

## THE 2001 FINNISH JABAL HĀRŪN PROJECT: PRELIMINARY REPORT

*Jaakko Frösén, Zbigniew T. Fiema, Katri Koistinen, Jacqueline Studer,  
Christina Danielli, Richard Holmgren, Yvonne Gerber, Nina Heiska and Antti Lahelma*

The Finnish Jabal Hārūn Project (FJHP) carried out its fourth fieldwork season between September 1 and September 27, 2001. The fieldwork this year involved only the archaeological excavations. The project is directed by Prof. Jaakko Frösén, University of Helsinki. The archaeological fieldwork was supervised by Dr. Zbigniew T. Fiema, University of Helsinki. In total, one archaeologist, and six archaeology students from the University of Helsinki, and two professional cartographers from the Helsinki University of Technology, as well as one Swedish archaeologist actively participated in the fieldwork. Dr. Christina Danielli, a senior conservator from Italy and two graduates from the Department of Conservation, Espoo-Vantaa Institute of Technology also took part in the fieldwork. The DoA representative for the FJHP was Mr. Basem Mahameed. Up to 12 local laborers were employed in the excavations. The FJHP is sponsored by the University of Helsinki and by the Academy of Finland. The Project wishes to express thanks to the Director-General of Antiquities of Jordan and the Department of Antiquities office in Petra for their cooperation and support.

The FJHP focuses on Jabal an-Nabī Hārūn (جبل النبي هارون), located ca. 5kms to the southwest of Petra, which, according to Jewish, Christian and Muslim traditions, is the place of burial of Moses' brother Aaron. The peak of the mountain is occupied by a Muslim shrine which contains a cenotaph believed to contain Aaron's remains. At around 70m below and ca. 150m to the west of the peak there is an extensive, ruined architectural complex located on a wide plateau of the mountain, at ca. 1250m asl. This complex, considered to be a Byzantine monastery/pilgrimage center dedicated to St. Aaron, and preliminarily dated to the later fifth through the seventh/eighth centuries AD, is the focal point of the investigation. The main objectives, fieldwork methodology, and the results of the previous seasons have already been presented elsewhere (Frösén *et al.* 1998; 1999; 2000; 2001a; 2001b). The following is a summary of the excavation, the cartographic and conservation activities, and of the current research on the faunal remains from Jabal Hārūn.

### CARTOGRAPHIC ACTIVITIES

(K. Koistinen and J. Latikka)

During the 2001 fieldwork, the members of the cartographic team continued to provide assistance in the recording of uncovered entities during the excavations. The recording system based on the use of a tachymeter, with three-dimensional readings downloaded every afternoon to the Project's database, was supplemented by digital imagery taken regularly in the excavation area. The digital images have also been utilized to record specific information related to the conservation work. For example, special attention was paid to the 3D documentation of the arches in Trench O, which required partial dismantling and considerable conservation effort. Furthermore, technical development work at the Helsinki University of Technology was continued, using the collected imagery to further improve the 3D model and to create various image products, such as photomaps (Koistinen *et al.* 2001). Although the 2001 fieldwork included only the excavations, the modeling of the ancient road recorded in 1999 was initiated using terrestrial panoramic images taken during 2000 season (Haggrén *et al.* 2001).

### THE EXCAVATIONS

In 2001, the excavations concentrated in the area to the west of a large basilican church in order to continue uncovering the non-ecclesiastical remains at the site (Fig. 1). The fieldwork was conducted in two trenches (O and P) which were fully excavated down to the lowest stratum.

#### **Trench O** (Nina Heiska and Antti Lahelma)

Trench O is located on the high ridge that delineates the presumed western outer wall (W.F) of the complex. The room with three arches which was uncovered in Trench O appears to have been an integral part of a composite building which occupied the entire ridge. In the central part of this building there is a large room (referred to here as the southern room) uncovered in Trench K in 2000. As this room was found completely filled up with piled-up flat stones, it somewhat resembles a platform-like construction. The work in Trench O was already



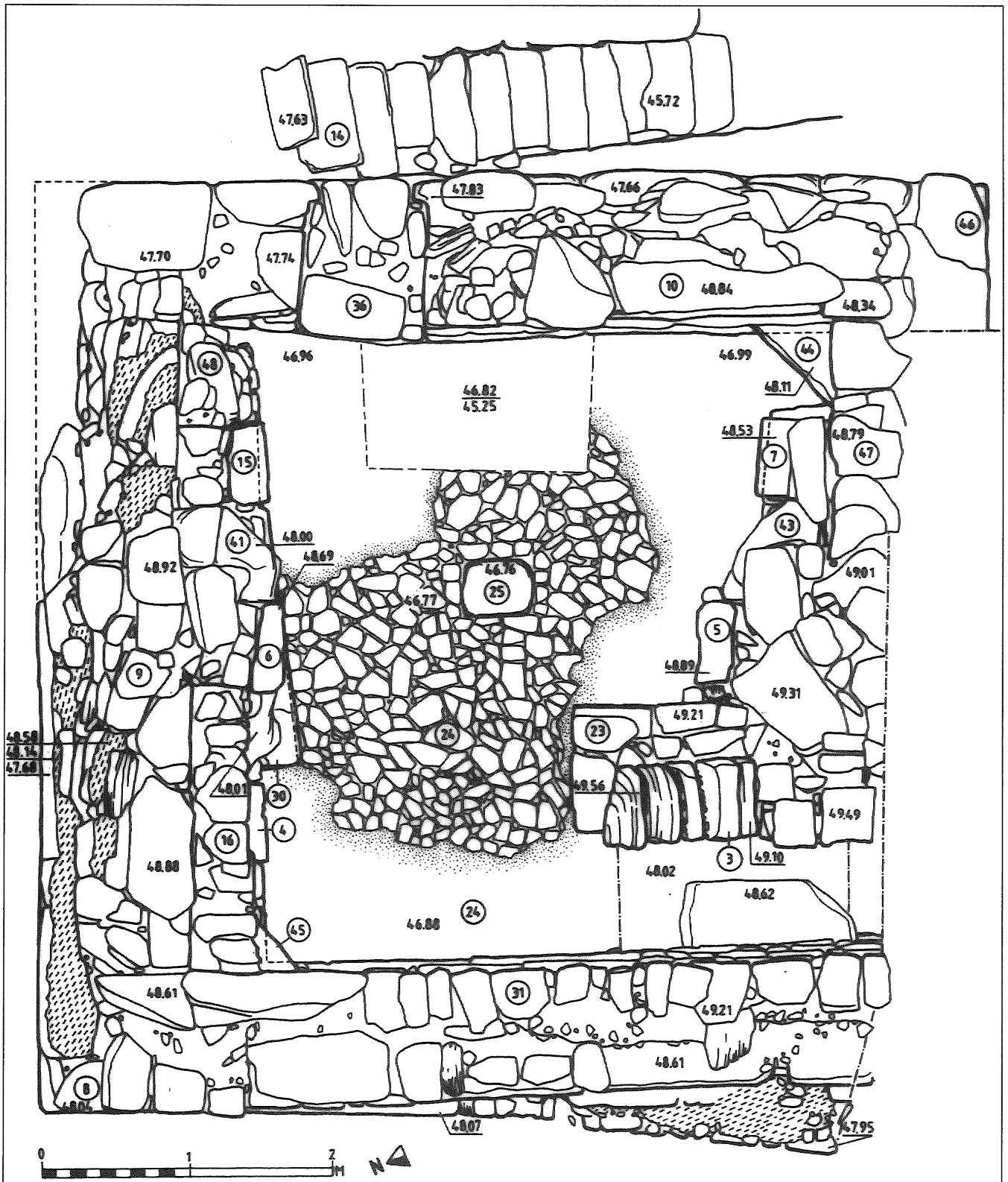
1. The plan of the monastic complex after the 2001 excavation season (by K. Koistinen and J. Latikka).

begun in the same year, partially exposing badly weathered arches already visible on the surface, and delineating the walls enclosing the room. During the 2001 season the trench was enlarged to the dimensions of 7.2m E-W x 6.1m N-S (Fig. 2). Additionally, the space adjacent to the NE corner of the trench was partially cleared, although a substantial stone tumble existing there postponed further investigations.

