadi Feinan, and discussed possible solutions. The success of this workshop has led to the formation of a committee to ensure on-going co-operation in this field among the national and foreign institutions in Jordan.

Over 150 scholars from around the



Queen Margrethe of Denmark, flanked by Their Royal Highnesses Crown Prince Hassan and Princess Sarvath, at the opening of the conference.

world attended the conference. Aside from the busy academic schedule, however, delegates also enjoyed a series of receptions. The first, hosted by the Lord-Mayor of Copenhagen at the City Hall, welcomed delegates to

the city, while the second, held at the Carsten Niebuhr Institute, allowed delegates to view the facilities of this renowned institution. A mid-week excursion to the Viking Ships at Roskilde demonstrated to delegates the richness of Denmark's archaeology. A dinner, hosted by the Director-General of the Department of Antiquities of Jordan, Dr. Ghazi Bisheh, on behalf of H. R. H. Crown Prince El Hassan bin Talal, at the Tivoli Gardens, was a fitting end to a conference

enhanced by the warmth and generosity of the Danish hosts. At the official closure, Dr. Bisheh concluded the meeting by inviting all delegates to the next SHAJ conference in Sydney in 2001. ■

Conservation, Heritage and Site Management

By: Alison McQuitty, British Institute at Amman for Archaeology and History, Amman (Jordan)

As part of the Seventh Conference on the History and Archaeology of Jordan held in Copenhagen in June 1998, a workshop focusing on the topics of Conservation, Heritage and Site Management (CHASM) was held. This workshop was the culmination of almost a year of discussions between the various non-Jordanian archaeological institutions based in Amman, latterly involving Jordanian representatives closely concerned with the topics of the workshop (see programme below). It was felt that the whole area of CHASM was one of pressing importance in Jordan today and should be highlighted in the main gathering of scholars concerned with the study of Jordanian heritage. Continually greater demands from tourism development are being made

on the archaeological heritage of the country, while the norms of good and ethical archaeological practice place their own demands. This workshop was seen as a forum in which to detail these challenges; to present the solutions which the various archaeological bodies have adopted to address these pressures, and to discuss future long- and short-term strategies which we as archaeologists can continue to pursue as a way of meeting these challenges.

Petra is, and probably always will be, the prime attraction for tourists, and as such is subject to heavy demands both in terms of physical conservation of the monuments and the management of the site, including infrastructural concerns, eg. water supply, waste management, visitor

control, and the socio-economic impact of any changes on the local population. Three presentations were devoted to Petra; from the Petra Regional Planning Council & the Department of Antiquities, the Petra National Trust and the Jordanian/German Conservation and Restoration Project. The presentation of the latter Project emphasized the crucial role of the establishment of training centres and programmes as part of the long-term strategy for meeting CHASM demands. The remaining presentations were largely case-studies describing various conservation and presentation options that have been adopted at the sites which are the particular concern of the non-Jordanian missions, (although many of these projects are

jointly pursued with the Department of Antiquities).

A recurring theme in discussions during this workshop was the expense of conservation and restoration and the problems in securing funding for such projects. At some sites there is a need for conservation and restoration to fulfill tourism demands: at all excavations there is a need for conservation — whether it be of monuments uncovered during excavation or covering up/back-filling the site to prevent further deterioration. Until the moment of excavation the sites were preserved for centuries under the accumulated debris of occupation and natural deposition. ACOR advocated that “at a minimum, archaeologists must back-fill their sites to recreate partially the environment that allowed preservation”. The presentations of ACOR and the Italian Franciscan Institute addressed these issues of conservation, concerning both the protection of individual structures (the Petra Church, the various churches in Madaba) and the mosaics themselves. The Spanish Archaeological Mission to Jordan (SAMJ) reported on their work on the ‘Amman Citadel, which represents the final step in this cycle: restoration. Their presentation

outlined the methodology behind this step and described the various solutions adopted for individual monuments on the Citadel and the overall presentation for the visitor.

In contrast, in the field of site-presentation, low-maintenance, low-cost and low-impact solutions have been adopted. IFAPO presented the simple yet extremely effective walking-trail that they have developed to present the remains of ‘Iraq al-Amir and its environs to visitors. BIAAH described the measures taken to inform visitors to Wadi Feinan about the sites in the area and to protect these same sites by the provision of display panels, the training of guides and the laying-out of trails.

Inevitably, at a workshop covering such a wide-range of topics there was ample material for lengthy comment. Dr. al-Sa’ad (IAA, Yarmouk University) had the unenviable task of directing this discussion, which continued at several subsequent meetings during the conference. A series of recommendations based on this workshop is in the process of being drawn up in conjunction with the Department of Antiquities. The actual presentations will be published in a monograph separate to the main Conference proceedings. The CHASM

topics will continue to be the focus of discussions between the various Jordanian and non-Jordanian archaeological institutions.

Presentations

“Preservation of a Historical Landscape: The Case of the Petra Region & Petra Archaeological Park,” Dr. Kamel Mahadin (Petra Regional Planning Council) & Mr. Suliman Farajat (Dept. of Antiquities)

“Petra: An Integrated Approach to Development & Preservation,” Aysar Akrawi (Petra National Trust)

“Stone Conservation at Petra,” Dr. Helge Fischer (CARCIP/GTZ)

“Excavation, Restoration & Conservation: Case Studies,” Dr. Pierre Bikai (ACOR)

“Mosaic Conservation,” Father Michele Piccirillo (Franciscan Institute)

“The Umayyad Palace of Amman: stratigraphy & restoration,” Dr Antonio Almagro & Dr. Ignacio Arce (SAMJ)

“Iraq al-Amir,” Dr. Jean Marie Dentzer & Mr. Jean Pierre Braun (IFAPO)

“Site Presentation at Wadi Feinan: A Minimalist Approach,” Mrs. Alison McQuitty (BIAAH).■

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Watershed Management in Wadi Ibn Hammad

By: Jörg H. Weik, GTZ-Watershed Management Project, Amman (Jordan)

Jordan's ecological situation is becoming increasingly severe; natural resources are degrading dramatically, resulting in serious socio-economic effects. In view of this situation the Government of the Hashemite Kingdom of Jordan is giving high priority to forestry and environmental sectors, including watershed management.

A watershed is a valley-shaped topographic unit of landscape, whose characterizing output is water, and which has potential for satisfying some or all of the needs of its inhabitants.

Watershed management is the process of guiding and organizing land use and use of other resources within a watershed to provide desired goods and services without adversely affecting soil and water resources. The recognition of the interrelationships among land use, soil and water, and the linkages between uplands and downstream areas, is embedded in this concept. With only a local farmer's perspective, downstream effects of land use are overlooked.

Watershed management has changed all over the world. Until ten years ago, emphasis was given to geo-physical features of a river basin. At present, the focus has shifted to the socio-economic conditions of people living in rural areas within the watershed.

Previous aid and development projects in Jordan traditionally concentrated on a more charitable approach that has kept some areas of the country dependent on external assistance. These projects have benefited Jordanians on an immediate level, but sustainable projects that build community infrastructure for the long-term benefit of Jordanian citizens are now needed. For that reason, the

Watershed Management Project aims at developing watershed management as a concept for an integrated approach, where, with participation of the local population, methods of sustainable land use are to be developed.

Participation means supporting people in articulating and negotiating their interests at the social, institutional and political levels. Development of local ownership and responsibility are the main consequences of people's participation.

The project started in December 1994 and is scheduled to last eight years. The Jordanian project-executing agency is the Ministry of Agriculture, while the German contribution is implemented by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. The project location is Wadi Ibn Hammad, in the south of Jordan, with a total population of 14,900 people living in ten villages.

Due to inappropriate and unsustainable land use a great proportion of precipitation is lost as run-off towards the Jordan Valley and the Dead Sea, producing erosion and floods on the way. The Watershed Management Project's purpose is to improve the living conditions of the local people, and to reach a state where natural resources, soil, water, and vegetation are conserved for sustainable use.

The project initiated the preparation of a participatory watershed management plan for Wadi Ibn Hammad, whereby as a first step the present land use was discussed with the land owners. In a second step, sustainable land use recommendations will be formulated, partly implemented, and

demonstrated. All steps are planned and developed together with the rural population, and the experience gained will be documented.

Maps will illustrate and explain the plan. A computerized Geographic Information System (GIS) is producing these maps, including social maps and other thematic maps.

Supported by a local NGO, the project has carried out ten watershed-related income generating community projects in Wadi Ibn Hammad, including construction of cisterns combined with water harvesting and construction of stone walls. Part of the land surrounding the cisterns has been planted with fruit trees. Among other implemented activities are bee keeping and chicken raising projects. Several home gardens have been established, in which vegetables are produced mainly for home consumption.

A women's group has been formed in the project area to implement income generating activities. Furthermore an olive tree planting campaign has been carried out successfully with farmers on their land in Wadi Ibn Hammad village, and the irrigation canal network has been improved.

In cooperation with the Directorate of Forests an afforestation site has been started near Shakhtur, where a multipurpose forest will be established to benefit the local population with fruit trees such as olives, pistachio and wild almond.

Within the Shakhtur afforestation area a demonstration site with stone walls, terraces and stone tree basins has been implemented. Range improvement plantations with atriplex, salsola and acacia had already been started two years earlier.

