BA'JA - THE ARCHAEOLOGY OF A LANDSCAPE 9000 YEARS OF HUMAN OCCUPATION: A PRELIMINARY REPORT ON THE 1999 FIELD SEASON

by

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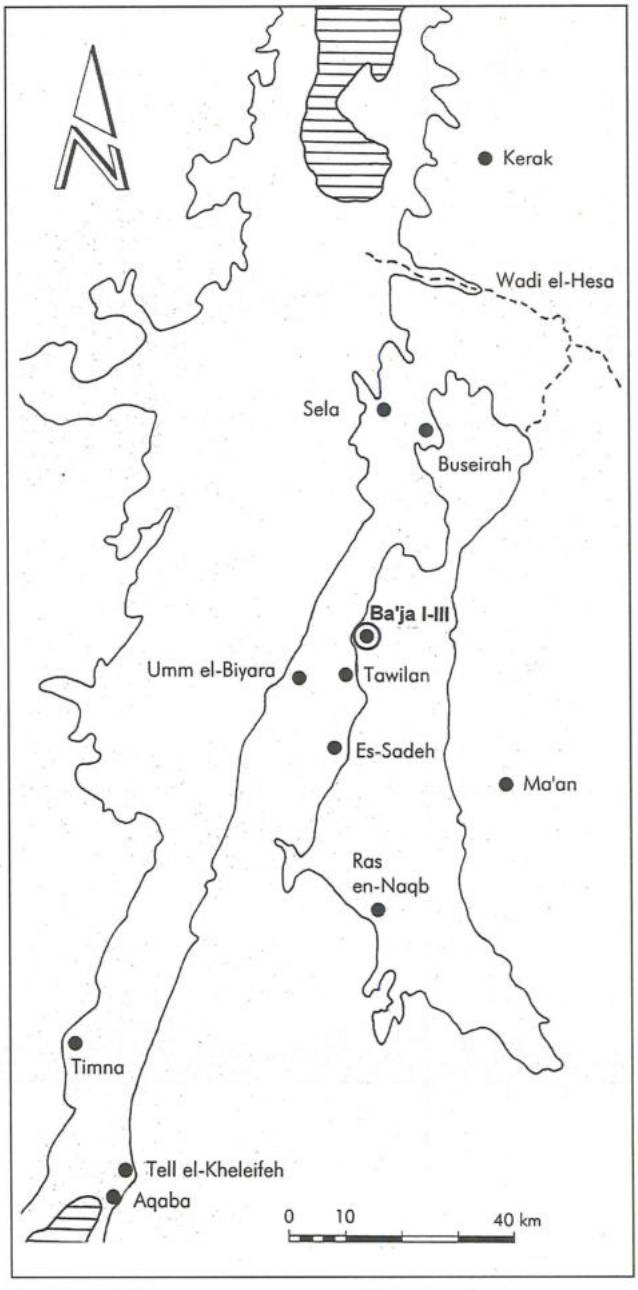
Introduction

Under the joint directorship of Hans-Dieter Bienert (DEI-Amman), Roland Lamprichs (Dresden, Germany) and Dieter Vieweger (Kirchliche Hochschule Wuppertal, Germany) the German Protestant Institute of Archaeology in Amman (DEI) conducted archaeological excavations and field studies in the Ba'ja region, an area approximately 10 km north of the ancient Nabataean city of Petra (Figs. 1 and 2). The project was carried out in cooperation and with the support of the Department of Antiquities of Jordan (DoA), the Petra Regional Planning Council (PRPC) and the Kirchliche Hochschule Wuppertal (Germany).

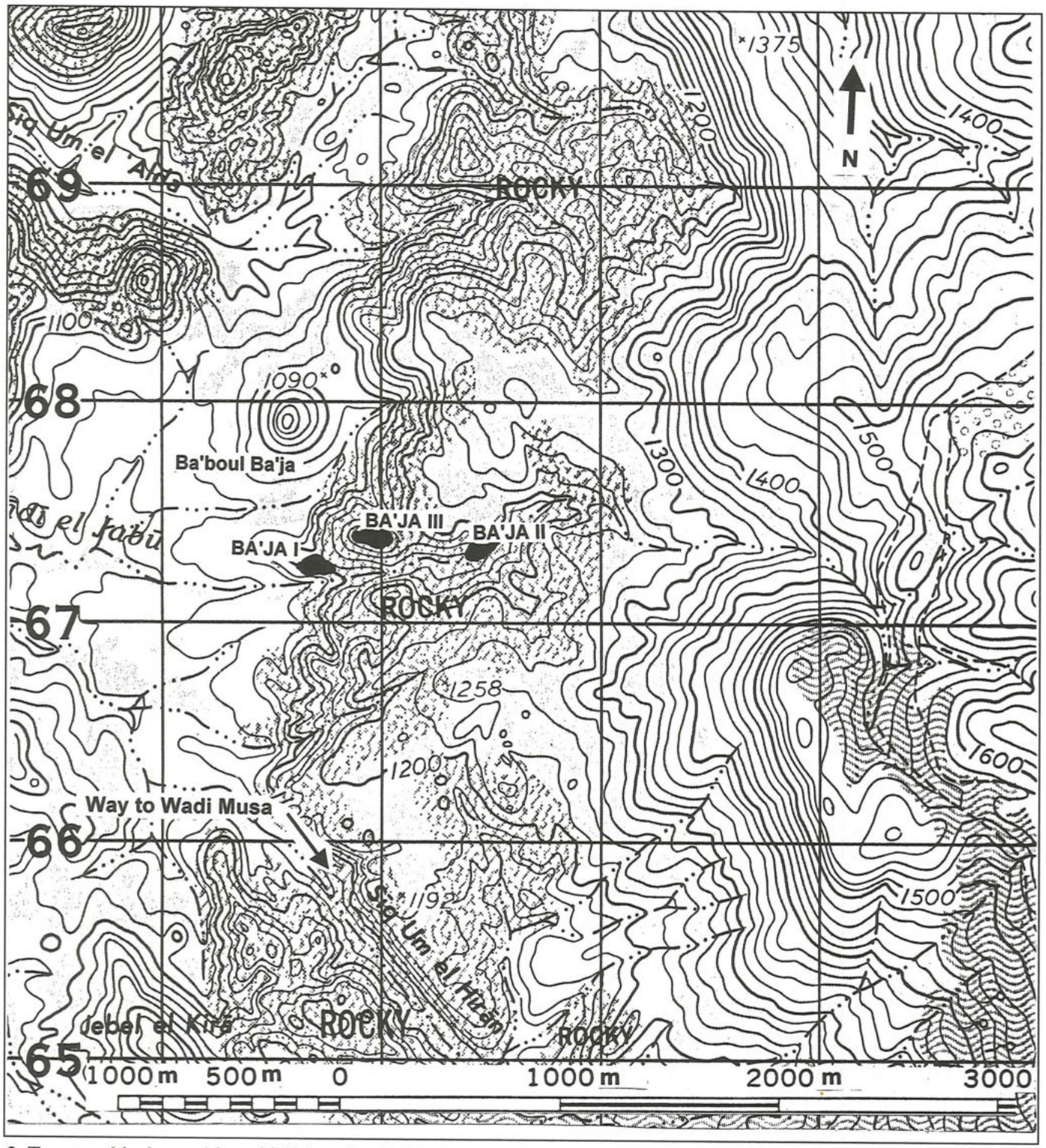
The project aimed at studying the archaeology of the Ba'ja region and documenting its remains from the earliest time of human occupation up to the Ottoman period. Previous research carried out by different scholars was incorporated in the research strategy of the project (Bienert and Gebel 1997a; 1997b; 1998a; 1998b; Bienert and Lamprichs 1999; Gebel 1986; Gebel and Bienert 1997a; 1997b; Gebel, Bienert *et al.* 1997; Gebel and Hermansen 1999; Kirkbride 1961; Lindner 1986a; 1986b; 1987; 1989; 1989/1990; 1992; 1996a; 1996b; Lindner and Farajat 1987).

Topography and Research History of the Region

The Ba'ja region, situated in the greater Petra area, can be reached via an asphalt road leading from Wādī Mūsā to Bayḍa and continuing further as a heavily damaged asphalt track and a road towards Wādī 'Arabah. After passing the junction of Bayḍa the road passes through Sīq Umm al-Ḥīrān and into the Jabu plain (Fig. 2). Entering the Jabu plain a huge round mountain, Ba'boūl al-Ba'ja, catches the attention of the traveller. The mountain massif just east of Ba'boūl



1. Map of Jordan showing the Ba'ja region.

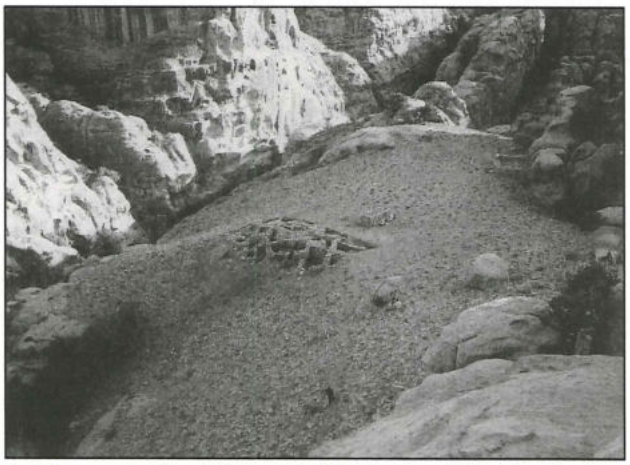


2. Topographical map (sheet 3050 I, series K737, 'Petra', 1:50,000) of the Ba'ja region with sites Ba'ja I, II and III.

Ba'ja is called Ba'ja. Early western travellers touring the region at the beginning of the 19th century focused on its archaeological remains (e.g., Musil 1907/1908, 2nd part: 217-220). More than half a century later Diana Kirkbride visitied the region of al-Ba'ja and mentioned in her notes "an area with ruins", probably the remains of a settlement dating to the late Islamic period, and Nabataean water channels (Kirkbride 1961: 448-451).

The first thorough archaeological research in that region was undertaken by Manfred Lindner and his team from the *Na-*

turhistorische Gesellschaft Nürnberg (Germany). In 1983 he started systematic surveys in the area (Lindner 1986a: 113-129; 1986b: 61-63; 1987: 291-294; 1989: 184-190; 1996a), and in the summer of 1984 Lindner discovered a number of prehistoric and historic settlements. The most ancient site, which Lindner named Ba'ja II (Fig. 2), dates to the Late Pre-Pottery Neolithic B (LPPNB: 6,500 - 6,000 b.c.). Its setting is quite spectacular; sitting on an intermontane terrace, covering approximately 12,000 m^2, the former settlement can only be reached through a narrow Sīq. Within the Sīq at least two barriers of huge fallen rocks have to be passed before one can reach the ascent to the Neolithic settlement. Here a large scale excavation was undertaken by the German Protestant Institute of Archaeology in Amman in 1997.[1] During a month long campaign an area of 250 m^2 was uncovered (Fig. 3). Typical PPNB walls of up to 2.5 m in height were detected. A large collection of sandstone ring fragments are some of the outstanding findings from the site. First preliminary reports have already been published (Bienert and Gebel 1997a; 1997b; 1998a; 1998b; Gebel and Bienert 1997a; 1997b; Gebel, Bienert *et al.* 1997).



3. The early Neolithic (LPPNB) site of Ba'ja II after the excavations in 1997.

In addition to Ba'ja II, Lindner identified three other sites which he named Ba'ja I, Ba'ja III and Ba'ja IV (Lindner 1989; 1996a). Close to the Sīq of Ba'ja a number of ancient - most likely Nabataean - rock-cut canals were found by Lindner which belonged to an ancient water network, leading water collected by a dam at the entrance to the Sīq towards the Jabu plain (Lindner 1986a: 121; 1989: 184; 1996a: 252-255). Rock-cut installations still identify the position of the former dam. It is very likely that in Nabataean times the region was heavily cultivated and that the water collected in the Sīq was used to irrigate the fields. This idea is supported by a large number of old terrace walls that can be found along the wadi of Ba'ja and at Ba'boūl al-Ba'ja. A rock-cut wine-press may also indicate wine production at the site.