Although the room with three arches was fully excavated, its function within the entire building remains elusive. In spite of the fact that the arched room (Trench O) and the room filled with stones (Trench K) appear to form an entity, it is difficult to correlate the phases of these two structures. Some of the difficulty arises from the long and complex history of rebuilding in this part of the site: the function of the building is likely to have

changed during the course of time. The structures in Trenches K and O differ markedly from the rest of the monastic complex in terms of building techniques and architectural appearance. The entire

building appears to have been in use already during the Nabataean period and its use continued (with breaks) into late antiquity, although its function must have changed over time.



2. Top plan of Trench O (by R. Holmgren). Wall designations: Wall F (locus 8), Wall G (locus 9), Wall AAA (locus 10), and Wall ZZ (locus 46).

*Phase I: Construction and Initial Use*

The initial construction included the four main walls: F (locus 8), G (locus 9), ZZ (locus 46), and AAA (locus 10), remarkably well-made of large, regular sandstone ashlar and a very hard, good-quality mortar. Considering this exceptional quality of building, it was somewhat unexpected to find that at least the eastern wall (AAA) appears to have been standing on soil (loci 38-40), as evidenced in a sounding. In addition to the Nabataean Fine Ware sherds (painted and plain) dated to the first-second centuries AD, these loci also contained ceramic material dated to the fourth-fifth centuries AD. Some parts of the walls may in turn lie directly on top of the bedrock, like Wall JJ in Trench K.

The original building probably had a ground floor and at least one upper floor, with N-S arches (probably three of them) supporting the upper floor. A large, flat slab (locus 41) protruding from the Wall G (locus 9) appears to be all that remains of the original upper floor. On roughly the same level, remains of the ceiling corner supports (loci 44 and 45) are still present in the SE and NW corners of the room (of these, the former shows marks of having been chiselled to fit a wooden roof beam). Furthermore, on approximately the same level as said structures, an offset ca. 0.1m wide is visible on the inner face of Wall F, and traces of a similar offset can be seen on Wall AAA. The presence of an upper floor in the original construction is also implied by the large number of huge ashlar found collapsed in the area just NE of the room (loci 1 and 13).

The pilasters (of which the lowest part of locus 7 is the only visible evidence) from which the ground floor arches sprung were set in a thick layer of mortar (locus 42H), which in turn was laid on a surface made of well-shaped sandstone slabs (locus 42I). The latter (only encountered in a sounding made in the SE corner of the room) also served as bedding for the ground level floor. No trace of the pavers of this floor was found in the soundings – presumably the floor was removed. The entrance to the ground level was located in the NE corner of the room, where a blocked doorway (locus 36) with doorjambs can still be seen. The possible place of a lintel may also be seen on the southern side of the doorway. It is unclear if the large room in Trench K was built in the same phase, but judging by the structure of its walls it should belong to roughly the same time period.

The first phase ended in destruction, doubtless caused by an earthquake: the walls suffered extensive damage, the arches collapsed, the upper storey floor was obliterated and presumably also the

ground-level floor was damaged beyond repair. From this point on the building apparently never had more than a single floor.

*Phase II: Wind-shelter*

Following its destruction, the room lay in ruins but remained in intensive use as a wind-shelter. The stone tumble was cleared, but none of the structures were fully rebuilt. The remains of the original floor were removed, and only in the SE corner bedding was found. The surviving stone pavers were probably reused elsewhere. On the level of the original ground floor, a beaten earth floor (locus 35) was now made. The ceramics from this locus were uniformly dated to the fourth-fifth centuries AD. Where the bedding of the original floor was still present – as in the SE corner – this was used as a living surface. Fires were burned in the room which apparently no longer had a roof, and an ashy occupational layer containing bones, homogeneous pottery deposits, etc., accumulated inside the room (loci 34 and 42G). The ceramic material from locus 34 was slightly later in date than that from locus 35, and it contained the sherds datable to the fifth-early sixth centuries AD. The entrance during this phase was still in the NE corner. Whether or not the lintel was still in place is unknown, but the threshold was removed in this phase. As for the room in Trench K, no information is available except that apparently it was not yet filled up with stones.

*Phase III: First Rebuilding and Use*

This phase marks a renaissance in the use of the building, perhaps related to the emergence of the monastery on the high plateau. The three arches were rebuilt and presumably also the upper courses of the walls would have been rebuilt, although the only clear evidence of this can be seen in the inner courses of Wall ZZ (part of locus 47). Some supporting, pilaster-like installations (loci 16 and 43) were constructed inside the room, presumably to relieve the pressure placed on the walls by the reconstructed arches. A huge stone (part of locus 43) that was curiously wedged between the SE and southern/central pilasters could be a feature of this phase, and its position may possibly explain the lack of symmetry between these two pilasters.

A new, layered floor level was constructed on top of the occupation layer of Phase II. It consisted of a layer of large stones in the fill of smaller stones and fine soil (locus 33/42F), then a layer of smallish, thick slabs (locus 32/42E); and finally the floor itself, made of small, thin slabs set in mortar and covered by another layer of mortar (locus 29/

42D). Notably, locus 33 yielded ceramics dated to the second half of the fourth through the fifth centuries AD, and no earlier or later material. As the floor now lay ca. 0.43m above the original (ground floor) level, the doorway in the SE corner became unusable and was blocked (locus 36). The most probable place for an entrance to the room in this phase would be the SW corner, where a corridor (partly excavated already in Trench K) now exists. As long as the southern room was still empty this would have been just a doorway connecting the two. A vertical crack in the masonry of the eastern wall of the corridor may mark the doorway that led to the room, now filled with the pile-up.

Phase III ended in some kind of destruction, for at least the easternmost and possibly also the central arch collapsed or was taken down. Wall ZZ also seems to have suffered damage. Curiously, in the two soundings, the mortar floor did not show any signs of damage. How this can be reconciled with the presumed destruction remains undetermined. Unlike the other two arches, the westernmost arch (loci 03 and 04) apparently remained untouched. The structures that still support its northern part belong to this phase; its voussoirs also have a different angle than those of the other arches.

#### *Phase IV: Second Rebuilding and Use*

In this phase, some structures of the room were rebuilt again. The phase can be further subdivided, with all but one of the new features belonging to the first sub-phase.