A main goal is to establish communication and cooperation between all groups of people living in the project area (women/men, farmers/nomads, rich/poor, etc.) according to their roles and needs.

Sustainable watershed management in Wadi Ibn Hammad can only be achieved through a high degree of participation and involvement of the farmers in all phases of the project. Sustainable land use will encourage people to remain in the rural areas, by enabling them to make their livelihood from their land. The small-

scale community-development projects help to bring the rural population closer to the project.

However, farmers are traditionally used to implementation of projects with relatively high financial inputs, and their cooperation with projects had been assured in the past with different kinds of subsidies. Efforts for self-help are weak and need to be developed through the project.

Future emphasis will be on developing the human resources of local people, and on establishing effective structures for communication

and cooperation between them. Setting up test sites and demonstrations will continue to be a necessary ingredient for assuring the acceptability of plans by the local people involved. However, the outcome of the project shall not be measured by the number of visible structures or trees planted, but by the willingness of the local people to adopt the planned measures on their own and with collective self-initiated efforts. ■

The Opening of the Petra Church

By: The American Center of Oriental Research (ACOR)

The rose-red city of Petra is famous for its magnificent rock-cut tomb facades of the Nabataean and Roman periods. Regrettably, the later periods in Petra have not received sufficient scholarly attention, so the discovery of a Byzantine church by Kenneth W. Russell in 1990 was a significant breakthrough in our understanding of the Byzantine period in Petra. Under the patronage of H. M. Queen Noor al-Hussein, the Petra Church was officially opened to the public on July 8, 1998. This was much more than a simple excavation in which some dirt is moved and an article submitted to a scholarly journal. From the beginning, this project was envisioned as more than that. ACOR archaeologist Kenneth W. Russell had first noticed the building in 1973, and in April of 1990 documented the surface remains. At the time, he wrote: "While the excavation of this structure is highly desirable, it is suggested that the simple clearance of the structure solely to uncover floor mosaics would

not do justice to significant data relating to reconstructing Byzantine chronology and the history of Petra.

Similarly, the potential for mosaics warrants extremely careful excavation techniques, with a conservation staff on hand during excavation to deal immediately with uncovered materials. Obviously, a long-term preservation plan must also be developed, with consideration made for possible public visitation of the site. The development of the site, therefore, involves 1) archaeological excavation, 2) conservation, 3) stabilization of the ancient structure, and 4) the construction of a protective shelter".

The first of three grants for the project was given to ACOR by the United States Agency for International Development (USAID) in October 1991. From that time until his death in May of 1992, Ken Russell and ACOR began the work of realizing the project. After his death, the project continued under the general direction of ACOR Director Pierre M. Bikai, who appointed Zbigniew T. Fiema, Khairieh Amr, and Robert Schick as co-directors. There were four

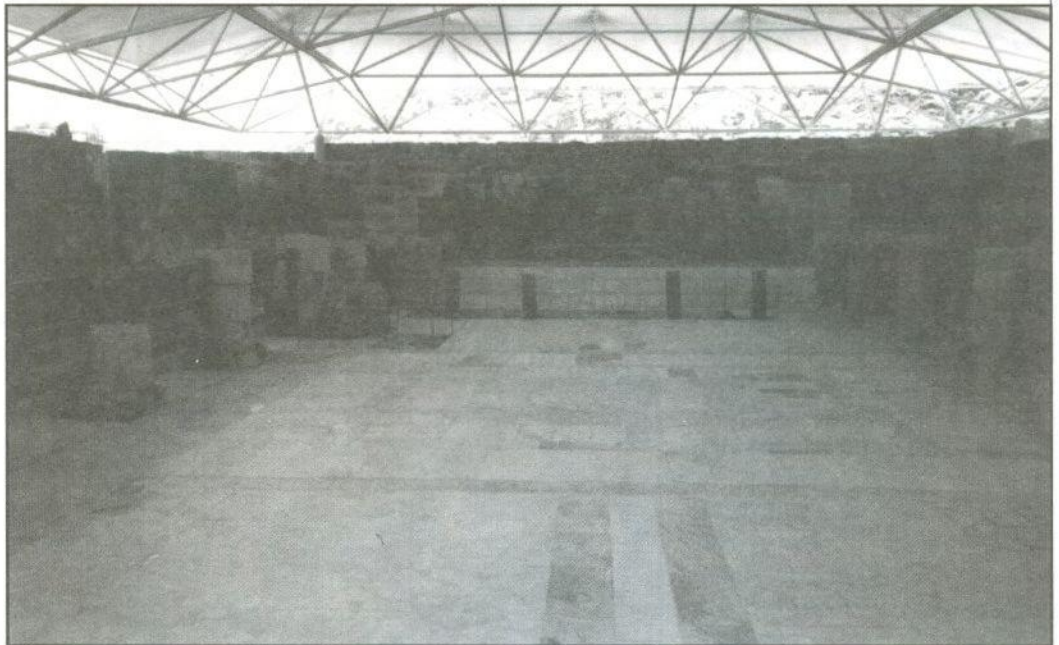


Her Majesty Queen Noor greets local dignitaries at Petra during the opening ceremony for the Petra church project.

excavation phases. The first, in 1992-93, involved some 25 archaeologists and three conservators as well as artists, surveyors, and photographers. In that phase, the main church was uncovered, with spectacular mosaics in the side aisles. The church is a tripartite basilica, measuring ca. 26 m by 15 m, with three apses to the east and three entrances to the west. Much of the material used for the construction of the church, such as the capitals, door jambs, and reliefs, must have come from the already ruined monuments of the Nabataean and Roman periods. The church complex also included an atrium - a stone-paved courtyard to the west. The preserved decoration of the church attests to its original magnificence. Both of the aisles have mosaic floors of patterns stylistically dated to the early 6th Century A. D. In the northern aisle, three parallel rows of roundels depict native and exotic animals and a variety of vessels and containers, the latter perhaps of symbolic meaning. The eastern part of the southern aisle is similar, while the remaining area of that aisle presents a variety of different motifs. The central panels contain personifications of the Seasons, Ocean, Earth and Wisdom. These are flanked by birds, animals and fish. The marble pavement of the nave was, unfortunately, poorly preserved. Several marble screens were also found, including the screens for the chancel area and for enclosing both side apses. Thousands of glass tesserae found scattered, some of them gilded, indicated that there were once mosaics on the walls. The excavation produced numerous small finds. Among them are coins, bronze and iron door fittings, glass, ostraca, fragments of Nabataean and Greek inscriptions on reused stones, and an engraved amethyst seal. A large

marble vessel decorated with two panthers forming the handles was reconstructed from more than 100 pieces. The collapse of the church's walls and columns, well evidenced during the excavations, can be associated with earthquakes. Prior to that, the church suffered a fire which brought down the wooden roof, and the building was abandoned. Squatter occupation, documented in the atrium and some parts of the abandoned church, could have continued into the 7th Century A. D. After the mosaics were found, it was clear that a shelter would have to be built and that, in

Simultaneously, the search for a solution to the problem of sheltering the beautiful mosaics without doing damage to the site continued. With the help of a volunteer review committee, the present shelter was designed. It is a space frame and rides on only six columns. Therefore, it has only the most minimal impact on the Roman and Nabataean antiquities that we know are below the church. The third phase of work in mid-1996 was devoted solely to conservation and preparing for the shelter, which was installed in May 1997. After that, the conservation of the mosaics continued



General view of the main part of the church with its protective shelter (Photo by Patricia Bikai).

order to build it, the whole northern side would have to be excavated for the foundations. The second excavation phase, with Zbigniew Fiedor as the chief field archaeologist, started in September 1993 and continued into April 1994. On Dec. 4, 1993, a cache of 152 papyrus scrolls was uncovered at the site. No one could have foreseen that event, but within a few months ACOR assembled the very best papyrologists to work on the materials. Right now, some twenty persons from the University of Michigan and the University of Helsinki are engaged in deciphering the scrolls.

and, in the final phase in 1998, attention was given to the configuration of the site so that it could be open to the public: the floor in the nave was restored, doors and barriers installed, and work began on the restoration of the baptistery, which is the largest and best preserved in the region. Work at the site itself is nearly complete, but work on the materials uncovered will continue. In addition to those who are working on the scrolls, some 25 other persons have been engaged in research on the other materials found here, from the tiny engraved amethyst that can be seen in the Petra Museum to the coins,

and, in the final phase in 1998, attention was given to the configuration of the site so that it could be open to the public: the floor in the nave was restored, doors and barriers installed, and work began on the restoration of the baptistery, which is the largest and best preserved in the region. Work at the site itself is nearly complete, but work on the materials uncovered will continue. In addition to those who are working on the scrolls, some 25 other persons have been engaged in research on the other materials found here, from the tiny engraved amethyst that can be seen in the Petra Museum to the coins,

statuary, pottery, glass, mosaics, architecture, and so on. All of these reports are currently being prepared for a publication that will appear in the near future. This was not just another archaeological project. ACOR deliberately set out to create a project that included all of the components that were outlined at the beginning: not just excavation, but also conservation and publication. The philosophy behind the project was that every archaeological site, including this one, has multiple values. Here there was a clear historical value in the building itself and in the scrolls. The mosaics and other finds have artistic value. There was also an economic value to the persons who worked there at that difficult time right after the Gulf Crisis; it has an educational value to those who will visit and to the Jordanians who were trained in conservation and

reconstruction. One of them, Fatma Marii, has just won a full-year internship at the Getty Museum in Los Angeles. The site has a value also to Jordan itself, in its effort to develop the tourist industry. The project was funded in the main by grants totalling \$1.05 million from the United States Agency for International Development (USAID). Other contributions were made by the Ministry of Tourism and Antiquities, the World Monuments Fund and US/ICOMOS. The scroll project is funded by the National Endowment for the Humanities, the Academy of Finland, the Samuel H. Kress Foundation, and numerous private donors. The American Center of Oriental Research also thanks the Embassy of the United States of America, the Department of Antiquities, the Petra Regional Council, the Ministry of Planning, the numerous researchers who

participated and the Bidul, Llyatna, Sa'ydeen, and Amareen communities who worked at the site.