On the northern slope of Wādī Ba'ja (see Fig. 2), close to the entrance of the Sīq of Ba'ja, Lindner identified the ruins of a village, which he called Ba'ja I (Lindner 1989: 184; Lindner 1996a: 249-252). In 1983 and 1984 Lindner undertook archaeological investigations (Lindner 1986a: 116; 1989: 184). Pottery from a site survey pointed to a Nabataen and late Islamic (Ayyubid-Ottoman) occupation. In 1998 another site survey was undertaken by Roland Lamprichs (Dresden) and Hans-Dieter Bienert (DEI-Amman) during which surface pottery was collected and analysed. Their findings confirmed a late Islamic date of the village. Furthermore, pottery of the Late Roman/ Byzantine and Nabataean periods was found

1. The Ba'ja Neolithic project was carried out by the German Protestant Institute of Archaeology in Amman in cooperation with *ex oriente* e.V. Berlin (Germany) and was funded by the German Protestant Institute of Archaeology (DEI), Headquarters (Hannover, Germany), the German Research Foundation (DFG) in Bonn (Germany), the German Archaeological Institute - Orient Department (Berlin, Germany) and *ex oriente* e.V. (Berlin, Germany). The project was jointly directed by Hans-Dieter Bienert (DEI-Amman) and Hans Georg K. Gebel (Free University of Berlin, Berlin). Since 1999 the excavations are conducted under the sole auspice of *ex oriente* e.V. and the directorship of H. G. K. Gebel (Berlin, Germany).

in some quantity. However, it was not possible to confirm the presence of an Iron Age settlement despite a few sherds found dating to that period (Bienert and Lamprichs 1999: 107-108). As part of the recent Ba'ja Project an archaeologcial excavation was undertaken by Dieter Vieweger (Kirchliche Hochschule Wuppertal) on the site of Ba'ja I. While surveying the vicinity of the excavation area team members collected a large quantity of worked flint, dating at first glance to the Neolithic period. Due to the quantity of the flint as well as the scatter, the area was defined as a new archaeological site and named Ba'ja V, following Lindner's terminology.

Ba'ja III offers the most oustanding setting of the sites discovered by Lindner: "Circa 40 m N of the Sīq exit leading up to Ba'ja II there is a series of chimneys and fissures with tiny worn footholds to climb up. About 140 m above the village of Ba'ja I a rugged mountain top consisting of dome- or tower-like foundations together with cisterns, grinding plates and Edomite pottery indicate an Edomite mountain stronghold or an easily defendable acropolis of a settlement down in the plain" (Lindner 1989: 187). Lindner and members of his team visited the site twice, in 1984 and again in 1986 (Lindner and Farajat 1987). On this latter occasion a sketch of the mountain top and its archaeological features was made by H. Hübl, a member of Lindner's team, showing the visible installations on the site (Lindner and Farajat 1987: Fig. 2). The few pottery sherds collected by the team dated entirely to the Iron Age II (Lindner and Farajat 1987; Zeitler 1992). However, up to now no indications of an Edomite settlement in the Jabu plain could be found, and it seems that Ba'ja III has, as mentioned by Lindner, been a pure mountain stronghold, comparable to as-Sadah, Jabal Qṣeir and Umm al-Bīyāra and other similar sites in the region.

Finally, the fourth site Ba'ja IV is situated ca. 2 km south-southwest of Sīq Ba'ja. Here, Lindner's team identified ancient terrace walls and house foundations in an area of 200 x 200 m. Pottery scattered on the surface dated to the Early Bronze Age, the Nabataean and Late Roman periods (Lindner 1989: 189; 1996a: 273-274). Since its discovery, the site has suffered severe damage by road works and agricultural activities (Linder 1996a: 274).

Ba'ja III - An Iron Age II Moutain Stronghold

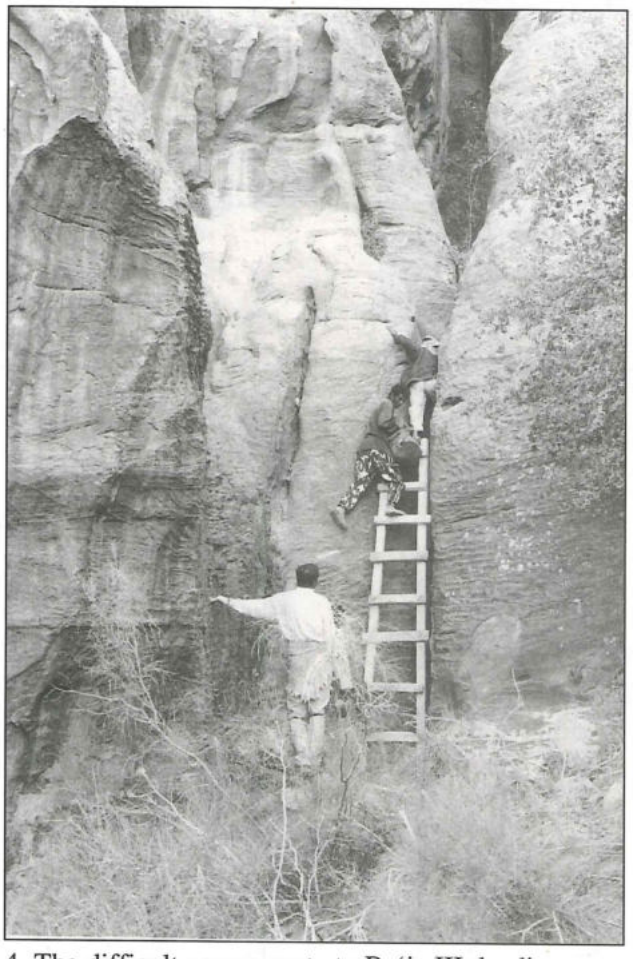
Within the framework of the Ba'ja Project a survey on the summit of Ba'ja III was conducted by Bienert and Lamprichs.[2] The area is characterized by small plateaus, steep and narrow canyons and occasionally dense vegetation. Due to the difficult access to the summit and the deeply fissured rock it was not possible - as intended - to produce an exact topographical map of the summit area.[3] However, the sketch map produced by Lindner and his team could be verified and new installations added.

In 1998 and in early 1999 several attempts were made to reach the summit of Ba'ja III, partly following the sketch of Lindner's access route.[4] However, it was not possible to reach the summit at that time. Only recently was it possible for a team, headed by Lamprichs and Bienert, ac-

2. During the survey of the summit area pottery was collected to produce a detailed study, for only 16 sherds found on the surface and 6 excavated in a cistern were published (Zeitler 1992: 167).
3. It is planned to properly map the area in a second phase of the project in spring 2001, possibly as a joint project of the German Protestant Institute of Archaeology in Amman, the Orient Department of the German Archaeological Institute (Germany), the Department of Antiquities of Jordan (DoA), the Petra Regional Planning Council (PRPC) and the Kirchliche Hochschule Wuppertal (Germany).
4. Alternative access routes were explored in the vicinity. Despite the help of local Bedouins, no easy access to the summit of Ba'ja III was found. It is also still uncertain where the ancient access route was located. No clear indications were detected.

companied by a number of local Bedouins, to reach the summit of Ba'ja III. During previous explorations the lower part of the ascent was well-known and a number of hooks set in the rock made the route easier. After having passed a large, almost vertical rock of approximately 4 m in height (Fig. 4) a very steep and narrow chimney of 18 m in length/height and only 0.5 m in width had to be scaled. Stairs cut into the rock of the gorge and chimney may point to the idea that this route was already used as an access route in ancient times (Fig. 5). Then a steep scree slope followed, and there was a desecent–using ancient rock–cut steps–into a gorge through which the ascent to the summit was made.

A detailed documentation of the ascent



4. The difficult access route to Ba'ja III, leading over large rocks through a steep and narrow chimney.

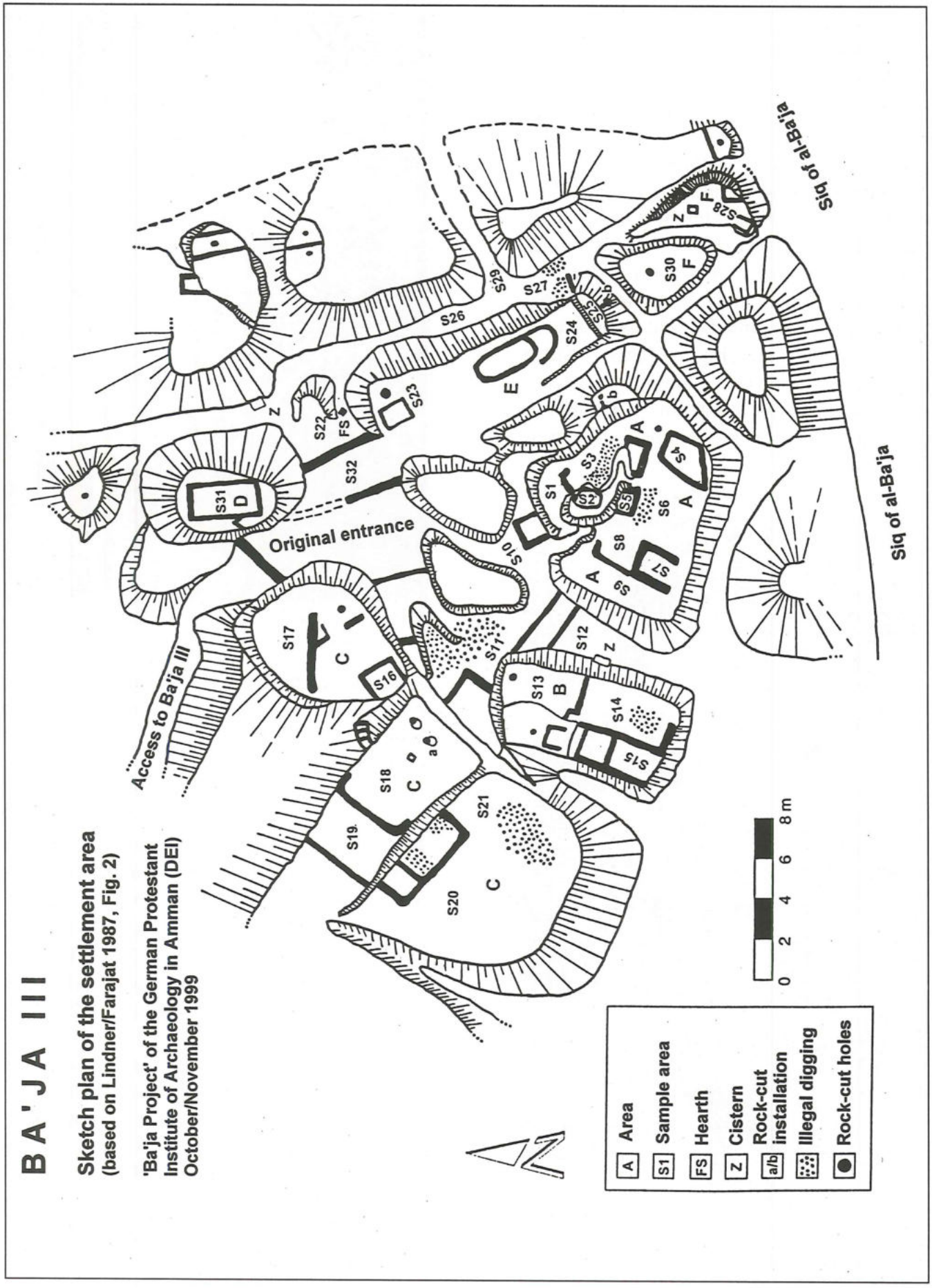
5. Rock-cut stairs leading to Ba'ja III through a narrow gorge.

route as well as of all visible installations on the summit (Fig. 6), was then undertaken by Bienert and Lamprichs with the help and support of nine local Bedouins from October 11-13. In the gorge[5] leading to the summit three rock-cut cisterns were documented.[6] They resemble three other cisterns located within the settlement area on the summit. All cisterns show remains of ancient plastering. It is quite likely that the gorge might have been used for agricultural purposes as some flat areas offered space for small fields (see also Lindner and Farajat 1987: 176; Lindner 1996a: 271, Fig. 27).

The "entrance" to the summit, which is characterised by deeply fissured rocks, was blocked by a wall of which remains were found. The wall would have made it easy to control and defend the area. To our knowledge no other access to the settlement was

5 Linder and Farajat (1987: 176) called this area the "gardens" due the flora.

6 These cisterns were found by Lindner and his team; see Lindner and Farajat (1987: 176): "Three more cisterns (IV, V, VI) of the same kind are located down a narrow valley in the NE of the summit".



6. Sketch plan of the settlement area of Ba'ja III (after Lindner and Farajat 1987, Fig. 2).

available unless ropes or ladders were used. Within the settlement area a number of terrace walls (Fig. 7) were found and documented. Using the given topography of the plateau and several man-made installations (e.g., "house" plans, wall remains, cisterns and fire-places) situated within the former settlement area of Ba'ja III, the site was subdivided into 35 survey units situated in areas A-F (Fig. 6). While survey units S1 to S32 are on the plateau proper of Ba'ja III, units S33-S35 are situated below this area on a slope northeast of the ancient settlement area (Fig. 6).

All of the installations found by Lindner (Lindner and Farajat 1987: Fig. 2; Lindner 1996a: Fig. 27) were verified and new ones found during the survey were added and mapped on a sketch (Figs. 6-13) based on Lindner's published map (Lindner and Farajat 1987: Fig. 2). It has to be mentioned that since Lindner's survey of the site, a considerable amount of illegal digging was undertaken and it seems to us that sometimes cultural layers were destroyed on purpose.[7]

The installations and architectural remains found on Ba'ja III can be classified in six groups:

I: Rock-cut rectangular basins (Lindner's "house foundations") (Fig. 8).

II.1: Platforms cut out of the rock with potholes or cup-marks in the centre.

II.2: Platforms cut out of the rock without potholes or cup-marks in the centre (Figs. 9).

III.1: Walls: structure/fortification.