*IVa* - For unknown reasons, the floor of Phase III was abandoned and a new floor was built ca 0.5m higher up (Fig. 3). This floor features a layering almost identical to the old one: a layer of big stones brought from the plateau (loci 27, 28, 42C), then a layer of smallish thick slabs (locus 26 and 42B), and the surface of the floor, made of thin sandstone slabs set in mortar and covered by a second layer of mortar (locus 24). Locus 26 produced few sherds dated to the sixth century AD, and probably later. The floor slopes slightly towards a small pit (locus 25) in the center of the room. The opening of the pit is 0.47m by 0.43m and it is ca. 0.42m deep, with gently curving walls covered with plaster, and a rounded bottom. The installation was found covered with a “lid” – a thin sandstone slab. Perhaps the sloping floor with a pit in the middle was reason enough for raising the floor level, but this may equally be associated with the substantial change occurring then in the southern room, i.e. its filling with piled-up stones.

The plastered pit could have been used as a small storage space for foodstuffs, valuables, etc. but this explanation does not account for the gradual sloping of the floor toward the pit. Elsewhere, similar installations have been interpreted as simple treading floors for producing wine or olive oil, with a collecting vat in the center (Frankel 1999: 52). The small size of the collecting vat should indicate the production of olive oil rather than wine, although such could also have been used in the production perfumes or spices from fruits and herbs (Frankel 1999: 54, 57). Frankel’s examples



3. The upper (extant) floor inside the room with three arches in Trench O. The pit closed by the capstone is in the center (by J. Vihonen).

are all cut in solid rock, but treading floors could also have been plastered installations (Kingsley 2000: 49). The soft, crumbling sandstone bedrock of the plateau, which quickly absorbs liquids, would seem unsuitable for a rock-cut treading installation.

Also in this phase, the eastern and central arches (loci 05, 06, 07, 15) were rebuilt, although in a haphazard way. The easternmost pilaster (locus 07) on the southern wall was at this point apparently demolished down to the level of the new floor which was then laid out on top of it. Then the pilaster was rebuilt standing on the floor. A supporting installation (locus 30) was built between the floor and the remains of the upper floor of Phase I (locus 41), still protruding from the wall. The northern part of the central arch (locus 06) was rebuilt resting on top of this construction. It is possible that a part of the similar installation (locus 16) built in the previous phase, now hidden by locus 30, supports the same slab, but apparently this was regarded as an insufficient support for the new arch.

Following its probable destruction at the end of Phase III, Wall ZZ was not rebuilt. Instead, a huge pile-up (Trench K, locus 04) of sandstone slabs was deposited inside the southern room, filling up the entire space. The pile-up covers the remaining courses of Wall ZZ while its northern edge has been used to create a vertical, wall-like surface (locus 47) against which the pilasters in Trench O were rebuilt. The westernmost arch, however, would presumably still have been directly supported by the remains of Wall ZZ as it dates from the previous phase. In this phase, the corridor between rooms in Trenches K and O was formed, its eastern wall partly formed by the pile-up. Steps led from the arched room to a landing (in Trench K) from which the top of the pile-up could apparently be accessed.

*IVb* - During this sub-phase a massive supporting structure of locus 23 under the southern part of the westernmost arch was built. As opposed to most of other supporting installations which feature mortar of the floor (locus 24) lipping up against them, here even the topmost layer of mortar extends under the installation, i.e., the structure was built on top of the floor. Perhaps the arch or the wall behind it at some point became unstable and had to be reinforced.

#### *Phase V: Decay*

This phase marks a change in use of the room. The pit (locus 25) was no longer used; it was filled with sand and rubbish wiped from the floor, covered with a slab and never opened again. The fill

loci (25 B-E) contained only few sherds but these were predominantly dated to Late Byzantine or the transitional Late Byzantine-Early Umayyad period, i.e., the late sixth-the first half of the seventh centuries AD. Windblown sand and occupational rubbish slowly accumulated on the floor, resulting in a layer (loci 20 and 21) containing quantities of pottery and bones, the latter including several vertebrae of the dorsal bone of a very large fish (possibly a sea bass), and other finds. Again, these loci have yielded pottery predominantly dated to the Late Byzantine-Early Umayyad transitional period. This phase also appears to have ended in destruction. The roof seems to have partially collapsed but the arches remained standing.

#### *Phase VI: Last Occupation Period*

The destruction filled the interior with a stone tumble which, however, was then removed from the main part of the room. A crudely built stone blocking (locus 18) was inserted under the westernmost arch. The collapsed stones in the interior were simply thrown behind the blocking which then formed a "platform" with its top ca 0.5m above the still occupied (eastern) part of the room. The corridor remained in use in spite of being half-filled with stone tumble. This is evidenced by a large slab resting horizontally ca. 1.5m above the mortar floor and by the crudely rebuilt uppermost courses (locus 31) of Wall F. The slab, which goes in between the original courses of this wall (locus 08) and the rebuilding, probably marks a level made of collapsed slabs and beaten soil, used for walking in the corridor.

Inside the room, an occupational layer (upper part of locus 20) continued to accumulate. Simple installations, loci 22 and 48, relate to activities of this phase; the former perhaps used to create a surface for storing something under the SE corner connection (locus 44), and the latter being perhaps a cluster of material pushed aside from the middle of the room. The entrance in this phase could have been from the corridor, although it would have required descending down from top of the platform (locus 18). Another possibility is the NE corner, which appears to have suffered severe damage. The blocking of the original door was still in place, but if the wall was preserved only to its current height, this would have been no obstacle. The steps (locus 14) leading up along Wall AAA would have made access convenient.

#### *Phase VII: Abandonment and Natural Deposition*

The Phase VI occupation ended at some point and the room gradually filled up with deposits of





this proposition cannot be easily tested due to the presence of a large piled-up structure (loci 6, 17, 19, 22) built against the southern face of Wall UU in Phase IV. Somewhat later, a southern extension (locus 34) of Wall TT was erected, which continues beyond the southern limit of the trench.

