Subterranean cavities at Khirbet el-'Ain, Judean foothills, Israel

Le cavità sotterranee di Khirbet el-'Ain, contrafforti della Giudea, Israele

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Abstract

Khirbet el-Ain is an archaeological site located in the Judean Foothills, northeast of the ancient city of Beth Guvrin-Eleutheropolis. The site contains two distinct areas of ancient ruins – Upper Kh. el-Ain and Lower Kh. el-Ain – separated by a slope devoid of archaeological remains. The ruins are located alongside the Roman road leading from Beth Guvrin to Jerusalem, adjacent to a dried-up spring. The article describes the results of an archaeological survey of artificial subterranean cavities at the two sites. We documented some 30 cavities and subterranean complexes used for quarrying, storage, industry, pigeon breeding, hiding, burial, and more. The cavities were carved out and used mainly during the Hellenistic, Roman, Byzantine, and Early Islamic periods.

Keywords: artifcial cavities for quarrying, storage, industry, pigeon breeding, hiding and burial, Hellenistic, Roman, Byzantine, and Early Islamic periods.

Riassunto

Khirbet el-'Ain è un sito archeologico situato ai piedi della Giudea, a nord-est dell'antica città di Beth Guvrin-Eleutheropolis. Il sito contiene due aree distinte di antiche rovine: Kh. el-'Ain superiore e Kh. el-'Ain inferiore, separati da un pendio privo di resti archeologici. Le rovine si trovano lungo la strada romana che porta da Beth Guvrin a Gerusalemme, adiacente a una sorgente prosciugata. L'articolo descrive i risultati di un'indagine archeologica sulle cavità sotterranee artificiali presenti nei due siti. Abbiamo documentato circa 30 cavità e complessi sotterranei utilizzati per l'estrazione, lo stoccaggio, le produzioni artigianali, l'allevamento di piccioni, ma anche quali rifugi, luoghi di sepoltura e altre funzioni. Le strutture costruite nei siti di Kh. el-'Ain non sono visibili in superficie o nelle sezioni di terreno lasciate da scavi clandestini. Senza l'avvio di attività scientifiche di scavo, non avremmo potuto dire nulla sulla loro disposizione, cronologia o funzione. Le cavità scavate nella roccia a Kh. el-'Ain sono abbastanza ben conservate. Un'analisi architettonica e tipologica delle cavità artificiali scavate al di sotto di queste aree ci permette di ricostruire, anche se in parte, un quadro di insediamento nei due siti durante il periodo ellenistico, romano, bizantino e primo islamico, epoca di cui sono stati trovati pochi frammenti di vasellame sulla superficie. Alcune delle cavità scavate nella roccia, sulla base di caratteristiche tipologiche che trovano paralleli nella città di Maresha distrutta intorno al 108 a.C., sono da ricondurre al periodo ellenistico. Quando queste e altre cavità furono incorporate nei tipici complessi destinati a rifugio, esse furono parzialmente modificate e cambiarono la loro funzione d'uso originale. In generale, i primi complessi di nascondigli conosciuti oggi in Giudea risalgono alla seconda metà del I secolo a.C. o all'inizio del I secolo d.C. I rifugi raggiunsero il loro apice di raffinatezza e la loro più ampia distribuzione geografica durante la rivolta di Bar Kokhba. I pochi reperti che abbiamo trovato nei complessi rifugi di Kh. el-'Ain sono compatibili con questa cronologia. I residenti dei due siti durante diversi periodi furono sepolti in tombe scavate nella roccia con loculi, secondo un modello caratteristico comune sia in Israele sia in aree vicine dal periodo Asmoneo (II secolo a.C. circa) al II secolo d.C., cioè nei periodi ellenistico e romano. La stragrande maggioranza delle cavità nel sito di Kh. el-'Ain inferiore sono strutture sotterranee a forma di campana. Esse erano destinate principalmente all'estrazione di blocchi rettangolari di calcare da utilizzare come materiale da costruzione. Un sottoprodotto dell'estrazione era il calcare tritato, utilizzato nella produzione di malte cementizie. Dopo il completamento dell'estrazione, rimaneva una cavità sotterranea che poteva essere utilizzata per vari scopi. Datare le operazioni di estrazione è stato difficile a causa della scarsità di riferimenti nelle fonti scritte e della quasi totale assenza di reperti del periodo in cui le cave vennero attivate e utilizzate. Nel complesso, comunque, i dati suggeriscono che le cave a forma di campana risalgano a un periodo successivo all'età romana. Le cavità a forma di campana sono chiaramente successive alle installazioni sotterranee create e utilizzate dalla popolazione locale prima della rivolta di Bar Kokhba, così come i rifugi, le grotte sepolcrali e le installazioni agricole. Nel complesso del Serin e in altri siti della regione, come Luzit,