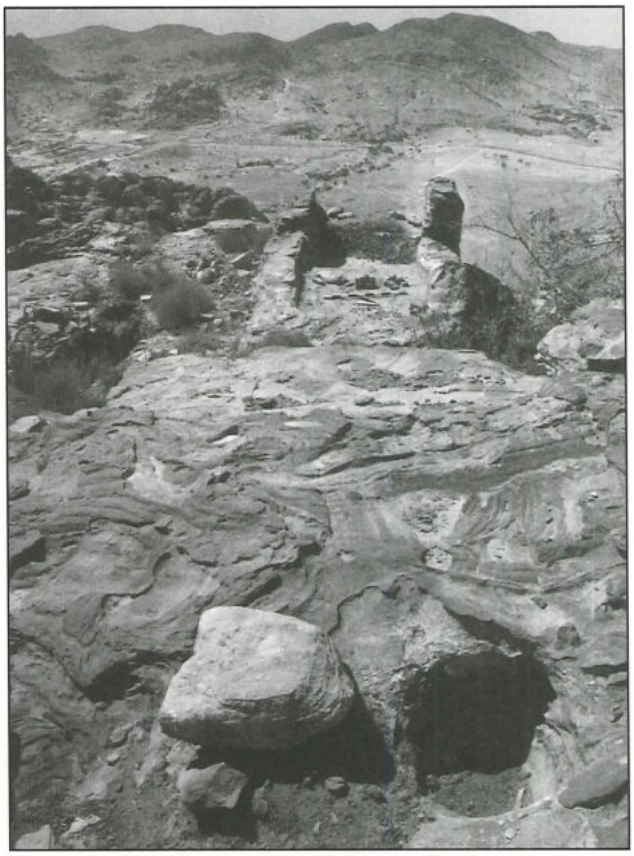
III.2: Walls: terracing (Fig. 7).

IV: Rock-cut cisterns (Figs. 10-11).

V: Water basins (Fig. 13).

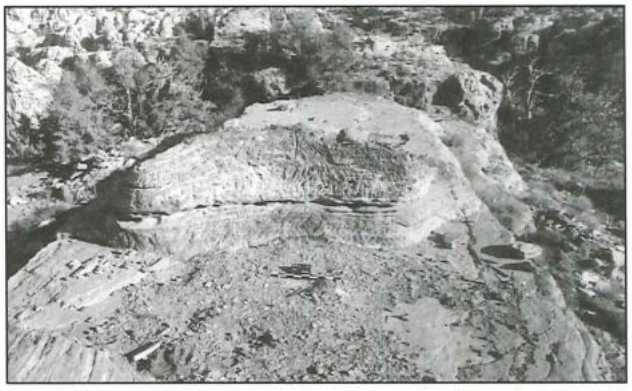
VI: Wine- or olive presses (Fig. 12).

It is not yet possible to name the original function of installations of group I. Al-



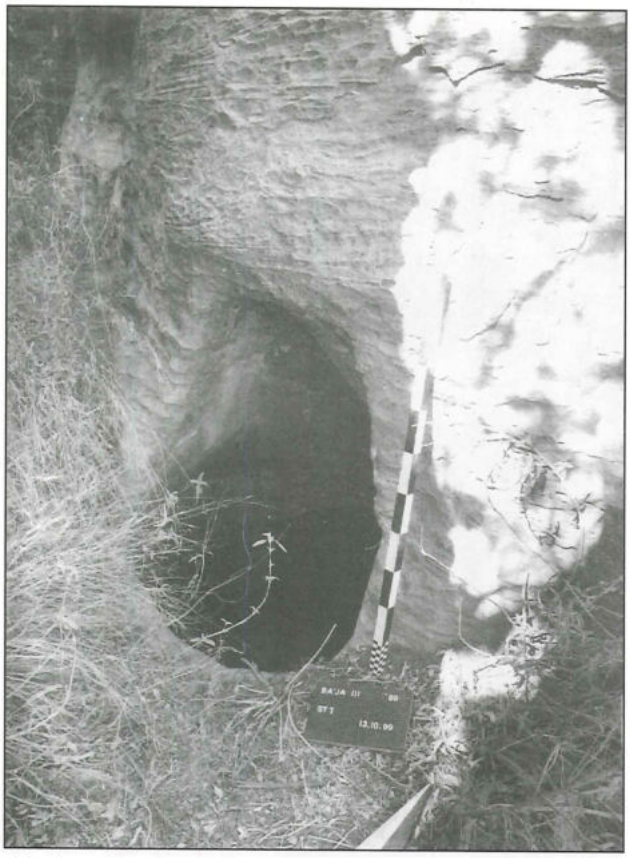
8. One of the rock-cut basins or house foundations at Ba'ja III (Area B, S15).

7. Terrace walls at Ba'ja III.

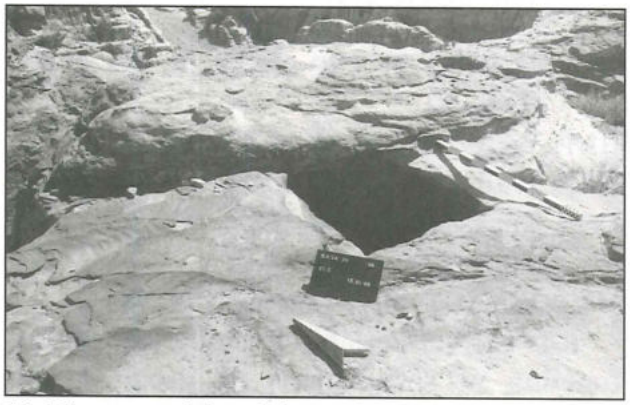


9. Hut/house foundations cut into the natural rock (Area C, S19).

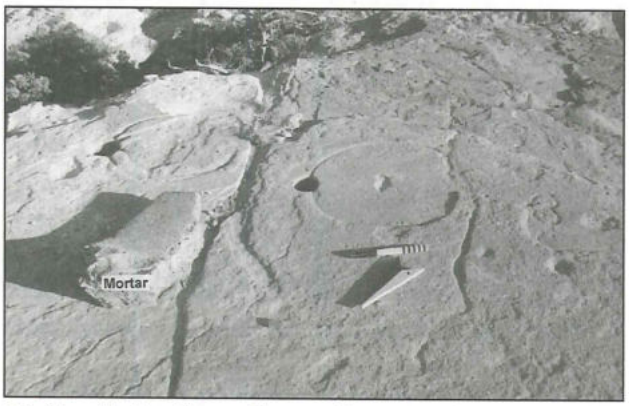
7. For example, survey unit 2 has been heavily damaged and a number of large - originally probably complete - Iron Age storage jars were destroyed.



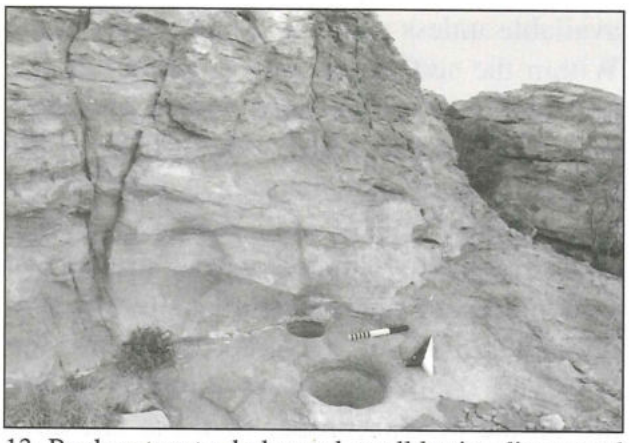
10. A rock-cut cistern (ST7 near S22) at Ba'ja III.



11. The square inlet of the rock-cut cistern ST5 (Area F, S28).



12. Small circular rock-cut olive- or wine-presses. To the left is part of a large mortar.



13. Rock-cut water holes and small basins discovered at Ba'ja III.

though Lindner suggests that they may have functioned as foundations for houses as he writes: "Nothing can be said about the purpose of the different ruins ... . They may have been houses, reservoirs, or animal pens" (Lindner and Farajat 1987: 176). The interior of these structures shows sometimes a difference in levels, but this does not give us any further indications of its former use.

The function of the rock-cut platforms is also open to discussion. In some instances a thin layer of soil mixed with pottery sherds was found. It seems that these platforms may have been used for activities related to food production and/or as locations for simple dwellings. The central rock-cut hole could have been used in different ways, perhaps as a pothole or as the place for a central post carrying a tent-like structure. It might also have been used for food producing activities. Lindner refers to similar installations found at Jabal al-Qṣeir, also an Iron Age mountain stronghold, approximately 10 km south of Petra: "... foundations had to be cut into or out of the extant dome-shaped hillrocks. Some are cut to find a level place, others are modelled with upright sides, an entrance and steps leading to it. A round hole in the centre of one of them suggests a pole for supporting a roof or a propped-up tent-like covering ..." (Lindner *et al.* 1996b: 142, Fig. 8:1).

The stone walls, found in different parts within the settlement area, functioned either

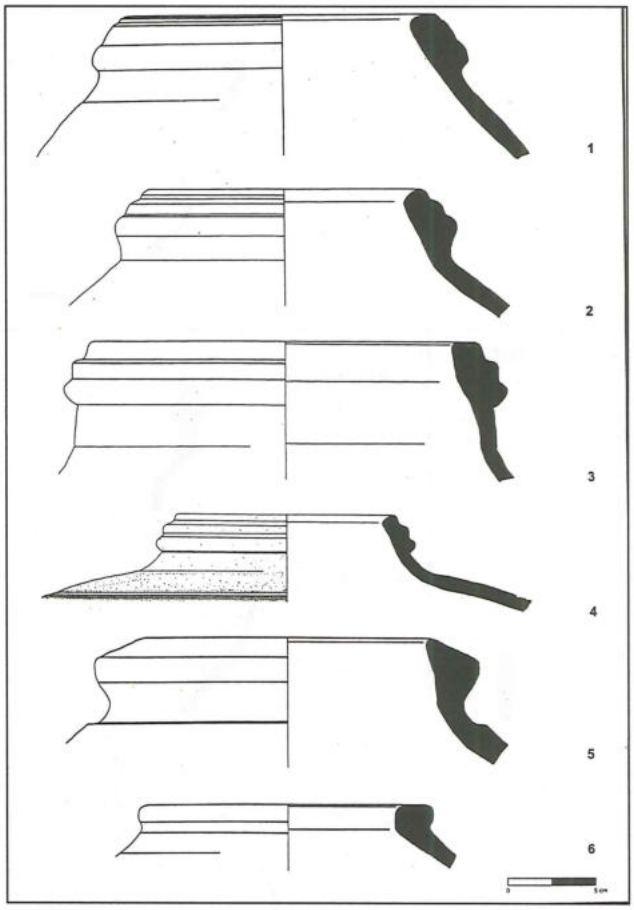
as walls of simple structures or as terrace walls. In one instance it seemed obvious that a wall was built to close the entrance into the settlement proper.

In the settlement area three more rock-cut cisterns were located. One of these cisterns, situated in survey unit 28 (Fig. 6) has a square opening of 90 x 90 cm and was examined by Lindner and his team (Lindner and Farajat 1987: 176, Pl. XVII.2; Lindner 1992: 144, Fig. 13.25; Lindner 1996a: 272, Fig. 25). It was not possible to determine the original total capacity of the cisterns, for in all cases sediment has filled up parts of these cisterns. However, one cistern[8] was partly excavated by Lindner (Lindner and Farajat 1987: 176) and measured as follows: "Cistern I is 5.35 m deep, 2.40 m wide with a curvature of 1.20 m in the upper part. The opening is roughly a square of 1 x 1 m. There are remains of plaster only in its upper part. Its bottom was covered by a layer of sand which was 0.75 m deep." It is intended to thoroughly study all cisterns and to analyse the plaster during the second season in spring 2001.[9]

At several spots installations were documented that might have been used as small water collecting basins (Fig.13) or have functioned in association with other liquids, such as olive oil or wine.[10] Especially, two small circular rock-cut installations in survey unit S18 can be indentified as olive- or wine-presses (Figs. 6 and 12).

Apart from the above mentioned installations, a total of 423 diagnostic pottery sherds (Figs. 14-19) was found during the survey: 231 body-sherds, 48 bases, 74 handles[11] and 70 decorated body-sherds (Table 1). The ratio of handles and decorated body sherds to rims is approximately 1:3 each. Their proportion of 17.94%[12] of handles or 16.55% of decorated body-sherds in the pottery-total is quite high and gives a first clue to the applications dominating the pottery assemblage. A significant part of the collected pottery is heavily weathered and moss-covered.