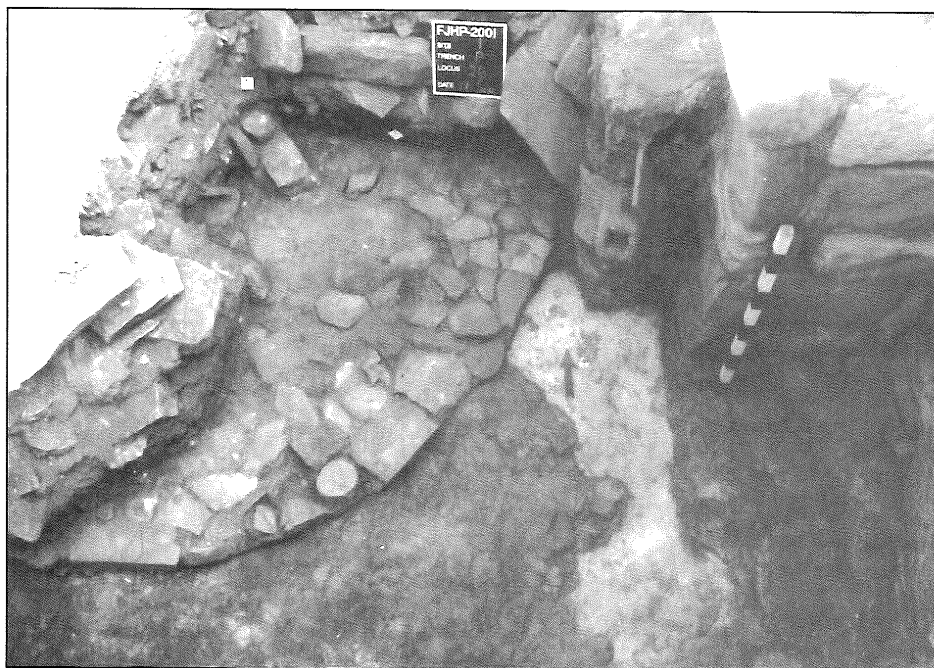
*Phase II: Room with Arches*

This phase witnessed the construction of a quadrangular room which used the existing Walls TT and UU and the new southern and eastern walls (XX, locus 11, and VV, locus 5). The only possible entrance to this room must have been the hypothetical door in Wall UU. Wall XX abuts the southern extension (locus 34) of Wall TT on the western end, and it bonds with Wall VV on the eastern end. The ceramics recovered from the collapse loci 8 and 13, dated to the second half of the fourth-first half of the fifth centuries AD, may partially belong to the fill of the interior of Wall XX. The line of Wall VV is continued farther south, as Wall YY, locus 33, which abuts Wall XX. It is unknown whether Wall YY was built then or later. The eastern wall had two pilasters serving as bases for two approximately NW-SE arches spanning the interior. Through rebuilding, the orientation of the corresponding, southern, pilaster in Wall TT was modified to respond to the line represented by the southern pilaster built against Wall VV. The corresponding northern pilaster associated with Wall TT is buried under the later structure (locus 6) built against Wall UU. There might have been a formal floor directly on top of the bedrock but no traces of it were found although the soil locus 27 seem to have been a floor buildup to even up the level of

the bedrock. That locus contained ceramics primarily dated to the late fourth-fifth centuries AD.

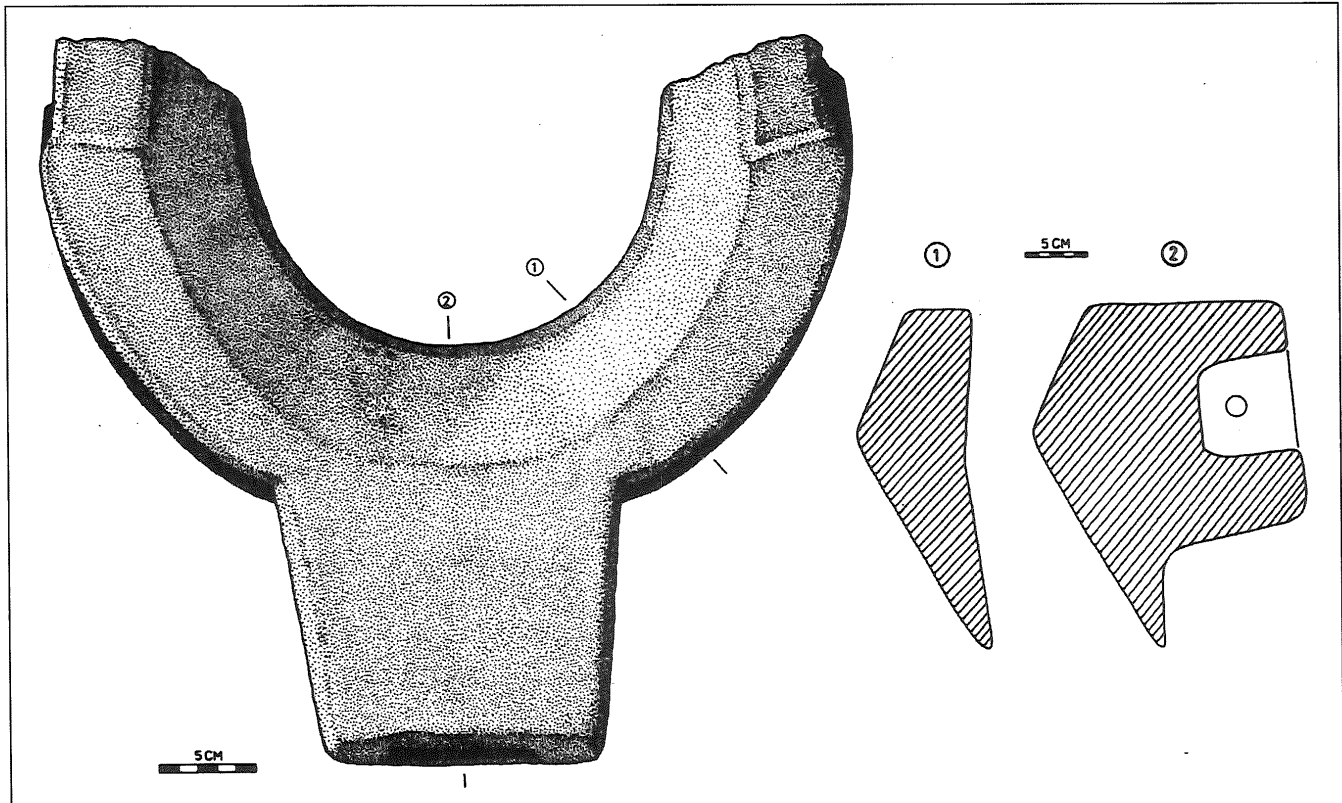
The central part of the room was occupied by a round low platform (locus 26) built of irregular but flat stones (Fig. 5). One quarter of that platform was exposed. The purpose of this platform appears to have been as a space where grain was ground for flour. This is inferred from the presence of the upper part of a basalt rotating grain mill (Pompeian type), found lying beside the pilaster of the southern arch, in the fill of locus 32 (Fig. 6).

Directly south of Wall XX, and within the confines of the trench, a narrow space was excavated which yielded well-stratified remains of a midden. It consisted of loci 10, 18, 20 (concentration of ash) and 21 (only the top exposed). Generally, these loci included ashy soil, often containing the frequently burnt sherds of cooking pots. A preliminary analysis indicates the presence of large quantities of fish scales and bones (see below). The depth and extent of the midden deposit are unknown but apparently continuing beyond the southern balk of the trench. The midden could have come into existence as soon as Wall XX was constructed in Phase II. However, it is equally possible that the deposition of food remains, ceramic debris and ash began later. At any rate, all three loci (10, 18, and 20) contained ceramics mostly dated to the transitional Late Byzantine-Early Umayyad, and Early Umayyad periods (late sixth-seventh centuries AD). As the nature of occupation south of Trench P is unknown it was decided to continue the excavation of this area (including the remaining part of the midden) during the following season.



5. The stone platform in the center of Trench P. The upper part of the rotary grain mill is visible between the platform and the arch pilaster (by J. Vihonen).