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graffiti ad un'altezza significativa che mostrano croci e talvolta iscrizioni in arabo e greco supportano la datazione delle cave al periodo bizantino e del primo periodo islamico. Le nicchie destinate all'allevamento di piccioni vennero successivamente scavate in alcune delle cavità a forma di campana a Kh. el-'Ain inferiore. Nelle vicinanze di Maresha e Beth Guvrin sono note dozzine di piccionaie scavate nella roccia o sotterranee. Gli studiosi ora concordano sul fatto che le piccionaie nelle colline della Giudea fossero usate per allevare i volatili sia quale fonte di cibo, sia per produrre fertilizzante e forse anche per scopi cultuali, dal periodo ellenistico fino al primo periodo islamico. A Kh. el-'Ain inferiore vi sono anche piccionaie successive a quelle ricavate nelle cave in disuso. Nella cavità 21 di Kh. el-'Ain inferiore, ad esempio, una croce incisa nella parete ma parzialmente distrutta dall'intaglio delle nicchie per i piccioni indica che gli operai che scolpivano le nicchie stesse non attribuivano alle croci un rispetto e un significato speciale. Così questa piccionaia, come altre nelle colline pedemontane della Giudea che furono create in cave in disuso a forma di campana, possono datarsi al primo periodo islamico. Alla luce delle informazioni qui presentate, sembra che i siti di Kh. el-'Ain siano stati frequentati dal periodo ellenistico fino al primo periodo islamico e facessero parte dell'entroterra rurale di Maresha. Nel primo periodo romano (e fino alla rivolta di Bar Kokhba) i siti erano popolati da ebrei, come attestato da caratteristici "reperti etnici": vasi di pietra, frammenti di ossari, uno o più bagni rituali e complessi sotterranei ramificati. In base alla loro posizione e dimensioni, insieme alla distribuzione delle stesse cavità sotterranee, proponiamo che nel sito di Kh. el-'Ain superiore vi fosse una tenuta o una fattoria. Al contrario, Kh. el-'Ain inferiore venne costruita in fondo al pendio, in un punto più basso, e la sua posizione venne determinata dalla vicinanza ad una fonte d'acqua, ai campi agricoli e all'antica strada, con una destinazione quindi agricola e commerciale. Forse l'ascesa della vicina Beth Guvrin, che ha ricevuto lo *status* di città romana nel 199/200 d.C. e la realizzazione di una presa dell'acqua sorgiva che scorreva ai piedi dell'area da destinare alla città di nuova fondazione, causò il declino dell'insediamento di Kh. el-'Ain. Secondo questo scenario, l'attività nel periodo bizantino e nel primo periodo islamico nel sito sarebbe da ricondurre più all'estrazione del calcare di alta qualità piuttosto che a un insediamento effettivo.

Parole chiave: cavità artificiali per estrazione, stoccaggio, produzione, allevamento di piccioni, nascondiglio e sepoltura, età ellenistica, romana, bizantina e primo islamica.