The density of surface pottery was altogether relatively high. Diagnostics are found

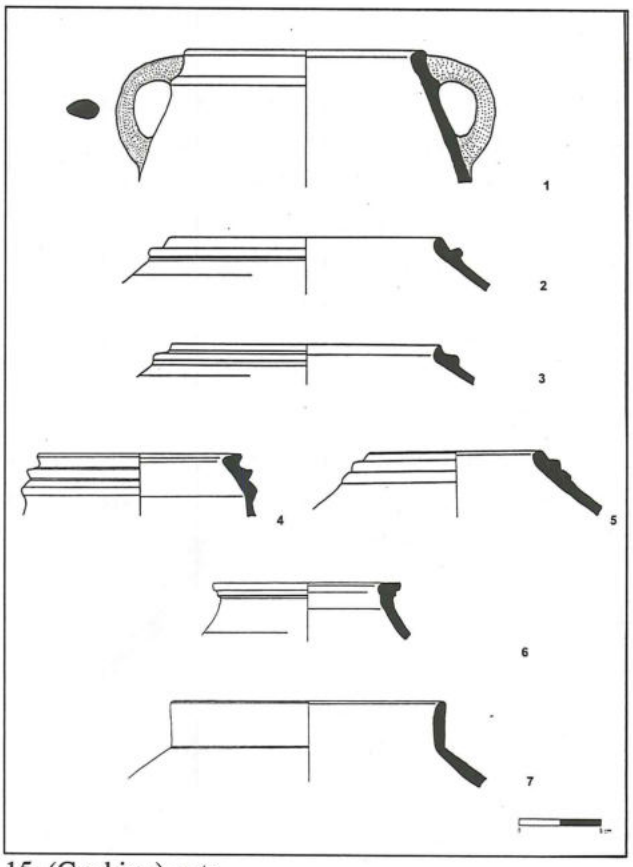


14. Storage jars.

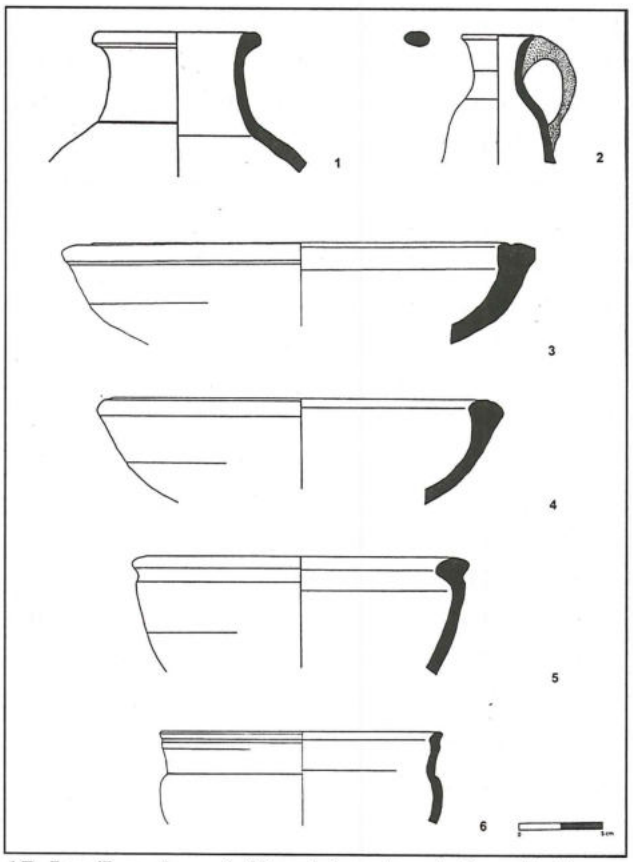
Table 1. Quantitative overview of potsherds.

	Rims	Bases	Handles	Bodysherds	Total
Quantity	231	48	74	70	423
%	54.61%	11.35%	17.49%	16.55%	100%

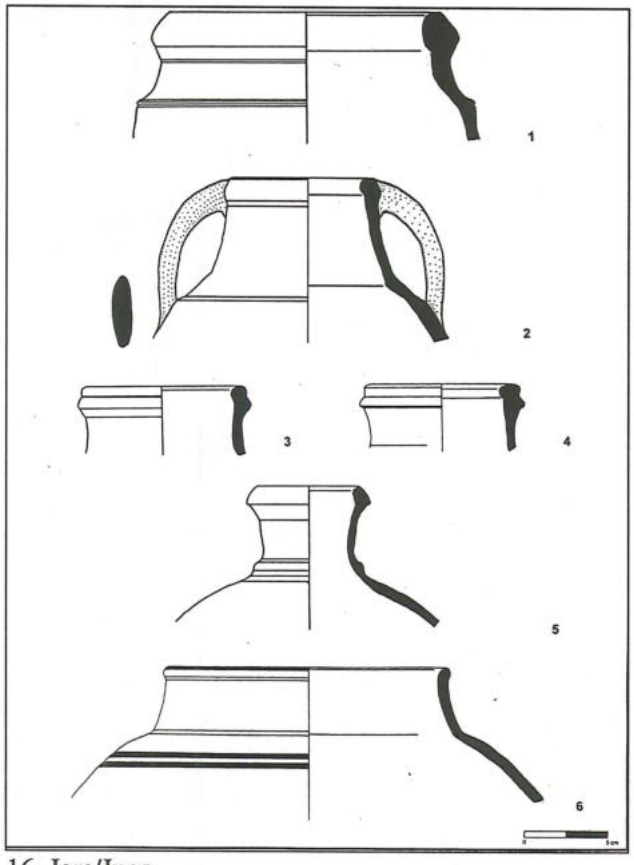
8. It is "cistern I" by Lindner and Farajat (1987: 176). Located in Area F in survey unit S28, it was named by Bienert and Lamprichs as ST5.
9. Prof. Dr Andreas Hauptmann from the German Mining Museum in Bochum will analyse the plaster from the cisterns.
10. Their locations are marked with "a" and "b" in Fig. 6.
11. Furthermore 29 out of 231 rims have a handle.
12. Adding the mentioned 29 handles counted as rims will raise their share up to 24.35%.



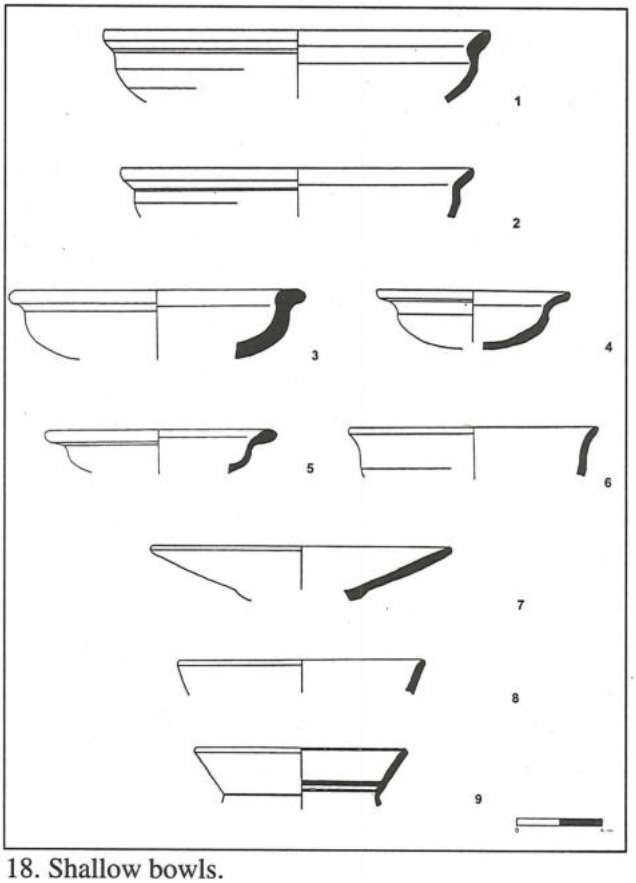
15. (Cooking) pots.



17. Jars/Jugs (nos. 1-2) and deep bowls (nos. 3-6).

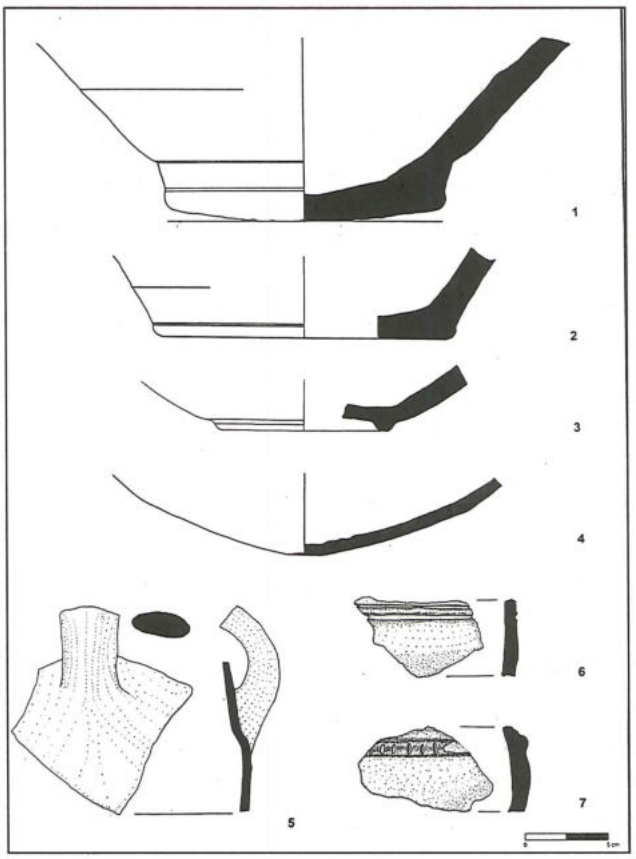


16. Jars/Jugs.



18. Shallow bowls.

in almost all areas of the plateau. With the exception of survey units 10, 12, 15, 23 and 29, all units showed at least some pottery on the surface. Quantitatively, the biggest pro-



19. Bases (nos. 1-4), a handle (no. 5) and decorated body sherds (nos. 6-7).

portion of pottery (64.78%) was found in only 10 out of 30 (pottery containing) units.[13] Units 17 (15.6%) and 18 (7.09%) followed by 3, 4, 24 (5.91% each) predominated. Units 2 (5.67%), 5, 21, 22 (4.73% each) and 6 (4.5%), show a high density of surface pottery as well.

A correlation of areas A-F (see in Fig. 6), defined by installations and the topographic situation of the plateau, with the given distribution of pottery shows clearly that almost two-thirds (66.43%) of all sherds were collected in areas A and C situated on the south- and west-north-west parts of the site (Table 2).[14] Within area A, 33.81% of the "pottery-total" was registered whereas the considerably bigger area C contributed 32.62%. Another 7.09% of the surface pottery was found in area E situated in the eastern part of the site. The remaining sherds all come from smaller areas F (3.55%), D (3.31%) and B (2.60%).[15]

Within the Ba'ja III pottery assemblage 10 wares could be distinguished that were summarized to four main groups (Table 3).

Wares 1 to 8, summarized in groups I-III, are all wheelmade, of coarse to fine fabric and most probably of Iron Age date. The

Table 2. Quantitative distribution: diagnostics/area.

Area	Rims	Bases	Handles	Bodysherds	Total	%
A	65	13	30	35	143	33.81%
B	5	2	2	2	11	2.60%
C	74	19	19	26	138	32.62%
D	9	1	3	1	14	3.31%
E	13	7	9	1	30	7.09%
F	12	1	2	0	15	3.55%

Table 3. Wares and corresponding group.

"Ware"	1, 2, 3	4, 5	6, 7, 8	9, 10
Group	I	II	III	IV

13. It should be considered, that this distribution may be (additionally) biased by illegal digging activities most probably conducted during the past years (see Lindner and Farajat 1987: 175, 179).
14. Areas A-F are defined as follows: area A = S1-S9; area B = S13-S15; area C = S16-S21; area D = S31; area E = S24-S25; area F = S28, S30.
15. It should be considered that some of the pottery found in the slope areas of the settlement (e.g. S11, S22, S26) were washed down from the upper parts of the site. For example, pottery found in unit 11 may be washed down from area B whereas sherds collected in S22 and S26 may have their origin in areas C and D.

colour varies from light buff to reddish-brown. A grey core is characteristic for some of the larger pots. The temper is usually of small white, grey and brown grits. Nearly all of the pottery (98.82%) collected in Ba'ja III could be assigned to one of these groups.

Only 1.18% of the assemblage belongs to wares 9 and 10, which are summarized in group IV ("others"). The pottery assigned to this group is completly different to the one mentioned before. It is partly hand-made and most probably of a non-Iron Age date.

Group I (wares 1-3) has a share of 30.26% in the "pottery-total" (Table 4). The pottery is coarse to very coarse, and its thickness varies between 1 cm and 1.8 cm. Group II (wares 4-5) is formed by "medium-coarse" pottery. It has a share of 30.73% in the pottery-total. Its thickness varies between 0.6 cm and 1 cm. Group III , comprising wares 6-8, is quantitativly predominant (37.83%). Its pottery-fabric is finer and the maximum thickness of sherds is 0.9 cm. Group IV comprises the few pieces of pottery (1.18%) assigned to wares 9 and 10. The very heterogenous material most probably does not belong to the main period of occupation.[16]

The typological spectrum (Figs. 14-19) recorded in Ba'ja III is restricted to 8 major (vessel) forms with several sub-types and numerous variations:

1. (Large) storage-jars (e.g. Fig. 14:1-6) and sub-types 1.1-1.2.
2. (Cooking) pots (e.g. Fig. 15:1-7) and sub-types 2.1 (cooking pots), 2.2 and 2.6 (multifunctional pots, eg. storage), 2.3-2.5 (Crater), 2.7 ("scattered-find" ?).
3. Jars/jugs (e.g. Fig. 16: 1-6; Fig. 17: 1-2) and sub-types: 3.1-3.5.
4. Deep bowls (e.g. Fig. 17: 3-6) and sub-types 4.1-4.2.
5. Shallow bowls (e.g. Fig. 18: 1-9) and sub-types 5.1-5.5.
6. Bases (e.g. Fig. 19: 1-4) and sub-types 6.1 - 6.4.
7. Handles (e.g. Fig. 19: 5) and sub-type 7.1.
8. Decorated and "striking" body sherds (e.g. Fig. 19: 6-7) and sub-types 8.1-8.5.