6. The upper part of the rotary grain mill (by R. Holmgren).

*Phase III: Disuse - Temporary Abandonment(?)*

The entire space seems to have been partially abandoned at the end of Phase II. A thick ash deposit (locus 24), possibly the remains of a hearth, was deposited on top of the platform, locus 26. The wind-blown sandy deposits, exemplified by loci 23 and 25, accumulated throughout the interior of the room. These loci had ceramics mostly dated to the Late Byzantine through the transitional Late Byzantine-Early Umayyad periods.

*Phase IV: Reoccupation of Undetermined Nature*

At the beginning of Phase III, a large, rectangular, soil and piled-up stone, heavy buttress-like structure was built against the southern face of Wall UU and on top of the wind-blown deposits above the round platform. The structure extends from Wall UU south to the line marked by the southern arch. The structure is composite and it consists of the following strata (from the bottom up): hard-packed soil with stones (locus 22), a very compact, hardened layer of soil (locus 19), a layer of irregular, tightly packed stones (locus 17), and a layer of ashlars and flagstones laid on the top in rough rows (locus 6). These loci produced ceramic finds representing the dating range from the Byzantine through the transitional Late Byzantine-Early Umayyad periods. It is apparent that the room remained unroofed during this phase. The western

part of the southern arch was still standing during the excavation, marking the southern extent of the structure. But the northern arch apparently collapsed or was taken down during the erection of the structure and its voussoirs were left inside the structure, still preserving the basic line of the arch. The top of Wall UU was seemingly levelled out, flush with the top of the structure. The function of this installation is unknown; it might have been a large defensive or supportive buttress, or a "platform" for a special purpose.

With the construction of the buttress, the only possible entrance to the room (in Wall UU) would have been permanently blocked, but the standing walls would still provide a shelter. Certain strata provide relatively large quantities of broken ceramics, bones, eggshells, and ash deposits. To these belong loci 9, 12, and 14 in a relatively restricted space between the northern pilaster built against Wall VV, and Wall UU, and locus 16 south of that pilaster. These loci produced pottery dated from the fifth through the first half of the seventh centuries AD. As no well-defined occupational surfaces were detected there it is also possible that these deposits represent episodes of dumping debris from occupational areas located near the room.

*Phase V: Destruction and Latest Deposition*

Wind-blown sandy deposits, such as loci 13

(lower) and 15, accumulated elsewhere within the room. The collapse of the walls is represented by stone tumbles loci 7, 8, 13 (upper). These may reflect episodes of destruction but also the gradual deterioration of the walls' condition. Locus 2 seems to specifically represent the collapse of Wall TT. Locus 1 is the most recent natural deposition.

## THE ARCHAEOZOOLOGICAL RESEARCH

(J. Studer)

During the 2001 excavations at Jabal Hārūn, very large quantities of fish scales were recovered from a midden located in the southern part of Trench P. Two distinct layers have been recognised (loci 10 and 18), essentially composed of fish scales in the matrix of sandy, occasionally ashy soil and small stones. Bones and ceramics have been found in these strata as well. A layer, locus 20, composed of fire residue (ash, charcoal), without any significant number of animal remains, separates the two layers. It is unknown at this point of time how large is the entire midden; apparently only a part was exposed in 2001. To achieve a maximum retrieval of all finds, especially the faunal remains, the sediments of the midden were sieved through a 3mm mesh. The assemblage comprises a total number of 3,188 bones, and the multitude of scales, filling three large buckets, which corresponds to ca. 90 litres.

### *The Fish Scales*

The results of the archaeozoological research indicate that this large amount of scales represents fish processing and preparation before actual consumption. To obtain a general idea of the quantity and variety of the scales, ca. 170ml of the sieved midden sediment were sorted and the small residues examined under the microscope (6x). In this procedure, only the complete or almost complete scales were counted. Identification of scales is particularly difficult because of their great variability in shape as well as in form, and because they vary in different parts of the same fish. Until a more complete fish scale reference collection is created, only a preliminary evaluation of the material from Jabal Hārūn is possible.

A total of 524 complete scales were counted in 170ml of sieved sediment, roughly separated into three size-related categories: large, medium and small. The majority of the scales fall in the medium-size group, with an average width of 0.5 to 2cm. They seem to belong essentially to emperors and parrotfish, and only some of them, ca. 1cm wide, show the typical scale form of groupers. There are also fragments of very large scales of

several forms which are as yet unidentified, and 181 small scales of 1 to 2.5mm, which correspond to *Scombridae*.

It seems that parrotfish scales are more fragile than scales of other taxa and tend to break more easily. The 2002 field season will include a careful excavation of the as yet untouched part of the midden in way to confirm this preliminary observation. If it is confirmed, then the final analysis will face difficulty in estimation of the relative frequencies between emperors and parrotfish, as the quantity of parrotfish scales will be biased by taphonomic factors. Not only the robustness of the scales is involved here, but also their number per fish and their size, depending on the species and the size of the fish.

### *The Fish Bones Recovered from the Midden*

The majority of the 3,188 bone remains (identified and unidentified fragments) recovered from the midden represent fish (90% of the total). Mammals comprise 9% and birds only 1%. The quantity of fish increases to 95% if the number of identified bones is used for calculation of species frequencies.

The most common fish are parrotfish (*Scaridae*; 73% of the identified fish bones). At least 81 individuals have been recognized (Table 1), almost all of them of a standard length between 20 and 30cm. Though less common, three other fish families appear regularly: emperors (*Lethrinidae*, 13%), groupers (*Serranidae*, 8%) and tunas (*Scombridae*, 6%). Other fish such as snappers (*Lutjanidae*), wrasses (*Labridae*), mullets (*Mugilidae*) or seabreams (*Sparidae*) are rare (3%), and in terms of quantity they seemingly played a minor role in the diet. Small *Clupeidae* of less than 10cm length are also attested.

The great abundance of parrotfish could be due to the taphonomic factors. It is known that differences in robustness, size and shape of skeletal elements, within and between fish taxa, affect their abundance in archaeological deposits (Wheeler and Jones 1989: 61-78; Colley 1990: 212ff; Falabella *et al.* 1994). Pharyngeal teeth of parrotfish, which are coral crushers, are particularly resistant, strong and large skeletal elements. In Trench P, the most abundant element is the upper pharyngeal bone which gives a minimal number of individuals estimate (MNI) of 54 (locus 10) and 27 (locus 18) individuals for these layers of the midden (Table 1). The lower pharyngeal bone, a single bone, gives an MNI of 38 and 18 for loci 10 and 18 respectively. If only the skeletal elements are considered minus the teeth, then the hyomandibular is the most abun-

**Table 1:** The more common parrotfish bones identified at Jabal Hārūn. NISP = number of identified bone; MNI = minimum number of individual (by J. Studer).

Parrotfish (Scaridae)	TRENCH P				TRENCH D			
	locus 10		locus 18		TOTAL		TOTAL	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
premaxilla	17	10	18	16	35	16	72	(43)
dentary	18	11	12	9	30	20	40	(30)
hyomandibular	23	13	16	9	39	22	47	(21)
upper pharyngeal bone	90	54	40	27	130	81	39	(20)
lower pharyngeal bone	38	38	18	18	56	56	28	(25)
vertebra	114	10	82	12	196	22	357	(28)
other element	89	-	48	-	137	-	178	-
<b>TOTAL</b>	<b>389</b>	<b>54</b>	<b>234</b>	<b>27</b>	<b>623</b>	<b>81</b>	<b>761</b>	<b>43</b>

dant element and represents an MNI of 13 and 9. These data illustrate the differential preservation of skeletal elements within the same family of fish. However, the final interpretation of these data will have to await a more detailed study since human activities, such as the preparation of fish for transport or for consumption, could also affect the representation of the bones at the site.