Khirbet el-'Ain is an archaeological site located in the Judean Foothills, about 1 km southeast of Tel Goded and 3 km northeast of the ruins of the Roman city of Beth Guvrin–Eleutheropolis (figs. 1, 2). The site contains two distinct areas of ancient ruins separated by a slope devoid of archaeological remains such as anthropogenic soil, ceramics, rock-cut features, or installations of other kinds. Lower Kh. el-'Ain (Israeli Cassini-Soldner 14213/11477) is a site with wide terraces, covering about 3 hectares, towards the bottom of a slope overlooking Nahal Goded (Israeli Cassini-Soldner 14213/11477). Upper Kh. el-'Ain extends over 0.2–0.3 hectares at a higher elevation to the south (Israeli Transverse Mercator 14196/11453). The ruins are located alongside the Roman road leading from Beth Guvrin to Jerusalem, not far from the Beth Guvrin junction where five Roman roads met (Roll & Dagan, 1988). The Roman road network was identified on the basis of paved segments with various installations, including milestones stating distances from Eleutheropolis. The second mile station along the road from Beth Guvrin to Jerusalem is located at the foot of Lower Kh. el-'Ain, with some milestones surviving *in situ*. A test excavation was carried out at this spot by Israel Roll (1976, 45). A spring flowed in antiquity through the now-dry riverbed at the foot of Kh. el-'Ain, as can be inferred from the name of the site, which in Arabic means "the ruin of the spring". Apparently, the spring existed when the climate was more humid. In the Roman and Byzantine periods, the water from this spring was gathered in a large collection pool and then transported to the nearby city of Beth Guvrin–Eleutheropolis via an aqueduct. This was the shorter, northern municipal water supply system of Beth Guvrin. It had the advantage of utilizing a nearby source of flowing water that was fairly easy to transport downhill along a gentle slope (Sagiv, Zissu, & Amit, 2002). Our previous explorations uncovered the pool, the aqueduct, and a rock-cut tunnel that apparently carried additional spring water. This spring, like others in the Judean Foothills, dried up over the years; all that remains of it is a fairly high level of groundwater, where a well (Be'er Reseq) was dug in the center of the riverbed at the foot of Lower Kh. el-'Ain.[1]

History of research

Several underground complexes at the upper and lower sites were first surveyed in 1899 and 1900 by Robert Alexander Stewart Macalister, who - together with Frederick Jones Bliss - was also excavating Tel Goded (Tel Judeideh) and Tel Maresha (Tel Sandahanna) at the time on behalf of the British P.E.F. Macalister documented cavities and subterranean complexes that served various purposes - underground quarries (some of them bell-shaped), an olive press, a ritual bath (?), and a dovecote - but because he was a true pioneer of research into artificial cavities, he lacked an accurate understanding of the purpose of each cavity (Bliss & Macalister, 1902, 224–237). In two of the complexes Macalister documented typical burrows. He was not able to identify the structures as hiding complexes, and instead he offered numerous suggestions regarding their purpose (Zissu & Kloner, 2015).
No significant work was done at the site after

[1] Because chalk is relatively impervious to water and increases surface runoff and evaporation, rain falling in the Judean Foothills evaporates intensively (Kloner, 1987). Some of it increases the runoff slightly, while a little trickles into the Coastal Aquifer. Therefore, there are currently no springs in the central Judean Foothills, and most of the wells dug in the valleys are dry. It seems, however, that this was not always the case. In recent years more data have been gathered on water sources in the Beth Guvrin area that were used by local inhabitants in the Roman and Byzantine periods but have since dried up. This topic, which is beyond the purview of the present study, is currently being studied by our team.