As a quantitative analysis shows, "pots" (type 2) are absolutely predominant within the assemblage. Almost a quarter (24.58%) of the pottery attested in Ba'ja III belongs to this type of vessel (Table 5). "Cooking pots" (sub-type 2.1: 10.87%) and "craters" (sub-types 2.3-2.5: 9.93%) are most frequent within this group (Table 6). The remaining pieces of type 2 belong to "pots with a short neck" (sub-types 2.2 and 2.6: 3.54%) and to a "pot with a chipped carved ledge" (sub-

Table 4. Pottery and Waregroups (WG): quantitative distribution.

Group	Rims	Bases	Handles	Body sherds	Total
WG I	53	9	29	37	128
WG II	75	19	25	11	130
WG III	100	20	19	21	160
WG IV	3	0	1	1	5
Total	231	48	74	70	423

16. Group IV consists of two wheelmade pottery fragments (belonging to one sherd of ware 9) of uncertain date, found on the eastern slope of the site. Furthermore three handmade pottery sherds of ware 10, most probably of a single vessel, belongs to the group. The latter differ in all aspects fundamentally from all the other pieces recorded in Ba'ja III. Parallels show that they probably are the so called "village-ware" of Late Islamic/ Ottoman date. Considering the extremely low quantity of corresponding finds, however, these sherds do not represent a later phase of occupation at the site. They are rather some kind of "scattered-finds".

Table 5. Quantitative distribution of pottery-types.

Type	1	2	3	4	5	6	7	8	Total
Quantity	37	104	51	13	26	48	74	70	423
%	8,75	24,58	12,06	3,07	6,15	11,35	17,49	16,55	100%

Table 6. Quantitative (absolute/relative) distribution of pottery sub-types [figures given in % refers to the "pottery-total" of types 1-8 (=423 pieces)].

Type	1.1	1.2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	3.3
Quantity	21	16	46	10	5	6	31	5	1	43	3	2
%	4.96	3.78	10.87	2.36	1.18	1.42	7.33	1.18	0.24	10.17	0.71	0.47

Type	3.4	3.5	4.1	4.2	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4
Quantity	2	1	9	4	13	2	6	4	1	4	4	31	9
%	0.47	0.24	2.13	0.95	3.07	0.47	1.42	0.95	0.24	0.95	0.95	7.33	2.13

type 2.7: 0.24%).[17]

Handles (type 7) and "decorated body sherds" (type 8) are the next most frequently documented. Their share in the pottery-total is 17.49% and 16.55%, respectively.

Jars/Jugs (type 3) and bases (type 6) account for only 12.06% or 11.35% (Table 6). Within these vessels of type 3 "jugs with a profiled rim, marked neck, oval body and handle" (sub-type 3.1) are most frequent (10,17%). Sub-types 3.2-3.5 make up only 1.89% of the pottery-total. Within the group of bases (type 6) vessels with a "foot-ring" (sub-type 6.3) are predominant (7.33%), followed by the so called "knob-foots" (sub-type 6.4: 2.13%). The remaining bases, sub-types 6.1 and 6.2, have a share of only 0.94% each.

(Large) storage jars (type 1) have a share of 8.75%, which is evenly spread over sub-type 1.1 (4.96%) and 1.2 (3.78%). They are, quantitatively taken, still situated in the "center-field", whereas deep (type 4: 3.07%) and shallow bowls (type 5: 6.15%) are quite close to the bottom of the scale. Almost half of the latter (type 5) are "flat carinated bowls with everted rims" (sub-type 5.1: 3,07%). Another third is represented by sub-types 5.3 (1.42%) and 5.4 (0.95%), which are of fine fabric showing some paint. The remaining vessels of this type (sub-type 5.2 and 5.5) althogether have only a share in the pottery-total of less than 1% (0.71%). Finally, within "deep bowls" (type 4) sub-type 4.1 has a share of 2.13%, which is more than two times the figure of sub-type 4.2.

Despite previous assumptions by several scholars (e.g. Zeitler 1992: 171-172), almost a fifth of the pottery assemblage from Ba'ja III is decorated. About 80 diagnostics (18.91%) out of 423 show four different ways of simple decoration (Table 7). "Decorated body sherds without/with handle" (type 8: 16.31%; type 7: 1.65%) are absolutely predominant (17.96%) in the pottery-total, whereas "decorated rims" are least frequent with only 0.95%.[18] Handles and bases, however, reveal no decoration at all. Besides parallel horizontal bands of dark paint ("Edomite-band-painted-pottery"), bands/ledges of rills, impressions and knobs/notches are attested. It is worth mentioning that bands of paint are testified, contrary to previous assumptions (Zeitler 1992: 172),

17. This kind of vessel(-sherds), as already said, is most probably of Late Islamic/Ottoman date. It has no parallels in Ba'ja III.
18. The mentioned rims belong to a shallow bowl (sub-type 5.4) and a jar/jug (sub-type 3.4), both of which bear remains of a paint, and to two pots with rills (sub-type 2.2) or knobs/notches (sub-type 2.7).

Table 7. Quantitative distribution of decorated sherds.

	Paint	Rills	Impressions	Knobs	Total
Rims	2	1	0	1	4
Bodysherds	4	54	10	1	69
Bodysherds (with handle)	0	6	0	1	7
Bases	0	0	0	0	0
Handles	0	0	0	0	0
Total	6	61	10	3	80

not only on plates and deep/shallow bowls but also on a jar/jug.

A correlation of decorated sherds and survey units shows that only about half of the units (16 out of 30) had decorated pottery. Painted pottery was located exclusively within area A (S3-S4) (Fig. 12). Rill-decorated pieces, on the other hand have been found in almost all units, with a small accumulation recognized in areas A and C (S2, S 5, S17, S21). Pottery sherds showing an impressed decoration are mainy recorded in area C (S17). Single pieces, however, are found in areas A, B and E as well.

Since the pottery assemblage was recovered during a surface survey, there are no direct clues for dating and interpretation of the material.[19] The general chronology of the site and the date of the recorded archaeological material, therefore, depend almost completely on data known data from "similar" sites situated within and outside the Petra-region.[20] Important archaeological sites within this framework include Umm al-Bīyāra, as-Sadah, Jabal Hubta, Jabal al-Qṣeir, Gareh, Khirbat al-Mu'allaq, Kuttle II, Ṭawīlān, Buṣayra, Sela' and Tall al-Khalayfī.[21]

A first analysis of the Ba'ja III material showed that the pottery assemblage is very homogenous and represents most probably a single period of occupation. No intra-site pottery development and no sub-phases within the material could be observed. The typological spectrum of the pottery assemblage largely fits the complex of the so-called "Edomite pottery", well known from southern Jordan.[22] No Iron Age I pottery could be distinguished with any certainty.[23]

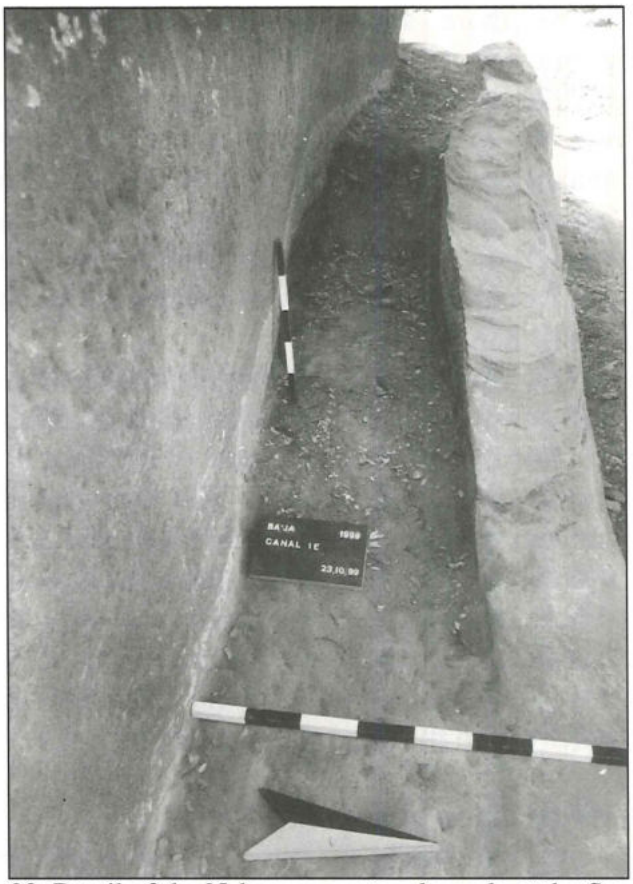
19. The following are first considerations only. A more detailed analysis of the surface pottery has to be done within the framework of a final report. For general problems concerned with the dating of "Edomite pottery" see Bienkowski (1992) und Zeitler (1992: 171; 1998: 23-25).
20. Regardless any assumption based only on a pottery assemblage gathered from short surveys remains speculative for the time being. A definite regional, functional and/or historic classification still needs further investigations. In any case, more excavations are necessary.
21. According to Bienkowski (1990: 91-95), Umm al-Bīyāra represents a single period of occupation and the pottery is homogenous. Based on a seal impression of Qos-Gabr, it is dated in the first half of the 7th century B.C. (Zeitler 1992: 171); Iron Age II pottery from Ṭawīlān is dated from the 7th-6th century BC (Bienkowski 1990; 1995). Area B at Buṣayra most probably dates to the 7th century BC (Bienkowski 1990). For finds from Tall al-Khalayfī, a date ranging from 8th-6th century BC is given (Bienkowski 1995). For more sites and their dates see, for example, Lindner *et al.* 1988; 1990: 204-211 (es-Sadeh / Umm al-Ala), Lindner *et al.* 1996b: 153-161 (Jebel al-Qṣeir), Lindner *et al.* 1996a: 126-130 (Khirbat Mu'allaq), Lindner *et al.* 1996b (Kuttle II), Lindner *et al.* 1997 (Jabal Hubta), Lindner 1997 (es-Sela'), Hart 1988 (Gareh), Hart 1995 (Ṭawīlān).
22. Local characteristics, such as numerous sherds with some kind of decoration, are present and need a detailed analysis.
23. See the discussion between Bienkowski (1992; 1995; 1997) and Finkelstein (1992a, 1992b, 1995) as well as the analysis of pottery found on Jabal Hubta by Zeitler (1998) concerning an Iron Age I horizon in southern Jordan.

Strong parallels regarding geographical setting and pottery assemblage with sites like Umm al-Bīyāra, as-Sadah and Jabal Qṣeir suggest most probably a Late Iron Age date (seventh - sixth century BC) for the site of Ba'ja III.[24]

The predominance of coarse wares and a corresponding typological spectrum indicates furthermore that the main functions of the recorded vessels were restricted. Probably storage (storage jars), food preparation (cooking pot) and handling of liquids (jars/ jugs) were among the most important activities carried out within the mountain stronghold of Ba'ja III during the Late Iron Age.[25]

Nabataean Water Channels at Ba'ja
(Isabelle Ruben)

The rock-cut channels along the north and the south sides of the Wādī Ba'ja were recorded as part of the Ba'ja Project in October 99 (Fig. 20). In the narrow Sīq of Wādī Ba'ja, some 50 m from where it broadens out, there is evidence of an ancient dam. All that remains today are slots cut into the bedrock on either side of the Sīq that would once have held the stones of a dam. Beginning a few metres upstream of this dam, on both sides, are rock-cut channels leading out towards the site of Ba'ja I and the open area of fields to the west. Along the narrow part of the Sīq the channels are cut into the vertical rock face, and in order to make room for them the rock has, in places, been undercut for up to 2 m. The typical diagonal Nabataean pick marks are visible in many places, particularly where the bedrock has been undercut. There is a one line Nabataean inscription just above the undercutting of the bedrock above the channel on the south side near the entrance of the Sīq. The channels are of varying width, with a mean of roughly 0.5 m. They have a rectangular cross-section, with the outside



20. Detail of the Nabataean water channels at the Sīq Ba'ja.

'wall' also being cut from the bedrock. In several places, where small side wadis join the main wadi, the channel has been damaged or completely eroded away. Across some of the wider side wadis, the original builders of the system must have constructed a small aqueduct to support the channel, but these too have eroded away.

On the north side there is only one channel, which nowadays disappears at its western end under the building rubble of Ba'ja I. The channel on the south side appears to have been rebuilt at least twice, because there are several stretches where a section of one channel cuts across another. In these places the channel sections run more or less parallel to each other but at different levels. In each case the lower channel has truncated the higher one and is therefore later, so

24. If or in what way Ba'ja III fits within a (functional) classification of "Edomite sites" given by Zeitler (1992: 172-176) still has to be checked in detail.