To ascertain that parrotfish is indeed more abundant in the midden than emperors or groupers, a comparison of the same skeletal elements families (for example, the hyomandibular), considered to have the same potential of preservation between the three fish has been undertaken. The results confirm that parrotfish have been the major fish eaten in the monastery, and are about 3 to 6 times more common than emperors and at least 7 times more common than groupers.

The large quantity of parrotfish bones gives some indication of the body part frequency. Although the entire fish is represented in the remains, there is an abundance of upper pharyngeal teeth, as shown in **Table 1**. But there are also two anomalies worth mentioning. First, if upper pharyngeal teeth have a better preservation gradient than lower pharyngeal teeth, premaxilla or dentary (all of them robust elements), the same proportion should be found in other assemblages at Jabal Hārūn. This, however, is not the case. In the room excavated in Trench D, one of the 14 rooms around the North Court and preliminarily interpreted as a hostel room for pilgrims, the most abundant element of parrotfish is the premaxilla (twice more frequent than the upper pharyngeal bone). The second anomaly is the frequency of vertebrae. Usually, vertebrae represent the majority of fish remains, often more than half of the fish bones at a site. Compared to Trench D where vertebrae comprise 47% of the identified parrotfish bones, the vertebrae in the midden represent only 31% of all fish remains. These variations are probably influenced by natural

taphonomic factors, but human activities could also have some role in affecting the relative proportion of these skeletal elements.

Sorting out a sample from the midden sediment under the microscope has yielded 12 tiny vertebrae of less than 1mm, including some *Clupeiformes*. These small remains resemble those found in a Late Roman pilgrim flask from az-Zanṭūr الزنطور (Petra), which contained the residue of the famous fish sauce – hallec – gastronomically much appreciated condiment during antiquity (Studer 1994). A Late Roman jar filled with tiny fish bones was also found at Aila-‘Aqaba (Parker 2000: 379), and small Clupeidae used as condiment (similar to the fish sauce from Petra) have been found in a store-room at Masada, and dated to 30-20 BC (Cotton *et al.* 1996). The evidence of preparation of small fish for sauce suggests the interpretation of the vertebrae from the midden at Jabal Hārūn as remains of culinary activities rather than the stomach contents of larger fish. Apparently, small fish were also consumed in the monastery. The tiny bones could be considered as a residue of a thick fish sauce (hallec) which was usually filtered to be specifically used as a juice. Therefore, these bones represent the refuse from the kitchen rather than the remains of a meal.

#### *The Bones of Mammals and Birds*

The presence of mammal (9%) and bird (1%) remains in the midden is insignificant. However, it is important to note that the only significant difference observed between loci 10 and 18 in the midden concern the mammal bones. In locus 10, mammal remains represent 2% (28 fragments) of the total number of bones found, as well as of the number of identified specimen (NISP: 18/888). In locus 18, they represent 15% (265) of the total number of bones, and the frequency decreases to 7 on the basis of NISP (30/403). Although the mammal bones are more frequent in the lower layer (locus 18) of

the midden, they are actually more fragmented than in the upper layer. The high degree of fragmentation may be due to the higher degree of pressure and compaction affecting the lower layer. But then it would be expected that compaction should also affect the preservation of the fish bones or scales, which does not appear to be the case so far. The observed differences in the frequency and fragmentation of mammal bones will have to be further confirmed by the analysis of material to be excavated in 2002.

The majority of the 48 identified mammal bones represent sheep and goat (88%). Cattle is also attested by 6 fragments found in locus 18. Chicken is the most common bird (85% of bird remains), and eggshell fragments of hen are regularly found mixed with the fish scales. Bones of wild birds like chukar partridge and water rail are also present.

There is practically no evidence for gnaw marks on the bones, either by dogs or rodents. In addition, rodent bones are missing from the midden sample checked under the microscope. Though the preceding archaeozoological study on another room of the monastery had shown that no bones were gnawed by dogs (Trench D; Studer in Frösén *et al.* 2001b), large quantities of birds' remains (and also some mammal bones) were gnawed by rodents. The presence of rodents' gnawing marks on the material from Trench D and their absence in Trench P has yet to be explained.

#### *The Significance of the Midden*

It is apparent that the part of the midden excavated during the 2001 campaign was filled up with kitchen refuse during the Byzantine period and probably later. The overwhelming abundance of scales is remarkable, and reflects *in situ* deposits that have been preserved till now, probably untouched.

The major characteristics of the midden, as compared to the culinary remains found in Trench D, can be summarized as following:

- an overwhelming predominance of scales;
- a high proportion of fish bones compared to mammals and birds (90% against 65% in Trench D);
- an absence of rodents and rodent gnawing on bones;
- parrotfish maintain the same proportion (73% and 78%), but the frequency of emperors and groupers is reversed: the emperors increase (13% against 8%) and the groupers decrease (6% against 14%).

There is no indication whether such density of fish remains could have been accumulated through intensive activity counted in weeks, months, or years. The quantity of fish scales obviously repre-

sent many more individuals than the minimum number estimate obtained from the fish bones, but a presence of the more substantial bone accumulation is still possible in another, yet unexcavated, part of the midden.

As shown by the ichthyofaunal analysis, the vertebrae can usually be connected forming assemblages of up to 6 joining elements. These connections can be recognized in the remains of the four major fish families. One set of vertebrae, of a skipjack tuna (*Watsuwonus pelamis*), has a cut mark that can be observed along 4 vertebrae. All these anatomical connections restricted to some bones suggest that we have remains of a part of the body, and not the entire fish. Thus the vertebrae may represent kitchen refuse or culinary remains, but undoubtedly, the scales and the eggshells have to be considered in the context of the food preparation.

### CONSERVATION ACTIVITIES

(C. Danielli)

During the past two seasons conservation work at Jabal Hārūn was mainly concerned with emergency repairs to stabilize the excavated architectural remains. As the excavation continues, larger areas of the site are gradually exposed, thus requiring more extensive preventive measures. During the 2001 season, the following issues were specifically addressed:

- a need for a more thorough analysis of the Byzantine building techniques used at the site;
- more substantial work on the stability of the architecture;
- the necessity of temporarily protecting the weakest structures with protective shelters;
- wall reinforcements and backfilling.

At the beginning of the season a survey of all previous conservation work was carried out to verify the condition of the structures and the repairs. Since the repairs applied during the previous seasons appeared to be effective and stable, the work was focused mostly on the consolidation of the recently exposed sandstone masonry. An extensive consolidation of the lime plaster covering the walls of a room in Trench J, which had suffered some losses during the winter, was also completed.