American Center of Oriental Research (ACOR), P.O. Box 2470, Amman 11181, Jordan, Phone: 962-6-534-6117; FAX 962-6-534-4181. Office Hours: 8:30 AM - 5 PM Sat through Thurs, Amman time. Answering machine at other times.

Boston Office: ACOR, ATTN: Dr. Don Keller, 656 Beacon Street, Fifth Floor, Boston, MA 02215-2010, U.S.A., Phone: 1-617-353-6571; FAX: 1-617-353-6575. Office Hours: 8:30 AM through 5 PM, Mon through Friday. Answering machine at other times. ■

Fellows in Residence and Associated fellows (December 1997 - June 1998)

- Dr. Andreas Hauptmann, Deutsches Bergbau-Museum, Bochum (Germany), "Experimental Archaeology in Wadi Feinan: How Copper Smelting Furnaces worked in the Early Bronze Age".
- Anja Wünsch, University of Leipzig, Oriental Institute (Germany), "Effects and Effectiveness of the Structural Adjustment Programme (SAP) in the Jordanian Economy", a project supported by the Volkswagen Stiftung (Germany).
- Jan Weitz, University of Mannheim (Germany), "GTZ-Watershed Management Project - GIS-Group".
- Anke Firnhaber, Robert Bosch Foundation (Germany) "GTZ-Watershed Management Project".
- Dr. habil. Thomas Weber, University of Mainz (Germany), "Excavations at a Christian Pilgrims Complex in Umm Qais".
- Prof. Dr. Ulrich Hübner, University of Kiel (Germany), "Excavations at a Christian Pilgrims Complex in Umm Qais".
- Prof. Dr. Ricardo Eichmann, German Archaeological Institute - Orient Section, Berlin (Germany), "German-Jordanian Archaeological Project in Southern Jordan, Archaeological Survey and Excavation in the Yitim and Maqass Area".
- Julia Reuter, University of Vienna (Austria), "Practical work for students of medicine at a medical clinic".
- Lorenza Schlotmann, Dipl. Ing. Agr., University of Hohenheim (Germany) "GTZ-Watershed Management Project - Gender and Participation".
- Prof. Dr. Angela von den Driesch, Institute of Palaeoanatomy, University of Munich (Germany), "Research on animal bones from LPPNB Ba'ja".
- Isabel Herkommer, University of Tübingen (Germany), " Temporary trainee at the GTZ - Arabic language studies at Jordan University, Amman".
- Dennis Döpfer, Free University of Berlin (Germany), "Temporary trainee at the embassy of the Federal Republic of Germany, Amman".
- Lothar Herling, Weinheim (Germany), "Post-excavation research: Lithic material from Maqass area".
- Scholars holding a one-year travel scholarship from the German Archaeological Institute (DAI): Dr. I. Gerlach, Dr. A. Alexandridis, Dr. N. Bauers, Dr. B. Ewald, Dr. M. Langer, Dr. S. Japp.

Brown University Excavations in Jordan at the Petra Great Temple, 1998

By: Martha Sharp Joukowsky, Brown University (U. S. A.)

The Great Temple represents one of the major archaeological and architectural components of central Petra. Located south of the Colonnaded Street and southeast of the Temenos Gate, this 7000 sqm precinct is comprised of a Propylaeum (monumental entryway), a Lower Temenos, and monumental east and west Stairways which in turn lead to the upper Temenos — the sacred enclosure for the Temple proper.

The Petra Great Temple was first explored by R. E. Brünnow and A. von Domaszewski in the 1880s; but it was W. Bachmann, in his 1921 revision of the Petra city plan, who postulated the existence of a "Great Temple". No structures were evident before the Brown University 1993 excavations under the direction of Martha Sharp Joukowsky, and the precinct which is constructed on an artificial terrace was littered with carved architectural fragments toppled by one of the earthquakes which rocked the site.

In the Lower Temenos are triple colonnades on the east and west, with a total of 96 to 120 columns! These lead into east and west semi-circular buttressed Exedrae. Here in the Lower Temenos, large, white hexagonal pavers were positioned above an extensive subterranean canalization system which has been traced from the Temple Forecourt under the Lower Temenos, the Propylaeum, and the Colonnaded Street to the Wadi Musa. Discovered near the West Exedra was a capital

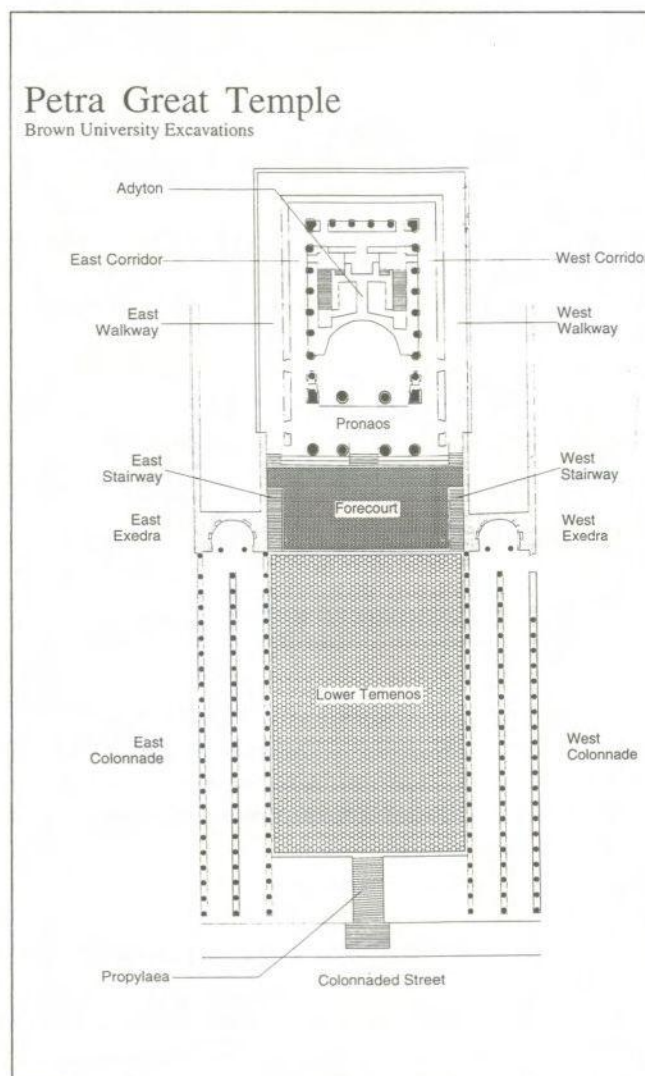
decorated with Asian elephant-heads; in addition to the thousands of architectural fragments, there are coins, limestone facial frieze elements, lamps, Roman glass, and ceramics which include figurines, Nabatean bowls, small cups, and juglets. Elaborate floral friezes and acanthus-laden limestone capitals suggest the temple was constructed in the beginning of the last quarter of the First Century B. C. E. by the

Nabataeans who combined their native traditions with the classical spirit. The structure was enlarged later in the Nabataean period in the First Century C. E. The Great Temple was in use until some point in the Fifth Century C. E., the Byzantine period.

The Great Temple's columns and walls were red-and-white-stuccoed, which must have had a dramatic impact when set against its rose-red environment. It is tetrastyle in antis

(four columns at the front) with widely-spaced (ca. seven meters, 21 ft.) central columns at the entrance, and two end columns located about five meters (15 ft.) to the east and west, respectively. Approximately 15 meters (45 ft.) in height, the porch columns plus the triangular pediment and the entablature, hypothetically place its height to a minimum of 19 meters (57 ft.)

The Great Temple measures 26 meters (78 ft.) east-west, and is some 39 meters (117 ft.) in length. The podium rests on a forecourt of hexagonal pavers; a stairway approaches a broad deep pronaos (entry), which in turn leads into side corridors that access a 550-630 seat bouleterion (council chamber), theatron/odeum discovered in 1997. The Pronaos entry is marked by two columns which are the same diameter (1.50 meters, 4.5 ft.) as those at the temple entrance, but are larger than either the eight flanking the cella walls or the



Groundplan of the Petra Great Temple.

six at the temple rear which have diameters of 1.20 meters (3.6 ft.). In the interior north are massive anta walls resting on finely carved attic bases. To the south is a two-or-three-storied complex dominated by a large, central vaulted arch and twin stepped arched passages leading to paved platforms, plus a series of steps which access the rear of the bouleuterion, plus a series of steps which access the temple corridors and exit. There are exterior paved walkways on the

temple east and west, where sculpted facial fragments and finely carved architectural elements have been recovered.