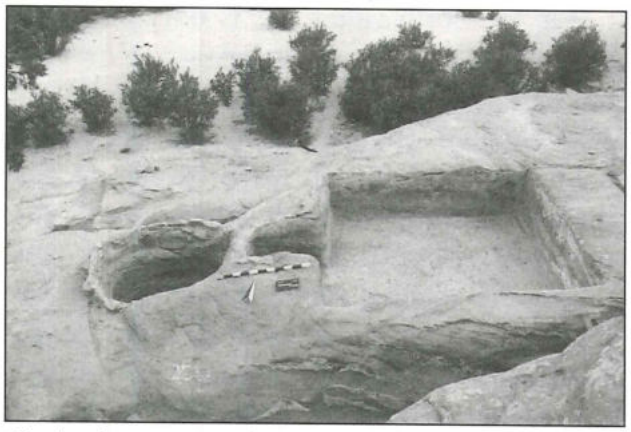
25. Decorated and painted fine wares and their corresponding functions are within this framework of marginal importance only.

where there are three channels, the uppermost one was the first to be built, the middle one was second and the lowest one was the last. The reasons for recutting new channels in certain places is not clear. The lowest channel is at the current level of the wadi bed, so that it seems evident that the level of the wadi bed was originally much lower than today.

It is probably safe to assume that the original construction of the channels dates back to Nabataean times, given that the inscription, the pick marks, and the overall concept of a large water catchment and distribution system are all typically Nabataean. Where the water was being led can only be surmised, but certainly a proportion of it must have been used for the irrigation of fields out in the flat area to the west.

Wine-Press and Petroglyphs

Approximately 500 m to the west of the entrance of the Sīq of Ba'ja an ancient wine-press was documented (Fig. 21), previously recorded by Lindner (Lindner 1996a: 254-255). The installations consists of three parts: a 2.90 x 3 m large and 1.10 m deep basin; a smaller basin of 0.8 x 0.8 m and 1.10 m deep; and a small circular canal of 1.80 m in diameter. Today this installation is used by local Bedouins as a water reservoir. No finds have been made in the context of the wine-press, but similar installations in the vicinity date to the Nabataean period, and this wine-press should also be of Nabataean origin.



21. A wine-press near the Sīq of Ba'ja.

Just north of the entrance into the Sīq of Ba'ja, a narrow - only 1 m wide - gorge was surveyed in which Lindner had documented a dam of 2.80 m in height (Lindner 1986a: Fig. 14; 1996a: 260, Fig. 14). Close to this dam a number of petroglyphs were found carved into the rock. Almost all of them depict animals, most likely ibexes. Similar petroglyphs are known from other regions in southern Jordan, especially from Wādī Rum (Borzatti von Löwenstern 1982; 1984; 1995; 1996).

Ba'ja I - A Nabataean and Late Islamic Settlement (Dieter Vieweger)

The rural settlement Ba'ja I (Figs. 22-24) at the bottom of the Ba'ja massif was discovered and first surveyed by M. Lindner and his team (Lindner 1996a: 249-252). According to his survey there are at least 20 buildings at this site (Lindner 1999: 490),[26] but it was not possible for him to ascertain the outlines of the ruins to a topographical map without excavating (Lindner 1996a: 249). The pottery from the surface (60 fragments in total) dates to Iron Age II (possibly washed down from Ba'ja III), to the Nabataean-Roman, and (exceptional in quantity) the Late Islamic (Ayyubid-Mameluk) period (Lindner 1986b: 116; 1999: 491).[27] Lindner proposed a larger settlement, especially during the Nabataean period, which was connected with the cisterns, the rock-cut channels, the terraces of the nearby conical mountain and some dams in the Ba'ja massif.

In February 1998 Bienert and Lamprichs undertook an intensive survey around Ba'ja I (Bienert and Lamprichs 1999). They collected 279 pieces of pottery that represent four different wares (Table 8).

26. Lindner wrote about more than 50 houses some years before (1986a: 116).

27. During his first survey Lindner interpreted the hand made pieces of pottery of Ba'ja I as Chalcolithic (1986a: 116; 1989: 186); but he later revised this opinion.

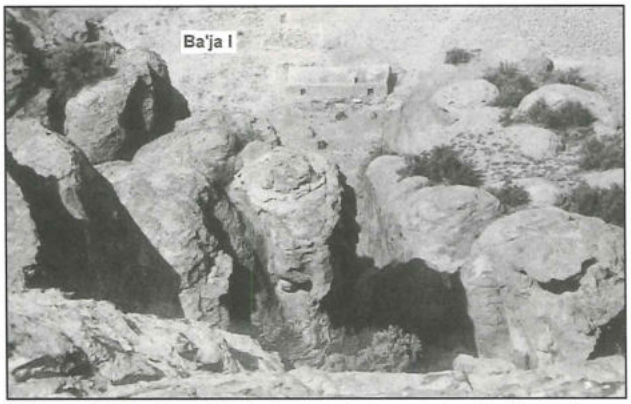
Table 8. Pottery "wares" of the survey (Bienert and Lamprichs 1999: Tables 3-4).

"ware" group	Quantity	Number of "wares"	Production	Date
I	76.34%	5	hand made	Late Islamic-Ottoman
II	12.90%	8	wheel made	Late Roman-Byzantine
III	10.04%	3	wheel made	Nabataean
IV	00.72%	1	wheel made	Iron Age II (?)

They supposed "evidently four settlement phases ..., that correlate somewhat with the four 'ware' groups ..." (Bienert and Lamprichs 1999: 107). However, on the basis of the extremely small number of Iron Age artefacts, they denied the existence of a settlement for this period in Ba'ja I (Bienert and Lamprichs 1999: 108).

The excavation field is located on a slightly rising slope and covers about 150 x 70 m. The Ba'ja massif to the north and east, the potential usable area of arable land in the west and the wadi[28] to the south and east mark the natural boundaries of the site (Fig. 22).

During the excavation in 1999 we first had to clarify the stratigraphy of Ba'ja I. It seemed to be favourable to select a prominent area of the site southeast of one of the modern houses constructed by Bedouins. Here we examined rectangular structures at the surface where we hoped to expose well preserved architectural remains. It was necessary to dig up several of such structures ('rooms') to reconstruct their possible functional combinations and the existence of larger units ('houses').



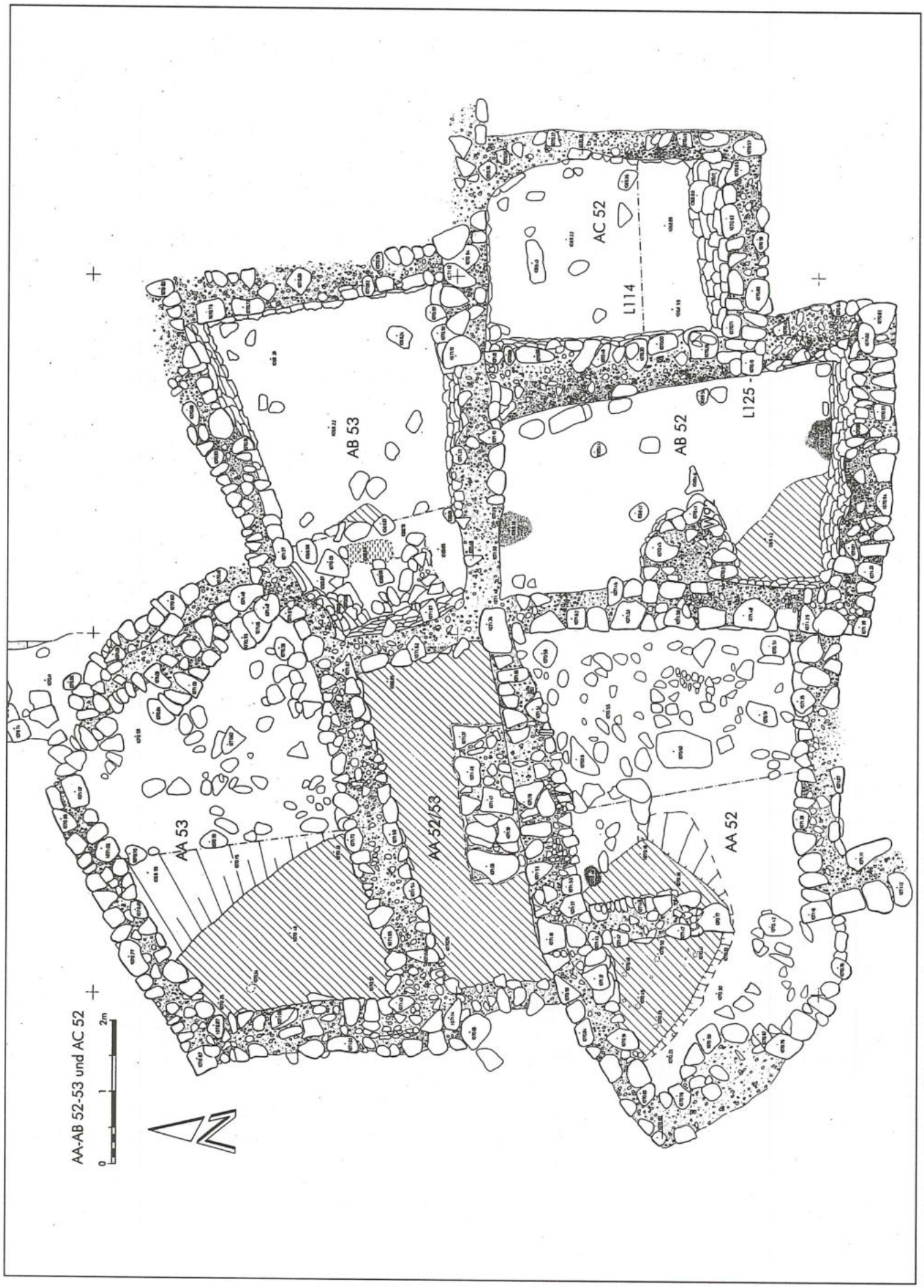
22. and 41: Looking towards towards Ba'ja I from the access route of Ba'ja III (photo: M. Lindner).

A geoelectric prospection of the excavation field was originally intended, but because of the extreme dryness of the soil it was impossible to get relevant results similar to what we got some weeks before in Sāl (near Irbid; see Kafafi and Vieweger, 2000). It seems necessary to try this method again in the spring.[29]

In the central excavation area approximately 120 m^2 were uncovered during the excavations (squares AA/AB 52/53 and AC 52; Fig. 23). Architectural features were found in good condition with high and well preserved walls. Altogether six rooms or houses were excavated. Two Islamic periods could be distinguished stratigraphically. Pre-Islamic architecture was not encountered and Pre-Islamic pottery was extremely rare.

The rooms of the older stratum were all constructed in the same way. The walls were based directly on the rock. Afterwards, the uneven surface of the rock was levelled by soil and stones to create a nearly horizontal surface. We found nearly no pottery in the fill, and especially not from Nabataean-Roman times. One must conclude that there were no older archaeological strata at this place at the time of construction. According to the slope, however, the absolute heights of the same stratum differ. The rooms of line AB and AC were placed deeper than those of line AA, where the rock sticks out higher (Fig. 23). The floors of the younger stratum

28. The wadi has carved into the ancient site over the past few centuries.
29. The cemetery on the small mount in the south of the wadi probably belongs to this site. It contains Muslim burials, so it could not be included in our field work.



23. Ground plan of the architectural remains of Ba'ja I in 1999.

(15-20 cm above the older one) were prepared without much extravagance. Obviously, the destroyed material of the older stratum was levelled and then stamped and used as new surface.

The archaeological remains of squares AB 52/53 and AC 52 (Fig. 23) were not disturbed by ëtest trenches' made by treasure hunters as was the case along line AA. Therefore, the upper (younger) phase was very well preserved. On the floor (L 61: 1069,52 m NN)[30] of room AB 53 we exposed some nearly complete objects (e.g. L 62.65 two oil lamps, and L 64.67 two fragmented vessels: 1069,52/1069,69 m NN). In room AB 52 we also registered some special finds (L 103, a pot within an installation; L 104, an iron ring: 1069,72/73 m NN). In the adjacent room AC 53 several vessels in context of the later inserted wall W 115 were excavated (L 112: 1069,77 m NN). Also, the older stratum sometimes contained well preserved ceramic material on walking surfaces (e.g. in room AC 52, L 114, fragments of scales: 1069,41 m NN).

Rooms in the central excavation field (Fig. 23) were probably erected at the same time. The basic plan - very generally speaking - subdivided the area into nearly rectangular plots. There are different wall building techniques. One can recognize some walls that were added to already existing walls. In one isolated case, we could define a temporal sequence of the wall construction. At some sections of the walls, even the inner as well as the outer face of the same wall is built up in different ways (size of stones, technique of pointing). This points to a division of labour and to different areas of responsibility while building houses whose walls were normally used from both sides.