#### *Masonry Repairs*

These were carried out principally in Trenches P, J, M and O. In Trench P an inner wall was reinforced with lime mortar in order to allow further excavation. As the walls of the site were generally constructed using sandstone blocks cemented with mud mortar which had disintegrated, a similar mud mortar was used as replacement, combined with a

small amount of hydraulic lime, to avoid altering the appearance of the original architecture (Fig. 7). In the areas where the disruptive effect of running water would compromise the integrity of the structure, lime mortar repairs and pointing were applied to avoid water infiltration and the displacement of detritus and small stones which were loosely encased in the masonry. These repairs were then brushed with wet soil to prolong the setting time as well as to give the repairs a more “natural” appearance.

While the staircase leading up to the structure in Trench O was in good condition, the adjoining wall with its attached base of an arch was collapsing due to the laminating and exfoliation of the sandstone blocks and the erosion of the binding mortar. After eliminating the pulverized mortar and debris from deep inside the wall, lime mortar containing crushed pottery was pushed inside the large gaps, and leveled to fill the base of the wall. Once the mortar had set, the weak blocks were removed and replaced with limestone ones. This operation was extremely difficult due to the thickness of the wall and the constant threat of collapsing blocks. When the gaps were filled and the blocks set in place, the joints between the blocks were sealed with mud mortar.

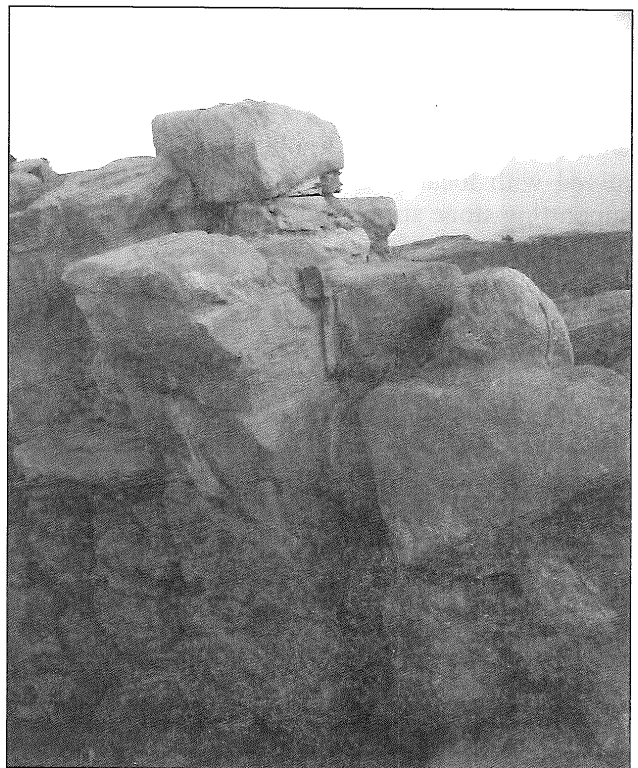
A similar operation was performed on the north-western wall (AA) and the eastern perimeter wall (V), both located in Trench M and composed of large blocks of sandstone. As in the previous case, the walls were freed from debris and filled with lime mortar containing crushed pottery. Loose fragments of wall plaster were consolidated and secured with injections of Syton X30 (20% diluted in water). After the setting of the mortar, the joints were sealed with mud mortar. The outer side of



7. Consolidated mud mortar of Wall G in Trench O after treatment (by J. Latikka).

Wall V was partly buried. When the soil was removed, it revealed that the lower blocks were in very poor condition due to the presence of salts in the soil. As the surface soil is sandy, the salts penetrate below the surface, crystallizing where the damp, compacted soil joins the sand layer, causing some of the buried sandstone blocks to disintegrate. The upper blocks of the wall were removed and the weakened bottom blocks were replaced by limestone ones. The wall was rebuilt using lime mortar to bind the ashlar.

While excavating the structure in Trench O, particular care was taken in securing the bases of the uncovered arches (Fig. 8). The consolidation of the walls and the arches had to be carried out gradually throughout the excavation to avoid the drying out of the walls and the consequent risk of contraction. As in the previously described cases, the weaker stones were found at about one and half meters below the surface, due to salt crystallization. This created a problem for the support of the arches and the integrity of the walls themselves. It was impossible to remove any of the ashlar, since the walls were quite unstable and the damp soil, which kept them together, was rapidly drying into dust. Emergency stabilization of the soil was carried out using Syton X30 (20% diluted in water) injected directly into the mud mortar. This method was tested beforehand on other stronger walls of the site and it worked quite effectively in stabiliz-



8. Arch pilaster and springer from Trench O after treatment (by J. Latikka).



ing the mud mortar, compacting it into a solid mass, which allowed the application of a final layer of lime mortar between the joints. For masonry repairs, the following mortars were used:

*Mortar 1:* 1:2.5 Hydrated lime with a small quantity of white cement : local sand + (for deep gaps) crushed pottery.

*Mortar 4:* 2:1 Local clay mixed with sand : hydrated lime.

#### Wall Plaster

The wall plaster uncovered in Trench J during the 2000 Season had survived poorly even under the temporary shelter. During the winter strong winds had damaged parts of the plastic sheeting of the shelter causing water infiltration, which damaged the upper parts of the wall plaster. The plaster was re-adhered to the wall with injections of liquid hydraulic mortar (Microlite) and kept in place with wooden props until the setting was complete. The cracks were sealed with lime mortar (Fig. 9). The exposed wall structure made of mud mortar and stone fragments was consolidated with injections of Syton X30 (20% in water). The same was done for the plaster surrounding the basin and the bench area and the floor, which was made of rough pebbles mixed into the lime. A new covering made of strong tent canvas was devised for the temporary shelter.

Two water channels leading to the cistern from the area in Trench J were also consolidated. They consisted of stone channels lined with a layer of hydraulic mortar, which became quite brittle and loose. The mortar was strengthened by injections of Syton X30 (20% in water). The edges were secured with a thin layer of hydraulic mortar (Serpo 148) mixed with local sand. In some places where the supporting stone structure was missing, a reinforcement of lime mortar with crushed pottery was used.



9. Wall plaster in Trench J after treatment (by J. Latikka).

The following mortars were used for plaster repairs:

*Wall plaster:* 1:2 Hydrated lime with a small quantity of white cement : local sand.

*Water channels:* 1:2 Hydraulic lime (Serpo 148) : local sand. Syton X30 was used for the consolidation of the original hydraulic mortar.

As the mortar repairs carried out during the previous seasons have held out very well in the arid climate, proportions were kept the same and the same type of lime was used. Further testing has been carried out on Syton X30, changing the dilution and using it as a consolidant for the constituent mud mortar of the original walls. As the use of ethyl silicate proved quite difficult because of the rapid evaporation rate of the solvent, Syton was preferred because it can be diluted in water and is easier to apply. It has been very successful in consolidating loose material such as mud mortar mixed with sand and brittle, eroded plaster fragments. All operations have been carried out considering factors of the reversibility of treatments and the historical authenticity of the site. Because interventions during this season concerned the original structure of the monastery, the close collaboration of all the members of the FJHP was extremely helpful in establishing the significance and function of the uncovered architectural elements, as well as in identifying traditional Byzantine building techniques.