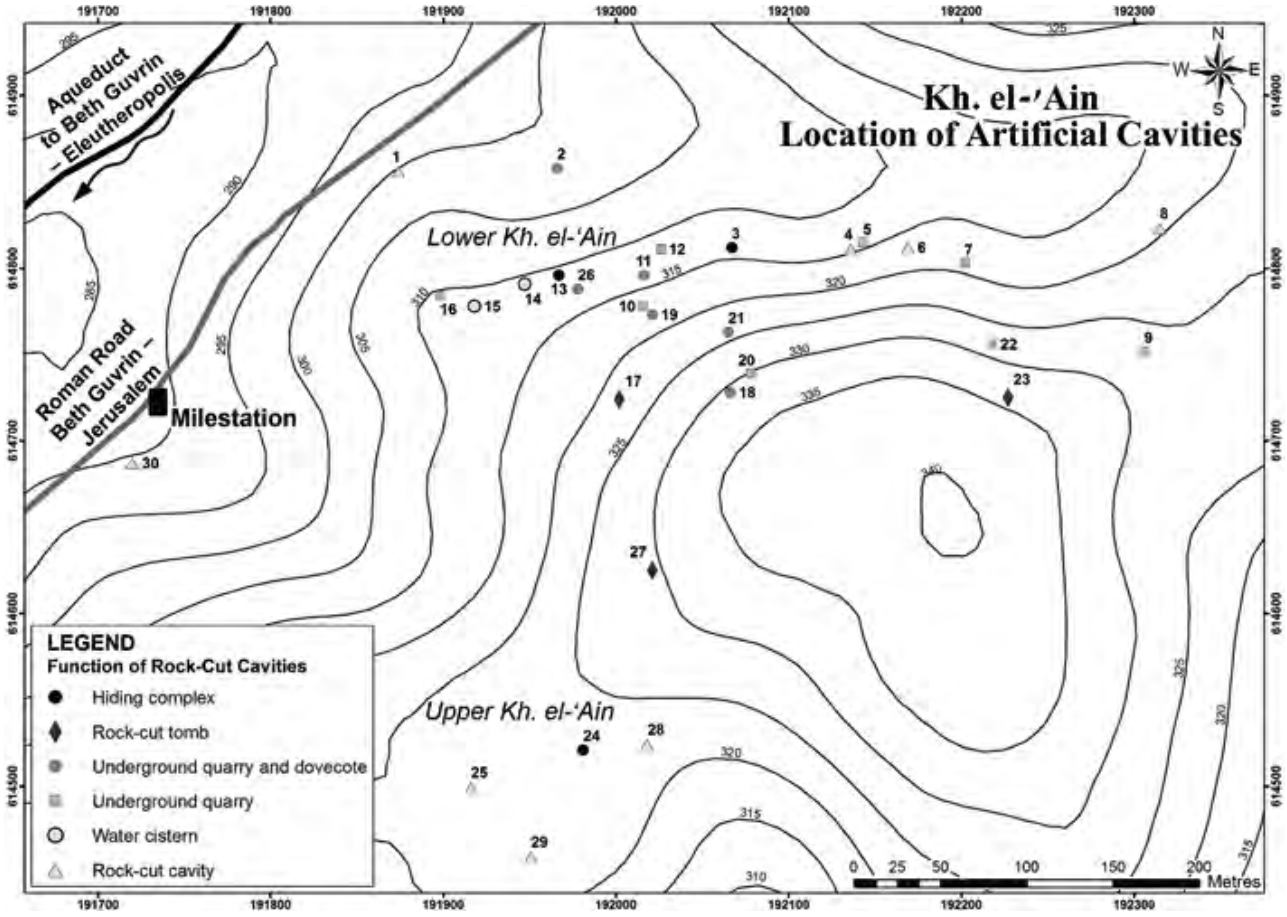

Fig. 1 – Map showing the location of all sites described in the article (drawing O. Gaster).

Fig. 1 – Mappa con la posizione di tutti i siti descritti nell'articolo (grafica O. Gaster).

Fig. 2 – Khirbet el-'Ain and nearby sites: aerial view, looking northwest (photo B. Zissu).

Fig. 2 – Khirbet el-'Ain e siti adiacenti: vista aerea verso nordovest (foto B. Zissu).

Macalister,[2] except for the excavation of an almost-empty burial cave that had been broken into by antiquities looters in the mid-1990s (Zissu, 2005; and see below). The present paper describes comprehensive fieldwork conducted in order to detect and document all accessible subterranean cavities at the site.[3] The recent work has made it clear that two of the complexes documented by Macalister with various degrees of accuracy are basically part of a much larger complex that has now been documented in full. No ancient structures or even remains of walls could be detected on the surface of the lower site, apparently due to systematic plunder of limestone (*nari*) building stones brought down the road to neighboring Beth Guvrin, and the total disintegration of soft chalk building materials left exposed on the surface. The ceramic finds scattered over the surface of the site, representing the Roman, Byzantine, and Early Islamic periods, were extremely sparse. In contrast, the rock-cut cavities documented for the first time in our survey indicate the nature and periods of activity at the site. The spatial distribution of the cavities helps us to determine the extent of the site. In the centre of the spur at the upper site is a ramified hiding complex; five additional subterranean cavities are located nearby (see below). The relatively small area of the site suggests that this was a farm or estate. Here, too, the absence of remains of buildings and the paucity of potsherds scattered over the surface are conspicuous. The few potsherds have been dated to the Hellenistic(?), Roman, and Byzantine periods. In our opinion, this is due to the plunder of *nari* building stones and the disintegration of soft chalk building blocks described above. It should be stressed that at both sites dressed building stones made of limestone (including some large, impressive stones), chalk building blocks, potsherds, elements of agricultural installations, and even architectural items were found within the subterranean cavities. It was easier for the looters to take apart buildings on the surface than to remove building material that had fallen into subterranean cavities. In the present project, we surveyed approximately 35 subterranean complexes and cavities of various types (see Appendix A). Below we describe the most elaborate and most important of them.

The Serin Complex[4] (see fig. 1: site No. 2)

The Serin Complex, discovered at the bottom of the slope, contains five connected bell-shaped subterranean cavities (fig. 3), carved in the living rock, each with a narrow mouth at the top.