The structure of the rooms in the excavated central area are homogeneous, too. All the doors of the rooms AA 52, AA 52/53 and AA 53 are in the southwest. Rooms AB 52 and 53 show transitions to other rooms in the northeast. Unit AA 52/53 was connected by a doorway to AB 53 during the older stratum.[31] Therefore, the rooms AA 52/53 and AB 53 originally formed a unit that was further extended to the northeast (AC 53). AB 52 and AC 52 were also originally connected to each other and supposedly were entered from the west via the as yet unexcavated room AA 51. A complete architectural unit could not been excavated yet. This would be a worthwhile task for the future and could give important information about Late Islamic life. In room AB 52 (L 125) a roof beam was discovered in fragmentary condition, placed *in situ* in one of the niches of the walls, which could also be found in other man-high walls (especially those of room AB 53).

There were later installations and renovations in this area, including the two thick semicircular stone columns W 92 (room AB 52) and W 15 (room AA 52/53). The first one was built in the older stratum, and the second in the younger stratum against the side-walls. They were probably used to support the roof as revealed in recent Ottoman houses. The division of room AC 52 by wall W 115 was also undertaken during the more recent period. The western wall of the room AA 53 (W 25) collapsed and was repaired in a slightly different line during the second settlement phase.

The results of the central excavation field (especially of AA 52 and 53) showed that the excavated rooms with their well preserved walls were grounded directly on bedrock. There is no evidence of older strata in this area. To look for them, we decided to excavate other areas where no houses were constructed during Late Islamic times, i.e., in the northwest near the Ba'ja massif.

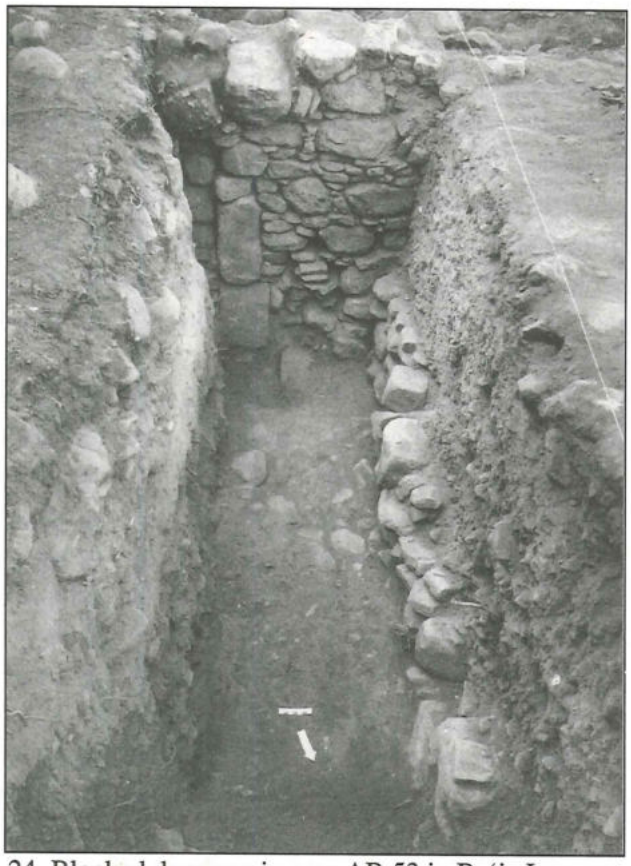
It also seemed reasonable to examine the continuation of the narrow rectangular room

30. L = Locus 5.

31. In the younger stratum the door was blocked and a fire place was installed near the former entrance.

systems in the central excavation area also in this area (AA 54-56). We exposed three Islamic strata - the two phases of the central excavation field and a more recent one. In square AA 56 we excavated a 2.50 m high wall (W 39) with a large gate used during the first Islamic period (Fig. 24). It was closed later during the second Islamic settlement period and later reused as wall in the youngest phase. The gate area in the south (inside) was carefully paved in the older stratum. A grinding stone (L 171) was included into the pavement. During the second stratum, the area northwest (i.e., outside of the now closed gate) may have been used as a rubbish area. We found a 39 cm deep ash layer there with countless sherds and bones (L 80).

Below the oldest Islamic phase, Roman and Nabataean artefacts were found in considerable quantity. Beneath the Islamic walls W 99 and 100 we exposed a Nabataean-Roman stratum to a depth of 1068,16 m NN that contained an extremely hard layer (L 116) with a fire place (L 167).



24. Blocked doorway in area AB 53 in Ba'ja I.

A large Pre-Islamic Nabataean settlement at Ba'ja I, predicted by the surveys, could not be found during the first weeks of our excavation campaign. But certainly there are canals, cisterns, water reservoirs, the nearby terraced hill, a wine press and other rock cut installations in the surrounding of Ba'ja I, that could all belong to the Nabataean culture. Did the Nabataean inhabitants live only seasonal in the Ba'ja area, in tents or huts during the winter time like the Bedouins of the 19th and 20th century in this area? The excavated the Nabataean fire place in square AA 56 could indicate such a possibility. But if there is definitely no large permanent village of Nabataean period there, one should find at least a small permanent settlement area, something like an outpost of the close Nabataean capital Petra. It would have been necessary for the Nabataeans to permanently care for the water installations, the fields, viniculture, and especially the nearby dams and cisterns.

Houses on the hill to the southwest of the central excavation area (with squares K 51; L 51/52) could fulfil the Nabataean requirements in the best way. Only from there would it have been possible to guard the Petra-Gaza trade route and to protect all the above mentioned installations in a direct way.

The outlines of the rocky surface of this little hill was cleaned by our excavation team. We found there a rectangular base of a probable building (approx. 13 m by 16 m). On the eastern slope we also collected some Roman and Nabataean sherds. Therefore we decided to examine this slope (K 51; L 51/52) more intensively. As in the central excavation area, here two Islamic strata were exposed. In squares L 51 and L 52 we excavated below Islamic walls W 122 and 119, and found a Roman-Nabataean stratum with architectural remains (W 162).

The Ba'ja I site seems to have no Iron Age settlement, as no ceramic artefacts of

this time could be found. But, there was Nabataean activity, and it would make sense to have used Ba'ja I during the Nabataean era as a seasonal campsite and perhaps additionally as a permanent outpost of nearby Petra. However, a large settlement was there only in Late Islamic times. Well preserved architectural features and a large quantity ceramics of a very interesting pottery sequence were exposed.

Ba'ja V - A Neolithic Site (Bernd Müller-Neuhof)

During the excavations at Ba'ja I, a surface examination in the direct vicinity of this site were undertaken by the excavators due to finds of scattered flint artefacts in this area. The high amount of lithic artefacts discovered during this short survey gave a hint of a Neolithic occupation of this new site, which was named Ba'ja V, following the designations of the other archaeological sites in this area by Lindner. Parts of this site are already destroyed by the construction activities of a water pool.

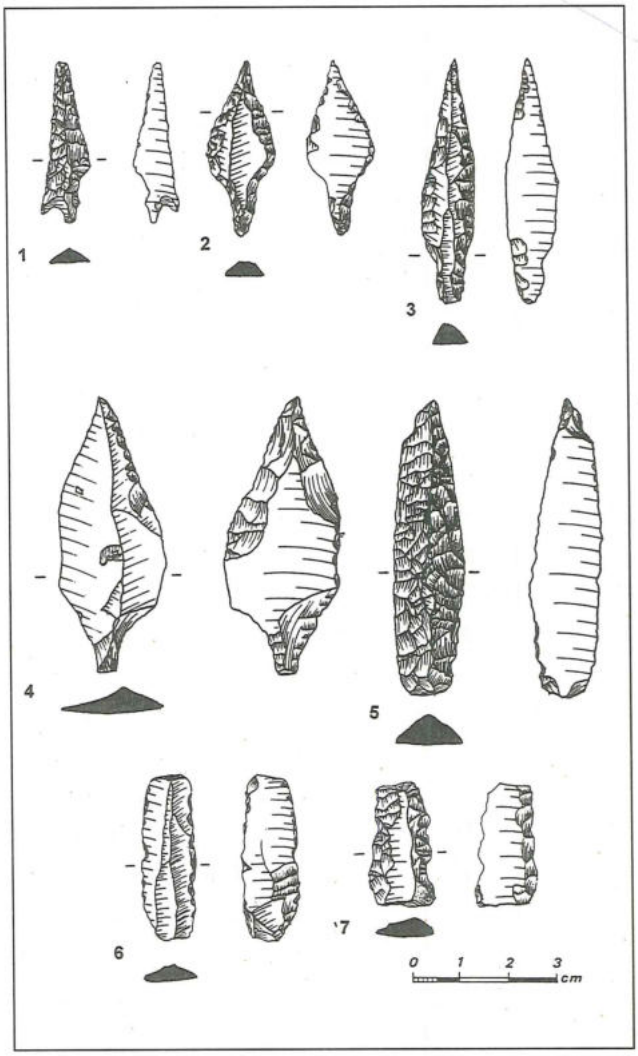
The lithic artefacts collected by the excavators - about 1,000 pieces - represent nearly all stages of blank- and tool-production on the site. These include unretouched fragments of raw-material, cores, core preparation elements, unretouched blanks and complete and fragmentary tools.

The group of cores consists of unidirectional blade- and flake-cores and multidirectional, irregular shaped flake-cores. Some of the blades show evidence of bidirectional débitage-technique, which hints at the existence of opposed platform blade-cores, which were not found in the collected material. Despite the high amount of retouched flakes in the collected material, a priority in the production of blades as tool-blanks could be observed.

The group of tools is made up of a high number of retouched core-preparation elements, which are mainly *ad hoc* tools, one hammerstone, some celts, one chisel, many projectile points (Fig. 25: 1-5), piercing tools and laterally retouched flakes and blades. Some of the blades are characterised by lateral denticulation (Fig. 25: 6-7), but sickle gloss could not be observed on these artefacts.

The projectile points and their fragments, which are characterised by their high number and their manifold typology, are generally represented by four types:

1. Long winged projectile points of the Jericho type (Fig. 25: 1)
2. Leaf-shaped stemmed projectile points of the Yarmoukian type (Fig. 25: 2 and 4)
3. Lanceolate shaped stemmed points of the Byblos type (Fig. 25: 3)
4. Long lanceolate projectile points with triangular cross-section of the Amuq type



25. Lithic artefacts from the newly discovered site of Ba'ja V (drawing: B. Müller-Neuhof).

(Fig. 25: 5).

The projectile points offer a preliminary dating of the collected material, which covers the period from the late pre-pottery Neolithic (LPPNB) to the early Pottery Neolithic (PNA) the Yarmoukian period. The earlier phase of occupation at this site corresponds to the LPPNB-site Ba'ja II, which is quite close to Ba'ja V. More secure information on the duration and the character of occupation at Ba'ja V is only obtainable by intensive surface examination and archaeological soundings in the areas of the site which were not disturbed by the above mentioned modern construction activities.

Fersh - A Nabataean Hamlet (Isabelle Ruben)

The hamlet of Fersh stands above a shallow wadi situated a few hundred metres from the edge of the mountains as they fall away to Wādī 'Arabah. Around it are some fields and the remains of a long boundary wall that encloses the hamlet and the fields. Today, there are two complete house complexes still standing (built *ca.* 1930s), and these are built from local stones and with many re-used Nabataean blocks (that show the typical diagonal pick marks). Traces of ancient wall lines are visible in a few places near the standing structures. About 40 m to the south of the houses are two large rectangular rock-cut Nabataean cisterns, one of which has been emptied out in recent years, but the other remains completely silted up.

As part of the Ba'ja Project a small test trench was opened in this deserted hamlet. The work was carried out by two archaeologists (Isabelle Ruben and Nasser Hindawi) from 10-18 October. A trench, 7 m long and 2 m wide (Trench 1) was laid out to include two wall lines visible at and above ground surface (Fig. 26), with the aim of determining the date of the original occupation of the site. A surface collection of pottery was also made in the hamlet itself and in a number of the surrounding fields.

26. Trench 1 at Fersh, showing architectural remains of Nabataean buildings.

The results of our work confirmed what was already evident from the surface remains, i.e., that the original occupation dates to the Nabataean period. Analysis of the pottery should help to refine the actual date.

Trench 1 (Fig. 26) was laid out roughly east-west and was excavated down to bedrock at the east and west ends. The land slopes downhill from east to west. At the west end there were the remains of a rectangular structure, called House 3, with the north wall (Locus 7) and part of the east wall (Locus 8) lying within the trench. Three metres to the east of wall 8 was a wall line running north-south, the continuation of the foundation of the west wall of House 1, room 3 (Locus 13). The sequence of events on the site uncovered in the trench can be reconstructed as follows. The site sits on a sandstone bedrock outcrop on which all walls were directly founded. However, before any of the excavated walls were built there had been a certain amount of natural (and possibly cultural) accumulation on the bedrock (Loci 19 and 10).

The first activity was the digging of the foundation trench for wall 13 (Locus 24). This trench cut through existing deposits and was partly cut into the bedrock on the west side. The east side was a natural drop in the bedrock (at least in the area of the excavation trench). Wall 13 was then built, a double-faced wall of well dressed sandstone blocks with a mud mortar, only two courses of which survive. At the bottom of the west face there was what seems to be a hard, very sandy mortar covering the joints between the stones. The foundation trench on the west side was then filled (Loci 26, 15 and 14), and on the east side the gap between the wall and the bedrock was closed (Locus 25). The east side of wall 13 was later used as an ash dump (Loci 23 and 22). Unfortunately, it was not very clear from how high up the foundation trench (Locus 24) was cut on the west side, and therefore just how deep cultural deposits had accumulated before the wall was built.