#### Small Finds (S. Pouta and A. Karakoski)

During the 2001 field season all new finds were cleaned of soil and packed for transportation. Fragile ceramic objects were consolidated to avoid further damage during transportation. Metal objects were packed with silica gel to protect them from moisture and corrosion. Small finds included metals, most of them small coins, decorated marble fragments, a lamp mould, ceramic pots and a small carved mother-of-pearl cross. Registered objects were taken to Finland for conservation and further study. All objects were properly cleaned in the conservation lab. Metals were treated with BTA and incralack to stop further corrosion. Where salt encrustations were suspected in ceramic objects, the pieces were soaked in several baths of deionized water to remove soluble salts. After cleaning, the broken objects were conserved.

#### PRELIMINARY ASSESSMENT

(Z.T. Fiema and R. Holmgren)

Contrary to previously held opinion, it is now apparent that while the rooms in Trenches O and K should be dated to the Nabataean period, the inten-

tional filling up of the room in Trench K must have happened during the later phases of occupation at the site, most probably during the Byzantine period. Both rooms, judging from their layout, architecture and masonry, were the components of a larger, Nabataean/Roman period structure. Whether or not the structure had a sacral function then, cannot be fully verified at this point of the fieldwork. At any rate, the excavations of the room with three arches (Trench O) have provided useful chronological indicators, perhaps applicable to the entire structure. The ceramics from the lowermost strata below the lower floor (Phase III) are either Nabataean or fourth-fifth century in date. Taking into consideration the removal of the original (Phase I) floor and the remains of the casual occupation (Phase II), it is possible that the original Nabataean-Roman structure was seriously damaged sometime in the fourth century, perhaps as a result of the AD 363 earthquake. Casual occupation continued for some time until the monastic center was constructed in the fifth century, and the structure incorporated into its precinct. The occupation in Phase III (lower floor) and Phase IV (upper, extant floor) would have continued throughout the sixth century and probably later. The gradual disuse of the place (Phase V) may be dated to the transitional Late Byzantine-Early Umayyad period, i.e., the later sixth-the first half of the seventh century and probably later.

The function of the structure once it was incorporated into the monastic complex is more problematic. Besides the most common function – habitation – there are few indications of any specialized use. The centrally located pit in the room in Trench O provides the only indication of a secondary use of that room during Phase IV. As stated above, the interpretation of the room in Trench O during that period – as a place where olive oil was pressed, filtered or stored – is so far the most plausible although not fully satisfactory. If the room's floor was used then as a treading surface, the pit could have served as a collection vat in the initial processing. Remains of olive pressing installations were found even in small isolated monasteries of the Sinai (Dahari 2000: 161), and the olive oil production in the Petra-Wādī Mūsā area during the Nabataean through the Early Islamic times is also supported by extant remains of the installations (e.g., 'Amr *et al.* 2000: 233-234, 239, 244).

The 2001 excavations also provided significant information about the economic aspects of the occupation in the monastic/pilgrimage complex, specifically in terms of the evidence of the diet of the site inhabitants and their visitors. Bones, seeds and plant remains were already collected during past

campaigns, but the quantities of fish remains (bones and scales) recovered in the midden in Trench P are indeed substantial. Furthermore, it appears that the midden continued to be used, possibly even beyond the latest occupation of the room in Trench P. At any rate, a fish diet in the monastic context is not surprising. For example, it is known that small salted fish made into a thick soup was quite popular among monks (Dembinska 1985: 441). Also, fish occurs commonly in monastic/pilgrimage contexts, e.g., *Scaridae* at Dayr al-Qaṭṭār al-Byzanṭī on the Lisān (Holmgren and Kaliff 1997: 324; Politis 1992: 284). Hopefully, future analysis will be able to detect the specific patterns and variations in dietary practices at the site.

In this context it is worth mentioning two Nessana letters (P. Nessana 47, before AD 605?) which deal with the shipment of fish (Kraemer 1958: 139-141). The exchange is between the abbot Patrick from Nessana and the deacon Stephan from an unidentified locality. Apparently, the Stephan's original request of 90 pounds of fish was not fully accomplished because Patrick sent "80 pounds of fish and 20 large heads," of which 70 pounds actually arrived. Notably, the text mentions *skaros* in Greek which probably means that parrotfish is specifically involved here. Nessana in the Negeb is located more than 150km away from the Red Sea, the natural habitat of parrotfish (Colt 1962: 66). The excavations at Nessana ('Auja al-Ḥafir) yielded bones of parrotfish in considerable quantities (Colt 1962: 66-67; Jackson 1962: 67-68).

It is apparent that the midden discovered at Jabal Hārūn in 2001 largely represents the remains coming from food processing and preparation. The actual consumption activities may have taken place nearby. In a monastic context, segments including the refectory, kitchen, granary storerooms, flour production area and a bread oven were usually located in one area, as at the Khirbat ad-Dayr monastery in the Wādī al-Ghār of the Judaeian Desert (Hirschfeld 1996: 140). The room uncovered in Trench P appears to have belonged to the kitchen complex, at least during Phase II. A large domed, bread oven with a circular stone baking platform was discovered at the monastery at Khirbat ad-Dayr (Hirschfeld 1996: 148-149) in a setting similar to that of the room in Trench P. However, the low circular platform at Jabal Hārūn is better associated with flour-producing activities, which is further indicated by the discovery of the rotary grain mill fragment there. A similar basalt biconic mill was found in the monastery of Khirbat Siyar al-Ghanam near Bethlehem (Corbo 1955: 9). As the

midden at Jabal Hārūn contains large quantities of ash, this may indicate the presence of an oven nearby. Bread was the basic staple of the diet of monks living in communal monasteries, and bread loaves were stamped with a cross (Dembinska 1985: 438; Hirschfeld 1996: 144, 149). A small limestone stamp with a lightly engraved cross was found during the 1999 fieldwork at Jabal Hārūn (FJHP Reg. No. 78). It should be noted, though, that some of the stamps with cross engravings are not necessarily found in the place of their original use. They were also traditionally preserved as valuable holy objects (Galavaris 1970: 20-21).

The recent discoveries indicate that the Monastery of St. Aaron had its own food production and subsistence strategy, and was not just dependent on the gifts and donations from the pilgrims and the population living nearby. This again supports the idea that the St. Aaron Monastery was of a *coenobium*-type, a proposition already put forward two years ago.

J. Frösén  
Z.T. Fiema  
Institutum Classicum  
PL 4, Vuorikatu 3 A  
FIN-00014-University of Helsinki  
Finland

K. Koistinen  
Institute of Photogrammetry and  
Remote Sensing  
Helsinki University of Technology  
P.O. Box 1200  
FIN-02015 HUT, Espoo  
Finland

J. Studer  
Département d'archéozoologie  
Muséum d'histoire naturelle  
CP 6434, CH-1211 Genève 6  
Suisse

C. Danielli  
Conservazione Beni Artistici  
Via Agrigento 3  
00161 Rome  
Italy

R. Holmgren  
ARCDoc, Archaeological Documentation  
Wollmar Yxkullsgatan 15B  
SE-118 50 Stockholm  
Sweden

Y. Gerber  
Department of Archaeology  
University of Basel  
Schoenbeinstrasse 20  
CH-4056 Basel  
Switzerland

N. Heiska  
A. Lahelma  
Institute for Cultural Research  
Department of Archaeology  
P.O. Box 59  
Unioninkatu 38 F  
FIN-00014 University of Helsinki  
Finland

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