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Part of the excavated bouleuterion, or council chamber, at Petra's Great Temple.

A Great Friend of Petra: Dr. med. Dr. phil. Manfred Lindner, Eighty Years Old

By: Herbert Donner, University Kiel (Germany)

On July 22nd, 1998, Dr. Dr. Manfred Lindner, the well-known German explorer of Petra, celebrated his 80th birthday. He was born in Nürnberg, and this old and famous free city of the Holy Roman Empire is still his place of charity, where he still practices medicine in spite of his age: but any free time he applies to the archaeology and history of Jordan, especially to the region of Petra. He is the president of the Naturhistorische Gesellschaft (Society for Natural History) in Nürnberg, and in 1994 he became an Honorary Member of the Deutsche Palästina-Verein (German Palestine Exploration Society).

As far as Petra is concerned, M. Lindner sort of came in through the back door. His interest in antiquity first manifested itself in numerous journeys made in the fifties and sixties throughout countries of the ancient and new world. In southern Jordan - we may imagine -- he was suddenly overwhelmed by the Petra experience, striking like lightning. That is nothing special, for most people experience the same at a touristic or poetic and aesthetic level.

In M. Lindner's case, however, it soon began to change into a serious and effective scholarly interest. He published generally intelligible booklets such as "Petra, Traumstadt in der Wüste Jordaniens", 1965 (Petra, Dream City in the Jordanian Desert), and "Freude an Petra", 1967 (Delight from Petra). But after that he became



Dr. Dr. Manfred Lindner.

very familiar with the topography and archaeology of the Petra area, and Nabatean history and culture. He made scholarly surveys and excavations in Petra and its surroundings starting in 1973,

together with (and living in the house of) his friend Mr. Dakhilallah Qublan. In Germany and elsewhere he prepared important Petra exhibitions: with H.-J. Kellner and K. Schmidt-Korte in Munich, Nürnberg and Tongeren/Belgium (1970); and with J. P. Zeitler in Nürnberg (1991), entitled "Petra, the queen of the incense road". In 1984 he founded the archaeological section of the Society for Natural History at Nürnberg as a focal point for his work.

In this way, M. Lindner became — without realizing it himself — one of the leading experts on Petra and the Nabateans in German and English-speaking lands. We see this in his almost sixty scholarly works, many of them published in renowned journals such as the Annual of the Department of Antiquities of Jordan (ADAJ), the Zeitschrift des Deutschen Palästina-Vereins (ZDPV), the Archiv für Orientforschung (AfO), *Aram*, *Das Altertum*, and *Archäologischer Anzeiger* a. o. Two anthologies edited and enlarged by M. Lindner are of particular importance: "Petra und das Königreich der Nabatäer. Lebensraum,

Geschichte und Kultur eines arabischen Volkes der Antike", 1970, 1989 (Petra and the Nabatean Kingdom. Lebensraum, History, and Culture of an Arab People in Antiquity), and "Petra. Neue Ausgrabungen und Entdeckungen", 1986 (Petra. New Excavations and Discoveries). Unfortunately, Lindner's excellent and copiously illustrated tourist guide "Petra, der Führer durch die antike Stadt", 1986 (Petra, the Guide through the Ancient City), is out of print, which should be urgently remedied. M. Lindner's articles on special problems of the Petra region

are of particular interest to archaeologists and historians: his information concerning archaeological activities at Sabra (ADAJ 26, 1982, p. 231-242), the investigations on the ad-Dayr plateau (Archäologischer Anzeiger 1984, 597-625 and Petra, Neue Ausgrabungen und Entdeckungen p. 87-103), the publication of the famous al-Uzza-Isis stela from az-Zantur (ZDPV 104, 1988, p. 84-91), the rediscovery of the baitylos of the Syrian goddess Atargatis (together with J. Zangenberg in ZDPV 109, 1993, p. 141-151) - and the list could easily be continued. All these works

significantly expanded our knowledge of ancient Petra and its surroundings, and of Nabatean culture and religion. The author has proved to be an outstanding scholar on Petra .

The Newsletter of the German Protestant Institute of Archaeology in Amman and many many friends and colleagues from Jordan and Germany join in congratulating him on his 80th birthday, hoping for many happy returns of the day and continued scholarly output. ■

Archaeological Excavations at Tell el-Hammeh

By: Evelyn J. van der Steen, Leiden University (Netherlands)

In 1996 and 1997 two seasons of small-scale excavations were conducted at Tell el-Hammeh, a small site on the north bank of the lower course of the Zerqa River. This tell had been visited by several surveys (Glueck 1951, 313; Gordon and Villiers 1983; Ibrahim et al. 1988) and was believed to be settled in the Early Bronze Age, and from the Early Iron Age to the Persian period. Some Roman sherds were found as well. The German Institute at Amman (DEI) also has a collection of sherds from the site.

Excavations were started in order to clarify settlement patterns in the transitional Late Bronze - Early Iron Age and at the beginning of the Iron Age, and to investigate the possibility of a trade route from the Deir Alla area, through the Wadi Zerqa, to the Baq'ah valley (van der Steen 1996).

Another reason for the excavation of this site was the fact that a large segment of the tell had recently been cut away for agricultural purposes, which stresses the need for research, but also provided a ready-made test trench, which only had to be cleaned.

Both seasons were funded by the Deir Alla expedition, and the

Department of Antiquities of Jordan funded part of the second season.

The excavations had two main aims: Cleaning and drawing the bulldozer cut, to get a first impression of the occupation history of the site; and, determining the period in which the tell was resettled in the transitional period, and the nature of this reoccupation.

Bad weather conditions (heavy eastern winds, known as sharqiyeh, in the first season, and much rain in the second season) seriously hampered the excavations. Still, we managed to clean large parts of the bulldozer cut, at both ends and in the centre, and a clear occupational sequence emerged. The earliest occupation found was Chalcolithic and Early Bronze Age. It is concentrated on the south-west end of the tell, where a mudbrick wall belonging to this early occupation was seen in the section.

On top of these early layers was material from the Late Bronze Age, surprisingly, as not one of the surveys had produced even one Late Bronze sherd. It was rather fine pottery with white and pink slip and painted

decoration. The highest concentration of this pottery was found in the central part of the tell, although sherds were found scattered over the whole site. On top of this the Iron Age occupation covered most of the tell.

The biggest surprise, however, came when we cleaned the northern part of the bulldozer cut: heavy ash and slag layers, as well as three furnaces, revealed the presence of a rather large scale iron industry. This was the side of the site that was most open to the eastern winds that are so frequent here. These layers have been provisionally dated to the early eighth century B. C., on the basis of the pottery.

Four squares were opened, adjoining the main section: two in the centre, one at the south end, and one at the north end of the section. This meant that we could excavate from the side, guided by the stratigraphy as seen in the section. Another advantage of this way of digging became clear in the second season: water could run off, without soaking the squares.

Chalcolithic and Early Bronze Age layers were found in the southern

square, in a small trench. The mudbrick wall that was seen in the section continued here, with layers of ash, and burnt rubble containing a high concentration of burnt bone lying against and over it. A complete Early Bronze Age II juglet was found. The results of several surveys on the site had failed to reveal Chalcolithic material, so its presence, like that of the late Bronze Age material, came as a surprise. It seems to be related to the pottery of Tell Abu Hamid. The material is still under study.

Late Bronze I and II material was found mainly in the two central squares. The earliest occupation in this period consisted of wash and surface layers, and their most conspicuous feature was a large number of cooking pots. A few small chocolate-on-white sherds were found.

These layers were cut by pits belonging to a later phase. On top of the earliest layers was a surface that was covered with stones, although it did not have the appearance of a regular pavement. Stones were found in quantities around the site, especially along the Zerqa banks, and they must have been used as a convenient building material for walls, and also for partitions between courtyard areas, and to make fireplaces, potstands, pavements, etc. The surface

was covered with a layer of soil with pebbles and much pottery. The pits were dug through these layers. The presence of large numbers of pits is often seen as an indication of farmers or farmers/pastoralists.

The pits were covered by surfaces where industrial or household activities had been performed, leaving ash, burnt surfaces and many sherds. A fireplace was found in one, and on another were remains of a tannur, and a kind of burnt round clay platform, 30 cm in diameter. Many cooking pots were found here also. There was also an irregular wall or boundary consisting of a north-south row of stones. A layer of wash covered this activity area. This phase is dated to the Late Bronze Age and the

transitional period.

In the next phase, phase 3, walls were found, probably belonging to three different buildings or structures. They had a base of two or three layers of boulders with mudbrick on top, but no foundation trenches. A courtyard was found with the remains of a tannur still in situ against one of the walls. A little to the west was an installation that may have been a fireplace, and south of that a small circle of pebbles that may have served as a cooking pot stand. This activity area was covered with burnt rubble containing roof debris. Another tannur was found related to one of the other structures in square II. This phase has provisionally been dated to the end of Iron Age I.