To the west of the wall, but not running right up to it and physically at a lower elevation, were the remains of what was probably a beaten earth surface (Locus 21). It was a thin compact surface of sandy silt resting on an uneven layer of flat slabs of sandstone that was presumably the bedding for the surface. Excavation in this central part of the trench stopped at these slabs, but bedrock is probably not too far below them.

The deposits to the west of wall 13 and above surface 21 (Loci 19, 20, 18, 17 and16) probably represent various layers of natural and cultural accumulation and dumping. Walls 7 and 8 are bonded walls forming the north and east walls of House 3 respectively. On the west side of wall 8 there was a clear foundation trench cutting through loci 10, 9 and 5 (layers of natural and cultural accumulation inside House 3). The fill of the foundation trench was Locus 3.

Unfortunately, the evidence for a foundation trench for wall 7 (the north wall) was very vague, but slight traces of a cut through the fill inside the house (Loci 10, 9 and 5) and a cut into the bedding layer 21 (to the north) indicate that there was a trench through the existing deposits down to the bedrock. The walls stand up to one metre and they are double-faced walls of roughly faced local sandstone blocks, laid in rough courses with a mud mortar. Wall 8 has one re-used well-dressed block with the Nabataean pick marks, indicating that this wall must, at the earliest, date to a second phase of building, if not much later.

After abandonment, this wall was destroyed and only one metre of it survives. Further south, it appears to have been rebuilt and used as a porch for the 20th century House 1. Ash was dumped in the break present in this wall (Locus 6). At the top of Locus 5 there was a small fireplace (Locus 4). Wall 13 must have been dismantled (because there is only one fallen block nearby) and some small pieces fell forming Locus 12. Lastly, the area was covered by natural accumulation (Locus 11) and topsoil (Locus 2).

The bulk of the finds from Trench 1 consisted of pottery, and the impression, before analysis, is that all of it dates from the Classical period, with Nabataean fine ware throughout (more in the lower levels than in the upper ones). In spite of the evident 20th century occupation of the site, only one obviously modern sherd was found. Apart from the pottery, a few pieces of bone were found in one locus, glass in two loci and one piece of iron was found. Similar results were obtained from the surface collection in and around the village. The vast majority of sherds are Classical, with a very small number of course hand-made wares that probably date to the time of the standing buildings.

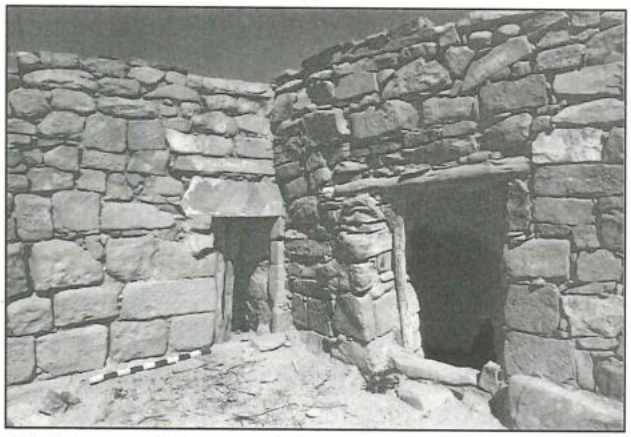
The surface evidence of Nabataean pottery sherds and well-dressed Nabataean ashlar blocks in the two house complexes suggests that the original settlement here was from Nabataean times. The test trench con-

firmed this hypothesis. No artefacts were found that pre-date the Nabataean period, and wall 13, which is the oldest wall found in the excavation can be dated to the Nabataean period (Nabataean sherds were in the foundation trench and Nabataean blocks occured in the well constructed wall). In addition, there are two Nabataean cisterns nearby.

No evidence was found for any re-use of the site after abandonment, which presumably occured during Nabataean times, until the houses were built in the 1930s. However, analysis of the pottery might show this to be incorrect. It is interesting to note that on the hilltop across the shallow wadi, there are groups of rock drawings of ibex and other animals amongst which there is a short Thamudic inscription. Were the owners of the original farm Nabataeans or Thamudic tribesmen?

Ba'ja and Fersh - Bedouin Architecture of the 20th Century (Janet Haberkorn)

One aim of the Ba'ja Project was to study cultural remains of all periods. Therefore, also recent Bedouin architecture of the 20th century was documented in the Ba'ja region. At two locations (Fersh and Ba'ja), abandoned, but still standing, structures were studied and documented and an architectural plan (scale 1:50) was made (Figs. 27-28). The buildings were constructed by Bedouins who travelled the region with their flocks.



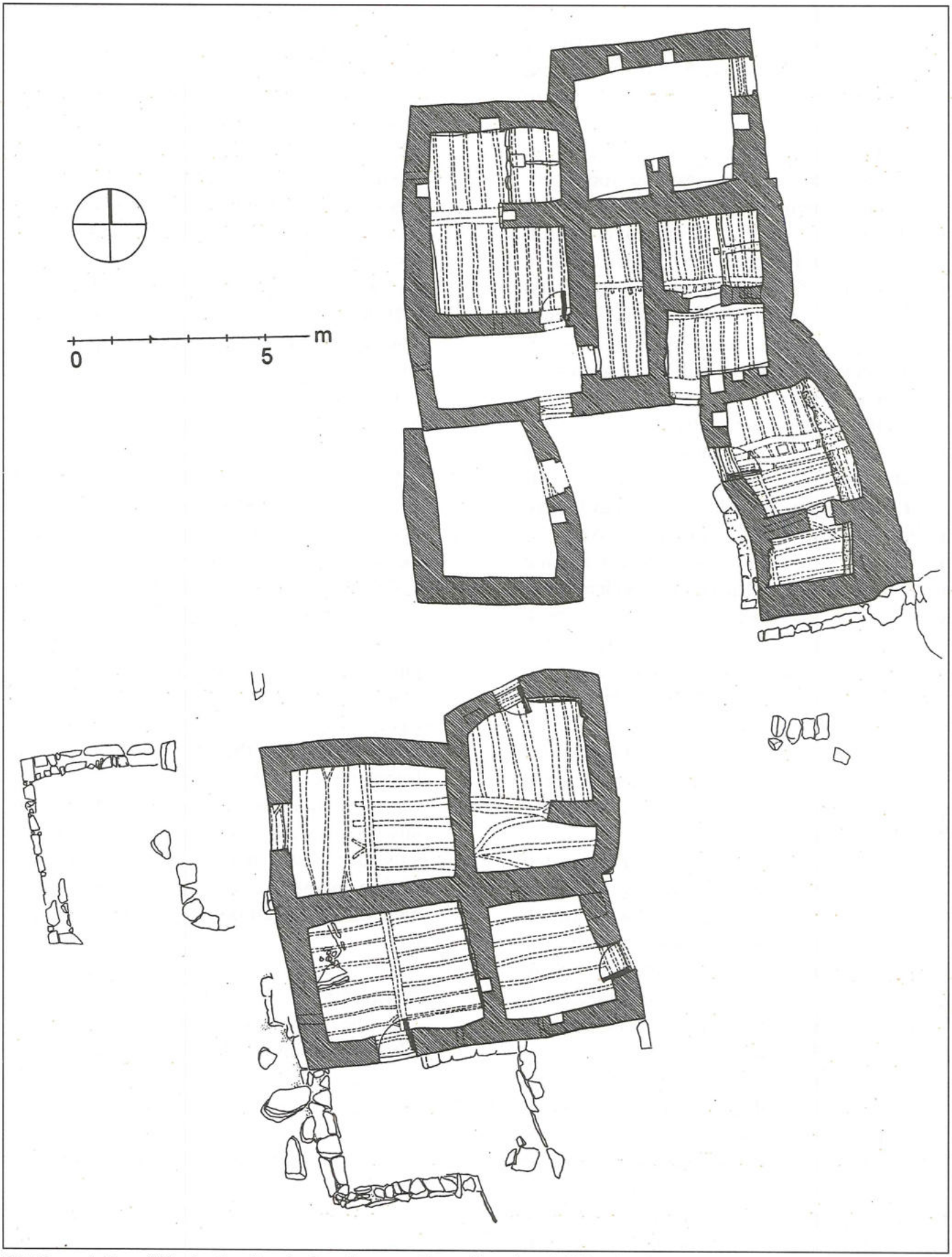
27. Houses of the abandoned village of Fersh.

The houses were mainly used to store the harvest and tools. People used them for living only in winter. Local stone and wood were used as building materials. Due to restrictions set by the physical attributes of building materials, houses could only reach a certain length and height.

The buildings reflect the dependence on nature and the restriction, in all parts of daily life, by this evironment: "In the past, the people of Jordan spent thousands of years 'researching', by trial and error, the fixed number of materials offered by the environment, an environment with very limited boundaries. ... Stone, mud, wood, water, light, wind and communal manpower were the materials and elements that settlers east of the River Jordan explored and understood comfortably over a long period of time. The limitations of the site in what it offers and the local technology in how much it allows us to use (or abuse) become the agency which issues the zoning ordinance, the codes and the aesthetics of an architecture that is most appropriate on that specific site. Traditionally people did not create an architecture of unlimited fantasy; the decisions were often not theirs at all, but the environment's. It dedicated to them and educated them while they remained humble, looking to their instructor with fear and respect: fear of its climate that, each year, caused the feeble to fail, and respect of its willingness to give" (Khammash 1986: 8).

The Bedouins often preferred to erect their houses on anceint sites, depending on the existence of wells, old cisterns and cut stones of abandoned houses or ruins, as is the case in Ba'ja and Fersh.

The masonry of the walls consist of local limestones. Better or more carefully dressed Nabataean limestone of ancient structures was reused at both sites. The stones were laid in clay and afterwards the joints were filled. If only roughly dressed stones were used, it was necessary to minimize the joints with small stones and potsherds. Because of the



28. Ground plan of Fersh, showing the housing complexes (drawing: J. Haberkorn).

weather conditions, clay joints needed regular repair. The interior walls in some of the rooms were plastered with clay inside and bear traces of smoke. These rooms where probably used for living. Small openings in the roofs indicate outlets for the smoke.

The scaffolding carrying the roof consisted of wooden trunks, roughly cut, with a length of 3 to 4 m. They were covered with brushwood and stones and sealed with a layer of clay. The length of the trunks determined the length of the rooms. To construct large rooms, additional small walls were erected which served as supports for the shorter beams.

Stones of Nabataean structures were often used for lintels and thresholds. All wooden doors show a uniform treatment: door furniture was made of old petrol cans, large uniform locks and nails made of wrought-iron. Of particular interest are the door hinges. A cylindrical wooden shaft connected to the door was tapered at both ends, allowing the doors to turn between the sill and the lintel. Small openings in the upper parts of the walls were left to illuminate and ventilate the rooms. Small niches were used as cupboards. These niches were sometimes built in a way that made it possible to use them as windows by taking out the wall stones.

The recent houses at Fersh were erected on top of a Nabataean farm. The farm and the fields were surrounded by a wall, which still stands in many parts. Even though the houses were abandoned, the fields are still in agricultural use. One of two Nabataean cisterns located near the houses was emptied of sediments and reactivated.

The available building material, water (cisterns), and fertile land were the reasons for resettlement. Nowadays, the farm consists of two house complexes. The exsisting fabric allows one to distinguish different construction phases. Besides horizontal and vertical building seams, changes in the masonry as well as blocked doorways support such an observation.

The larger house complex to the north (Fig. 28) consists of a "core-house" to which several rooms were added successively. These later additions can be distinguished by different kinds of masonry .

The "core-house" made use of a rockface. It is of small height but the ground plan is larger than the later added parts. Every room has a separate entrance from the outside. They served, it seems, no special functions.

Both houses at Ba'ja are situated very close to the deserted site of Ba'ja I. The smaller of the two houses is shelterd by a rock facade. The large house consists of three rooms. Two of them are linked and were probably used for daily life (sleeping and cooking, as well as animal keeping). Due to its construction and the presence of a big arch, the third room might have been used for offical functions. The smaller house was probably mainly used for storage purposes and for keeping animals.

As these Bedouin houses deteriorate quickly, not only at Fersh and Ba'ja but also at many other places in southern Jordan, it is urgent that we document these hamlets and small villages, for they reflect a building tradition typical for the Bedouin-dominated south of Jordan. More care has to be put not only on research into the ancient settlement patterns but also into the more recent ones. Further investigations should help to document other contemporary sites in the Petra region.

Prospects

In the framework of the Ba'ja Project, cultural remains of all periods of human occupation within a small region in southern Jordan were studied and documented. The results may inspire future research of that kind in the greater Petra region. The surveys and archaeological fieldwork of Manfred Lindner from the Naturhistorische Gesellschaft in Nürnberg were the basis of the project. Due to his courage and long lasting

ventures it was also possible to specifically define the outlines of the projects. In a second project phase it is intended to further research the mountain stronghold of Ba'ja III and the Neolithic site of Ba'ja V.

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