Tell el-Hammeh within its immediate environment; the tell is the central mound with houses, in the centre of the photo.

In the next phase, phase 4, remains of a larger building were found. Two walls formed a corner of the building. Parallel to the N-S wall, on the east side (the outside) at a distance of about 1 m, was a second wall, which did not turn west, but continued north. It may have been a courtyard wall.

Inside the building was a row of standing stones, about 30 cm in height, also parallel to the N-S wall, at a distance of about 1 m. At one point, the space between them was closed with mudbricks. The walls of this building, like those from the previous phase, consisted of layers of boulders, set on the surface, with a superstructure of mudbricks. This way of building a wall is paralleled in contemporary farmhouses like the one

presently on the tell. The layer of stones prevents undermining of the walls by rain. A row of stones, set against the outside of the mudbrick superstructure at a somewhat higher level, probably served the same purpose in a later stage, when washlayers had covered the stone substructure.

Still later in this phase, possibly after the building had gone out of use, the iron furnaces were built, one of which was found north of the building. Heavy layers of slag and ash were found lying between the courtyard wall and the wall of the building. Another of these furnaces has been excavated in square IV, which was opened for this purpose. It was a rounded structure with a diameter of

about 2 m (unfortunately most of it had been bulldozed away), built of mudbricks which were burnt bright green and partly sintered. It was set on a sequence of slag layers, suggesting a sequence of furnaces on the same spot. Heavy layers of white ash and slag were found around it. In the south square a stone pavement or paved street was found, with some slag lying between the stones, which may belong to the same period.

The main feature of phase 5 was a huge pit in square II, some 6 or 7 m in diameter, lined with mudbricks, and with stones at the bottom. It was dug into virgin soil, cutting through all phases. Comparable pits have been found at Deir Alla, but so far their function remains unclear. North of it an activity area was found, consisting of a round installation, 1 m in diameter, of rather small stones, with a large number of loomweights and two grinding stones scattered between the stones. The surface that belonged to it contained a very high concentration of sherds.

The final phase, phase 6, is immediately below topsoil. Its main feature is a heavy building in square I, made of dressed blocks, of which two walls were found. It was dug in deeply, its foundation trench cutting

through several earlier phases. South of it a stone wall or wall foundation was found, running east-west, set in a foundation trench. This wall seems to have been reused, a new wall being put on top of it. Wash and rubble were found against and covering the wall, but it was largely disintegrated. A number of pits had been dug into these layers, as well as a kind of trench or ditch, running north-south in the west part of the square. This phase was provisionally dated to the Persian period.

Although the analysis of the finds is only beginning, it is clear that Tell el-Hammeh must have been an important

site, especially in the Iron Age II. It may well have been the centre of the iron industry in the region in the eighth century. It has been assumed for several reasons that in the later Iron Age there was a centre of iron industry in the region and several candidate sites have been named, Deir Alla among them. However, convincing proof for any of these sites has never been found. Perhaps Tell el-Hammeh will provide the answer.

Literature:

N. GLUECK, *Explorations in Eastern Palestine IV. Annual of the American Schools for Oriental Research* 1951,

25-28.

R. GORDON, L. VILLIERS, *Telul edh-Dhahab and its environs. Surveys of 1980 and 1982, a preliminary report.* - In: *ADAJ* 27, 1983, 285-289.

M. M. IBRAHIM, J. A. SAUER, KH. YASSINE, *The East Jordan Valley Survey, part two.* - In: KH. YASSINE: *Archaeology of Jordan.* Amman 1988, 189-207.

E. J. VAN DER STEEN, *The central East Jordan Valley in the Late Bronze and Early Iron Ages.* - In: *BASOR* 302, 1996, 51-74.■

German-Jordanian Archaeological Project in Southern Jordan: Archaeological Survey and Excavation in the Yitim and Maqass Area, 1998 (ASEYM 98)

By: Ricardo Eichmann, German Institute of Archaeology, Berlin (Germany) and Lutfi Khalil, University of Jordan, Amman (Jordan)

From January 10th to February 18th, the German Institute of Archaeology (Orient Department) and the University of Jordan (Amman) carried out field research only a few kilometres north of Aqaba. Work concentrated in the area which had been surveyed in 1932 by the architect and historian of architecture Fritz Frank.

His work centred on late classical architecture, but he also recorded medieval ruins and even remains of military installations from World War I. Frank was probably the first travelling explorer to include on a map two sites, Tell Maqass and Hujayrat al-Ghuzlan, which are part of the current investigations (1). The sites are located approximately

1.5 km from each other, about 4 km north of Aqaba. According to results from the first soundings carried out by Dr. Lutfi Khalil in 1985 and 1990, both tells began to form in the late

4th Mill. B. C. (Late Chalcolithic/EBA) (2).

More settlement remains of the same period have been identified in the vicinity of Hujayrat al-Ghuzlan, as well as along the perimeters of the nearby Wadi el-Yitim which bends off in an easterly direction. From a strategic point of view, both settlements were well placed. They controlled the northern access to the Red Sea as well as the traffic through the Wadi el-Yitim, where the King's Highway once passed. Research in the Aqaba area up to now had concentrated on the Roman, Byzantine and Early Islamic periods. Some investigations of the pre-Roman Iron Age evidenced human occupation as early as the 8th



Wadi Yitim B settlement, looking down into the Wadi Araba.

Century B. C. Little more is known about the preceding periods than what was revealed by the above mentioned excavations by L. Khalil and surveys carried out by American colleagues in 1995 (3).

An evaluation of the data obtained from the new survey and excavations is already underway (4).

The sites of Maqass and Hujayrat al-Ghuzlan mark an early phase of metallurgy in Southern Jordan. At the latter site, a systematic surface investigation carried out in squares measuring 10 m by 10 m over a surface of 80 m by 150 m, produced many products related to this industry, ranging from copper ores and slags to smelting crucibles and a remarkably high density of incinerated residues. Additional artefacts possibly associated with metal working are heavy duty stone tools, such as hammers, hard crystalline and basalt-like rocks, as well as stone pestles. The large stone tools also include about 300 grinding stones (granite and sandstone) of which two were proven to yield traces of copper, possibly originating from a process of crushing copper ores or forging copper artefacts. Other artefacts include flaked tools from sheeted flint, sickle blades, limestone mace heads, and beads. The finds distribution on the surface, though badly disturbed, strongly suggests the former presence of specialised craft activity areas, an issue which will be checked in the next excavation campaign.

Along the northern and eastern margins of Maqass, which has suffered severely from road works (remaining surface: 60 m by 40 m, height 5 m), L. Khalil in two previous campaigns uncovered substantial structures, including over 3 m high, inclined walls built of wadi boulders, but whose function remains unknown. The question of whether or not they were part of some sort of fortification needs to be answered. In order to examine the situation, a test sounding of 5 m x 10 m was opened and will be extended next season. A second sounding at the bottom of the mound was intended to furnish data on the beginnings of the site. According to

the excavated findings, the oldest of three identified building layers had formed on an ancient surface of the Wadi Araba, approximately 2 m below the actual wadi surface. Irregularly angled rooms with straight walls and no access from the ground surface were among the other noteworthy architectural features. They probably served as storage facilities.

The settlement Yitim B, situated about 90 m above the wadi bed, is distinguished by the remains of at least 25 different houses of worked and un-worked stones. Their ground plans show straight running, quadrangular or round walled structures. Soundings showed that the cultural deposits, both in and outside the buildings, were no more than 40 cm thick. They contained ashes, some pottery fragments, grinding stones, a stone mortar, and two copper awls. These largely uncharacteristic finds do not qualify to give reliable dating of the site. The little data obtained only shows a preliminary affiliation of the site to the late Chalcolithic/Early Bronze Age.

The latest investigations verify our current state of knowledge and are intended to help to pave the way for future investigations on larger scales. A catalogue of pottery-ware covering all three sites was begun, and is expected to lead to more effective and rational methods of evaluating the ceramic corpus.

The three settlement sites were carefully surveyed and plotted on location by aid of computer processing. Botanical samples recovered from the soil (Dr. R. Neef, German Archaeological Institute, Berlin, Germany) will contribute to the

reconstruction of the vegetation in the Aqaba region in the late 4th Millennium B.C.

In order to check on the former beach lines, geo-archaeological investigations were carried out in cooperation with the Institute of Geography at the University of Marburg, Germany (Prof. Dr. H.



Maqass



Round structures at Wadi Yitim B settlement.

Brückner). One of the findings from this examination was that the Holocene beach line which was identified in earlier years in the vicinity of Maqass proved to be a misinterpretation. Drilling samples obtained from sandy clays in a wadi depression close to the Israeli-Jordanian border revealed that ancient beach lines whose ages have yet to be established once reached several hundred metres inward on land. During surveys around Hujayrat al-Ghuzlan, a number of settlement traces and terracing walls inside the wadis were discovered, as well as other architectural features.

Notes:

1) FRANK, F., *Aus der Araba I: Reiseberichte*. - In: *Zeitschrift des Deutschen Palästina-Vereins (ZDPV)* 57, 1934, 191 ff., plan 27

2) KHALIL, L., *The second season of excavation at Al-Magass-'Aqaba 1990*. - In: *Annual of the Department*

of Antiquities (ADAJ) 39, 1995, 65 ff.

3) SMITH II, A. M., M. STEVENS, T. N. NIEMI, *The Southeast Araba Archaeological Survey: A Preliminary Report of the 1994 Season*. - In: *Bulletin of the American Schools of Oriental Research (BASOR)* 305, 1997, 45 pp.

4) In preparation for the forthcoming publication series by the Orient Department (Orient-Archäologie) of the German Archaeological Institute. ■

Excavations at Deir Alla, March 1998

By: Gerrit van der Kooij , Leiden University (Netherlands) and Zeidan Kafafi, Yarmouk University, Irbid (Jordan)

Introduction

The joint excavations at Deir Alla restarted in 1994, after a break of seven years. The second season occurred in autumn 1996 and had a small scale follow-up during March 1998. The work is co-directed by Dr. Zeidan Kafafi (since 1996) of Yarmouk University, replacing Dr. Moawiyah Ibrahim, who went to Oman, and Dr. Gerrit van der Kooij from Leiden University, Netherlands. Mr. Mohammad Balawneh represented the Department of Antiquities, the third party in the project.

The Deir Alla excavations had begun in the 1960s under Dr. Henk Franken, from Leiden University. The work was resumed in 1978, as a joint project with a new program aiming at the settlement study. The results up to 1987 are summarized in the booklet *Picking up the Threads* (1989). The seasons in 1994, 96 and 98 had the following main aims:

- finish the excavations of the later Iron Age phases (ca. 800-350 B.C.), in order to prepare their final publication.

- further explore the earlier Iron Age periods as a settlement study, mainly by expanding the northern trench of the 1960s.

- further explore the Late Bronze and final Middle Bronze settlements, partly



General view of excavations on the summit of Tell Deir Alla, looking north.

by expanding the old northern trench at the temple area, and partly by taking other "samples" of this period, mainly on the southern slope.

- study the wider region, including small scale excavations at a few endangered sites that might have had a close relationship with Deir Alla — Tell el-Hammeh being the first one (small scale excavations in 1996 and 1997).

The archaeological work is combined with training of students from both universities, as well as others, including some from outside Jordan. The special training obtained on this "mudbrick site" is in the use of a strictly stratigraphic approach.

In addition this season, steps for consolidation of the site and preparations for visitors have been started.

Results

The results of this season's dig may be summarized by considering the

archaeological periods studied in the different fields of excavation.

1. The final MB and early LB periods

(Area X; supervision Mr. Nabil Qadi; this section is clearly visible from the road.)

The earliest use of the site discovered so far is a town settlement dated to the MBIIC period. Some information about this came from a rescue dig at the

bottom of the SE-slope of the site in 1978. There some rooms and solid mudbrick walls appeared, as well as a pit with discarded bronze weapons: a trident and a decorated spear head. It became clear also that this site had started on a low natural hill (Lisan marl) and that this hill was expanded to the north by dumping soil for a terrace to be used for the temple, partly excavated in 1964.

During the 1998 season rescue work was done at the eastern slope, along the main road (area X): the first stretch of 15m was stepped to prepare for consolidation. At places the western end of the cut became 6.5m high, representing two major building phases, in which solid mudbrick walls and thick deposits of plant-rich courtyard accumulations dominate. The earliest walls were placed on some stones, on top of the loess, that had been naturally deposited on the Lisan marl. After some collapse and

rebuilding a final destruction with small scale fire occurred. The mobile remains include a number of oblong sickle blades, often very well prepared, chocolate-on-white ware, and a black burnished possibly Tell el-Yehudiyeh sherd. A very exceptional find was a well preserved bronze ax, lying on a floor under the burnt debris.

The phase was followed by an accumulation of thin layers, including a burnt one visible all along the section.

The second major building phase started 3 m above the loess with a heavy N-S wall and some successive minor walls, one protecting a well built, 1m wide tannur with pottery sherds for insulation. To the west of the main wall a 3 m thick deposit of plant-rich, brown coloured courtyard layers had accumulated. The layout of the building complex is not clear, and it is uncertain how far to the east the settlement had reached.

Surprisingly a high footed bowl, a type not used after the transition to the Iron Age, was found on the east slope, probably in its original context, 15m above the natural loess (and 7m below the eastern top). This find may indicate the high position of the eastern part of the LB settlement, contrasting with the more than 10m lower position of the final LB settlement at the western part of the site.

2. LB and transition to IA period

(Area C, four squares and a small cut were excavated; supervision Mrs. Everline van der Steen.)

In 1994 and 1996 the first excavations at the lower south slope (western part) revealed a number of interesting facts, such as the solid mudbrick wall limiting the LB settlement to the SW, and the final LB settlement (destroyed by fire) expanding more than 30m beyond this wall. Furthermore the southern excavations revealed a town character of the final LB phases and not the character of a central sanctuary with functionally associated buildings, as had been proposed, based on the excavations of the north slope only. The chronological similarity between the exceptionally heavily burnt final

LB phase (phase E, dated after ca. 1180 B. C. by the cartouche of Taouset) of the north slope (see Franken's Excavations at Tell Deir Alla, the Late Bronze Age Sanctuary, 1992) and the S-slope is also supported by pottery assemblages and by the discovery of the same kind of clay tablets and their still unknown script at both locations. The southern most structures gave indications of bronze works, such as crucibles and amorphous bronze residues.

The 1998 excavations explored a location somewhat more to the east of the trenches of the preceding seasons, on a protruding part of the slope, cut to the east by the deep gully that splits the south slope in two halves. The burnt layers also appear there - again possibly associated with phase E of the north slope. These layers form the debris and wall stumps of a building complex, with wide walls and some complete pottery with decorations (such as an abstract palm tree motif) also known from the north slope. The character of the buildings of this phase is not yet clear. A lower phase included a series of occupational and wash or dump layers, with many, often big sherds, including some wasters; they indicate the presence of a nearby potter's kiln. The initial part of the Early Iron Age is represented (based on pottery types known from the north slope) by a pebble pavement over earlier LB Age levels.

3. The later Iron Age period (mainly ca. 800 B. C.)

(Top parts of Areas B and D,

respectively supervised by Lucas Petit and Mohammad Jaradat.)

The major field in area B and the 5x20 m test trench to the south in area D had been excavated before 1987, but some final excavations had to be done during the recent seasons.

Important information came from phase VII, that had been poorly



Stepped excavation in area X, along the east side of the tell.



An ax from area X, dating from the MBIIC period.

documented before. The architectural remains are still fragmentary, but the biological and artefactual information is rich and shows a culture of a mixed character, exemplified especially by the pottery assemblage: much fine textured and well fired thrown ware (including "Assyrian palace" ware) together with some types following the original local tradition. Large amounts of wheat have been found stored in wooden and reed

containers, and other materials stored in large hole mouth jars.

Phase IX (ca. 800 B. C., known especially from the Balaam inscription on wall plaster) is the best preserved of the later phases, and this season the extension to the south (area D) was identified. A stratigraphic connection was made between the extensively excavated B area and this trench to the south. Also the relationship with the preceding phase became more clear: the inhabitants of phase IX did not continue from phase X, which was partly excavated this season to be sure about the transition. In fact phase X is closely connected with its preceding phases, as excavated and published by Franken in Deir Alla I, 1969.

Phase IX in area B shows a group of living spaces, mostly roofed, connected by some long walls. The roofed spaces were partly used for storage of all kinds of materials, including foodstuffs, dung-fuel, lime plaster in a pot, pottery and tools not in use, as well as quite a number of loom weight groups. Some of the looms were apparently in use during the destruction by earthquake and fire. This season another one was found, and associated carbonized poles were probably connected with it. In several weights traces of string were found, but no pieces of cloth, as previously

found, made of hemp thread. Close to this loom was a grinding installation, with a very well shaped lower grinding stone (sandstone) placed on a platform, partly surrounded by a clay-made depression bordered with a clay rim — apparently meant to keep the flour together. An upper grinding stone (also sandstone) that fits on this lower one was found close to it. Also excavated in phase X was a room, where grinding activities were dominant.

The southern part of the IX-settlement became clear this season, showing the more open character of the village. After the destruction phase X an enormous circular pit was made, more than 12 m diameter and 5m deep, with the sides lined with mudbricks, making a slight slope so as to prevent erosion of the sides; a very small part of it was excavated to the bottom, but without clarifying its use. In any case, later it was almost filled with layers of washed in and wind blown soil as well as much plant material. A building with light walls was erected in its centre (it seems) during phase IX, apparently surrounded by open space where courtyard accumulations continued. Finally, a fire caused the destruction of the building, and a deeply penetrating heat burned the courtyard

layers to ashes. The contents of the two rooms consisted of different kinds of pottery, including storage jars, juglets, bowls and a small crater, but also about a hundred loomweights, mainly of the doughnut type and other shapes, including out-size examples.

Conclusion

The results of this season are considerable: for the later Iron Age phases the stratigraphic situation and many other aspects are better understood, and the publication can now be prepared. For the LB and transitional period of the south slope the continuation of the excavation program will include the joining of squares so as to get a view of a considerable part of this southern side of the LB settlement.

At the top some more of the eroding edges will be refashioned and prepared for consolidation. For the main sections, as proposed, this means the construction of a sloping mudbrick wall.

Also the east slope, with its rich information about the initial stages of the settlement, will be consolidated, but with the use of stones. Preparations of other parts of the site have to be made during future seasons.■

New Discoveries Near the Baptism Site (Jordan River) (al-Maghtas Project)

By: Dr. Mohammad Waheeb, Department of Antiquities, Amman (Jordan)

Not far from the Jordan River, at a distance of one mile to the east, is the place where the Prophet Elijah was taken into heaven in a chariot of fire "and it came to pass, as they still went on, and talked, that, behold, there appeared a chariot of fire, and horses of fire, which parted them both asunder; and Elijah went up by a whirlwind into heaven. And Elisha saw it and he cried". (II Kings 2 : 11 - 13).

The place of that event was east of the Jordan River, across from Jericho, in Wadi el-Kharrar, perhaps the same place where Elijah took refuge when the ravens brought him bread and meat (I Kings 17 : 5).

The itinerary of the Bordeaux pilgrim (333 A. D.) mentioned that "From there to the Jordan, where the Lord was baptized by John, is five miles. Here there is a place by the River, a little hill on the far bank, where Elijah was caught up into heaven."

The Roman five miles is equal to four and one-half English miles, the distance from the Dead Sea up stream to Wadi el-Kharrar in Jordan.

Theodosius (530 A. D.) says that it was five Roman miles from the Dead Sea to the place where the Lord was baptized, where there was a church of St. John, but it is not clear whether the church was on the east or west bank of the River. He says explicitly that the Lord was baptized on the east side (Jordan) and he refers to the Little hill where Elijah was taken up. Obviously he means the little hill in Wadi el-Kharrar. The little hill was called Hermon, Elijah hill, Jebel Mar-Elyas and, recently, Tell el-Kharrar.

The question that arises now is: where was the place of John's work. In John 1 : 28 and 10 : 40 there is clear reference to a specific place for



General view of Bethany site, with Elijah's Hill near centre of photo.

John's work, stating that he was baptizing in Bethabara or Bethany beyond the Jordan ("John answered them, saying, I baptize with water: in the midst of you standeth one whom you know not, even he that cometh

after me, the laces of whose shoe I am not worthy to unloose. These things were done in Bethany beyond Jordan where John was baptizing") (John 1 : 23 - 29). The second question is: where is Bethany beyond the



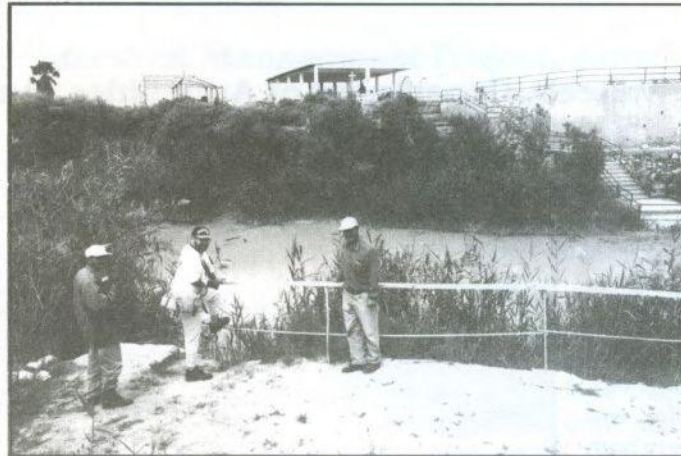
Architectural fragments from one of the probable Byzantine churches being excavated next to the Jordan River.

Jordan? The town of Lazarus, two miles east of Jerusalem, has been suggested as Bethany beyond the Jordan. But the Jordan River is about twenty miles from this town, Bethany is located in the text on the banks of the Jordan, and John is said to have baptized there. A team from the Department of Antiquities of Jordan has conducted emergency surveys and systematic excavations in the area since March 1997, and these continue under the supervision of the author. Several factors have been considered in a work plan for the project, such as:

- The size of the area to be examined.
 - The depth of the archaeological deposits.
 - The complexity of the architectural remains which may be found.
 - The site's importance for the early history of Christianity during the period of John the Baptist and Jesus Christ.
- Our approach to studying the region

consisted of four steps:

- Analysis of the aerial photos and identification of "visible" sites.



Dr. Mohammad Waheeb (in white hat in centre of photo) and friends at the Jordan River, at the site associated with the baptism of Jesus.

- Intensive archaeological survey and identification of periods of occupation at "visible" and "invisible" sites (sherds, flint scatters, buried sites, etc.)
- Soundings at selected sites for the establishment of a stratigraphic

record.

- Limited excavations in different areas, followed by comprehensive excavations for two years at least.

Archaeological excavations on the southern bank of Wadi el-Kharrar revealed the presence of several sites, with architectural remains scattered throughout the area approximately two kilometers to the east of the Jordan River.

The discovered sites consisted of churches, water installations, stepped cisterns, coloured mosaic floors, stone piles, caves and other facilities.

The discovered sites in Wadi el-Kharrar and the recently excavated sites in Wadi el-Kafrein will shed light on the importance of the eastern side of the Jordan River during the early years of Christianity. ■

(continued from page 1)

Amman, have been held at the institute and were very well attended. In addition, Ms Nadine Riedl, assistant director at the institute, conducted a special lecture for children, introducing them to the methods of archaeology. More lectures are planned for autumn this year. Two receptions were also held at the institute. One was the traditional "Springtime Reception", the other was the farewell for the pastor of the German Speaking Congregation, Ms Claudia Schreiber. For the past two years she has not only been a very active pastor but also became a very good and supportive friend of the institute, which owes her much. So, farewell Claudia, and we hope to have the pleasure and honour to welcome you



Nadine Riedl conducts a special lecture on archaeology for children.

again in the near future.

This issue of our Newsletter is dedicated to a man, Dr. Dr. Manfred Lindner, who dedicated many, many years of his life to the "red-rose" city of Petra. As head of many expeditions by the Naturhistorische Gesellschaft from Nürnberg (Germany) he conducted many surveys and excavations in and around the capital of the Nabataeans. In August he is celebrating his eightieth birthday, therefore we would like to take that opportunity to congratulate him and wish him many happy returns — especially to Jordan, and in particular to Petra, his second home.■

'Araba - Expedition 1997: Umm Ratam

By: **Manfred Lindner, Naturhistorische Gesellschaft Nürnberg (Germany)**

During an expedition of Naturhistorische Gesellschaft Nürnberg (NHG) in October 1997 the area of Umm Ratam was surveyed under the author's direction. Members of the team were Prof. U. Hübner (University of Kiel), Dr. Ing. I. Hübl (University für Bodenkultur Wien), Mss. I. Knne, E. Schreyer, E. Gunsam, A. Schmid and Dakhilallah Qublan. The project was supported by the Department of Antiquities (Director-General Dr. Ghazi Bisheh) with Mr. Suleiman Farajat as its local representative. Besides a specific objective, i.e. the plan to build a dam across Wadi Musa, aims of the survey were to make a critical assessment of previous descriptions and a general survey of the area, including exact measurements by GPS, the water supply of the Qasr Umm Ratam, the chronology of the Nabataean-Roman settlement, traces of early occupants, and exploration of the surroundings, especially the passages between Petra and Umm Ratam. The NHG team walked in the footsteps of German Fritz Frank, who, under difficult conditions, examined Umm Ratam in 1932.

A small-scale excavation attested to an early origin of the settlement on the bank of Wadi Umm Ratam, preceding the building of the Qasr. In fact, the settlement (including a khan or mansio) was the centre of a large agricultural area with (originally) Nabataean and (later) Roman cross walls toward the west of Seyl Wadi Musa. An Early Palaeolithic station above the valley is reminiscent of a quite different environment some 100,000 years ago. The Wadi Musa Conduit was recognized as a marvel of hydraulic engineering in the Nabataean-Roman period of the site. It will take many months to analyze and publish the finds of the survey, mostly pottery. ■



A view of part of the standing remains at Qasr Umm Ratam.



The remains of the reservoir at Qasr Umm Ratam (foreground) amidst other ancient remains at the site.

Al-Baseet Neolithic Site in Southern Jordan

By: Nazeh Fino, Department of Antiquities, Amman (Jordan)

During an archaeological survey carried out in Wadi Musa the new Neolithic settlement of al-Baseet was discovered in October 1996. This fieldwork was carried out as part of the Wadi Musa water supply and wastewater project (AMR et al. n.d). The significance of this site was recognized when construction activities destroyed part of the site. By chance, the symposium on Neolithic settlement patterns in central Jordan was being held at the same time, and some of the participants dated this site to the Late Pre-Pottery Neolithic B (LPPNB, ca. 6,500-6,000 B.C.) period, on the basis of recovered surface artifacts (Fino 1997, 13). Because this site was endangered the Department of Antiquities of Jordan decided to carry out excavations

Al-Baseet is a medium-sized village, c.5-10 ha. in size, located in the Wadi Musa area near Petra.

This settlement varies in elevation from 1,195 to 1,235 metres above sea level, and is located between two geographic units. Towards the east lie the steep slopes of the Eastern Arabian plateau with springs located in the middle and upper parts of this area. The area to the west is characterized by sandstone areas of modest relief.

The excavations in LPPNB deposits unearthed architectural remains which were not well preserved due to destruction in later periods. The architectural remains in this area are characterized by walls which were built of large undressed limestones that do not exceed two courses in height. These walls formed rectangular rooms which abutted one another. The dimensions of two identified rooms are not clear. The interior walls and floors of both rooms, 1 and 2, were covered with lime plaster. In

room 2 the plaster floor was renewed at least three times. The plastered walls of both rooms were painted with red pigment.

In the northeastern corner of room no. 1 there was a circular hearth set into the plastered floor. In contrast to rooms 1 and 2, the floors in rooms 3 through 5 were covered with compact clay.

A tentative interpretation is that rooms 1, 2, and 5 were used for domestic activities whereas rooms 3 and 4 were used for storage. This hypothesis is based on the layout of these rooms. A small storage bin, 0.60 m. in diameter, was constructed in between the walls of rooms no.1, 3 and 4.

The layout of the LPPNB building remains at al-Baseet are similar to the architecture found at the following sites: Ain Jammam (Fino, 1996 n.d), Ain Abu Nkheilah (Kirkbride 1978, 1-10), Ba'ja (Bienert and Gebel 1997) and Basta (Gebel 1988, 109).

Fieldwork in Phases I and II unearthed more than 6064 pieces of chipped stone. Most of this material is made of flint, however there are also pieces of limestone and quartzite in this assemblage. The technical features of this assemblage are indicative of a LPPNB occupation.

The Ground Stone Industry is very limited and may not be well represented by the tools collected during the 1997 excavations. Nevertheless, the find of a plano-convex hand stone suggests that crops were processed at this site. Other artifacts in this assemblage include small and large stone bowls.

The fieldwork carried out at al-Baseet demonstrates that the architecture and material culture at this site is comparable with other LPPNB sites such as Ain Jammam, Basta, and

Ba'ja.

References

AMR, K., S. FARAJAT, A., AL-MOMANI, H. FALAHAT, Archaeological Survey of the Wadi Musa Water Supply and Wastewater Project. Department of Antiquities, Amman: unpublished report, n. d.

BIENERT, H.-D., H. G. GEBEL, Ba'ja - Early Neolithic Settlers in the Petra Mountains. - In: *Occident & Orient* (Newsletter of the German Protestant Institute of Archaeology in Amman) 2, 2, 1997, 2-4.

FINO N., Ain Jammam; An Archaeological Study. Amman, University of Jordan: Unpublished M.A. thesis, 1996.

FINO, N., AL-Baseet, a New LPPNB site found in Wadi Musa, Southern Jordan. - In: *Neo-Lithics* 3, 1997, 13-14.

GEBEL, H. G., Preliminary report on the first season of excavation at Basta. - In: A. GARRARD and H. GEBEL (eds.), *The Prehistory of Jordan. The State of Research in 1986*. B. A. R. International Series 396.1, Oxford 1988, 100-134.

KIRKBRIDE, D., The Neolithic in Wadi Rum. Ain Abu Nekheilah. - In: R. MOOREY and P. PARR (eds.), *Archaeology in the Levant*. Warminster 1978, 1-10. ■

Experimental Archaeology at Feinan: How Copper Smelting Furnaces worked in the Early Bronze Age

By: **Andreas Hauptmann, Deutsches Bergbau-Museum, Bochum (Germany)**

Since its very beginning during the Pre-Pottery Neolithic Period, metallurgy has had a decisive impact on the development of cultures in the Old World. At first copper, then gold, lead and silver, were manufactured for tools, jewellery, and weapons. The invention of copper-tin-bronzes during the Third Millennium B.C. created a revolution and led to the first "Golden Age" of mankind. Later, with the dawn of the Bronze Age at the end of the Second Millennium B.C., iron and steel spread all over the Eastern Mediterranean.

Scientific work on the history and development of metallurgy is called archaeometallurgy. As a special part of archaeometry, it is an

interdisciplinary field of research: It is based both on archaeology and applied natural sciences (physics, chemistry, geosciences, materials science, engineering, etc.). Major questions concern the early technology of metal smelting and alloying, and the composition of metal objects and ores, aiming to reconstruct ancient trade links (provenance studies).

Between 1983 and 1993, the Department of Antiquities of Jordan in cooperation with the German Mining Museum at Bochum organized a major survey on early mining and smelting at the ancient copper ore district of Feinan, halfway between the Dead Sea and the Red Sea. In 1986

and 1988, the remains of some 40 (!) smelting furnaces were excavated. According to archaeological and radiocarbon-dating, these furnaces and associated slag heaps (some 1000 t.) resulted from Early Bronze Age (EBA) smelting activities, during the Third Millennium B.C. They are among the most ancient smelting furnaces known from the Old World! Puzzling for every metallurgist was the fact that these furnaces, without exception, are located on top of hills or steep crests, kilometres away from the mines where the ore was exploited. A preliminary suggestion of the author (Hauptmann and Roden 1988) for such a strange location was the use of natural winds to run the furnaces.

This hypothesis, however, was heavily debated in archaeometallurgy, as early smelting furnaces were believed to have operated only by tuyeres and bellows. In the case of the Wadi Araba, it was even totally excluded that the rather irregular winds would have been utilized for such a purpose (Rothenberg 1988).

As a result of these discussions, a research project was organized in 1994 to further investigate the EBA smelting processes as indicated by the excavations. In



Dr. Hauptmann inspects the replicated EB furnace during the Feinan trials.

contrast to many other scholars, Prof. Wolfgang Bunk and Prof. Günther Woelk from the Technical University at Aachen were convinced of the model proposed by the author. Thanks to the Volkswagen-Stiftung, the experimental work was generously supported. This institution (which also financially supported the foundation German Protestant Institute in Amman) has been engaged for many years in Feinan, and also supported archaeometallurgical work at Timna, on the western side of Wadi Araba. The first steps of the project started in the laboratories of the University of Aachen. Based upon thermodynamics and fluid mechanics, Dipl.-Ing. Stephan Kölschbach, assisted by his colleague Dipl.-Ing. Peter Gelhoit, calculated and reconstructed possible shapes and designs of EBA wind-powered furnaces 'Model Feinan', always including the archaeological evidence. Several test runs to smelt copper were carried out in a wind channel of an industrial company at Aachen.

Much more efficient, however, was the experimental work at Feinan itself. In close vicinity of the Byzantine ruins of Feinan, on top of an EBA smelter, Kölschbach and Gelhoit constructed three furnaces with a height of ca. 60 cm, with two openings facing the direction of the winds. They used both local clay and modern refractories as construction materials. With the permission for the Royal Society for the Conservation of Nature (RSCN), the original copper ore from the mines at nearby Wadi Khalid was utilized to charge the furnaces. The results of the experimental work were fantastic! After a long period of waiting in the first half of a very sunny March, we succeeded in doing several smelting runs during the sandstorms which covered Jordan several times: on 18 March, for example, wind speeds between 14 and 18 m/sec

were measured almost for ten hours.

The two engineers, accompanied in the field by Professor Bunk, produced copper and a fluid slag (which is always the best indication for successful smelting processes), and thus



Close-up view of the replicated EB smelting furnace.

demonstrated indeed that metal production in wind-powered furnaces was possible in the EBA. The winds were so strong that inside the furnaces temperatures reached 1.400°C (!). This revealed a problem: at such high temperatures the furnace wall started to melt. Hence, the ancient metallurgists at Feinan had no difficulties to produce copper, but they were faced with the problem of finding suitable refractories for the furnaces. We didn't understand the solution immediately, but it was obvious, and it was in the finds of thousands of clay sticks ('Ladyfingers') on the slag heaps. We assume that these clay sticks, made of a high refractory material, were inserted in parts of the clay furnace walls to

reinforce their stability — similar to steel armatures in concrete.

The evidence that copper smelting furnaces were powered by natural winds could not only contribute to a better understanding of the development of metallurgical techniques: Following the smelting of ores in small crucibles, as was practised in the Chalcolithic era, EBA wind-powered furnaces were the precursors of reaction vessels operated by means of bellows and tuyeres, in the Middle Bronze Age, to better control the firing process. The experimental work should be seen in a larger context of how the metallurgists — or the entity of the tribes at Feinan — responded to the enormous demand for copper in the Early Bronze Age. Feinan, site of the major ore deposits in the region, was challenged to meet this demand, by initiating new inventions and organizations. Mining activities and the smelting of ore probably were no longer a specialized craft undertaken by a few members in society, but required a large-scale organization of labour. It was impossible to smelt larger amounts of ore in traditional crucibles; new furnaces with a

larger volume had to be developed, and to run these furnaces a new kind of material was invented.

References

- HAUPTMANN, A., CH. RODEN, *Archäometallurgische Untersuchungen zur Kupferverhüttung der Frühen Bronzezeit in Feinan, Wadi Arabah, Jordanien.* - In: *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 35, 1988, 510-516.
- ROTHENBERG, B., *Researches in the Arabah 1959-1984, Vol. 1: The Egyptian Mining Temple.* Inst. Archaeo-Metall. Studies, London 1988. ■

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