The mouth of cavity A is elliptical (2.3 × 1.8 m). One can walk down a rock-cut staircase adjacent to the eastern wall into a bell-shaped cavity measuring 12 × 10 m. Fourteen rows of triangular dovecote's niches were carved out of its walls (figs. 4a, 4b). Towards the bottom of the northern wall, a narrow passage (0.5 × 0.9 m) leading to cavity B was carved out. This bell-

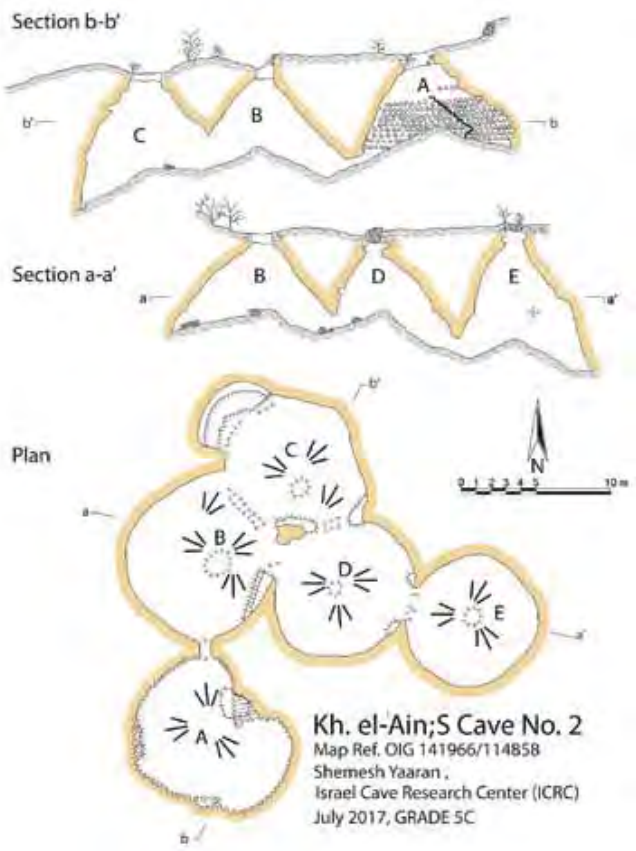

Fig. 3 – Plan and section of complex 2: The Serin Complex (drawing S. Ya'aran).

Fig. 3 – Pianta e sezione del complesso 2: Complesso Serin (grafica S. Ya'aran).

Fig. 4a – Cavity A in complex 2, looking north (photo B. Zissu).

Fig. 4a – Cavità A del complesso 2, verso nord (foto B. Zissu).

[2] The site was apparently examined by Yehuda Dagan as part of the Beth Guvrin map survey, but this survey has not yet been published.

[3] The site was surveyed by the authors, with the participation of students from the Department of Land of Israel Studies and Archaeology at Bar-Ilan University and volunteers from the Cave Research Center, under IAA permit S-753/2017.

[4] The names of the caves and cavities as used in this paper are not official names, but just informal ones given by the surveyors.

Fig. 4b – Cavity A in complex 2, looking west (photo B. Zissu).
Fig. 4b – Cavità A del complesso 2, verso sud (foto B. Zissu).

shaped cavity measures 10.5 × 12 m and is currently 5.2 m high, from the oval mouth at the top to the debris and sediment covering the floor. A wide passage (5 × 2.4 m) carved out in the northern part of cavity B leads to cavity C. A low passage (2.5 × 1.1 m) leading to cavity D was carved in the eastern part of cavity B. Cavity C is bell-shaped and measures 12 × 8 m. Its shape was affected by the wide passages in its southern section and by an attempt to enlarge it by hewing towards the northwest. An opening was carved at its top, about 5.8 meters above the sediment covering the floor. In the southern wall of cavity C there is a wide passage ascending to cavity D, which is also bell-shaped (8.5 × 9 m). The original entrance, sealed long ago with large stones, is near the top, about 4.6 m above the sediment. From cavity D a low passage (0.7 × 2 m) leads eastward to cavity E. This is a bell-shaped cavity (8 × 9 m) with an oval mouth near the top, about 7.2 m above the sediment; the mouth is currently sealed by large stones. Three crosses were engraved on the walls about 3.5 m above the sediment.

Fig. 5a – Plan of complex 3 (drawing S. Ya'aran).
Fig. 5a – Pianta del complesso 3 (grafica S. Ya'aran).

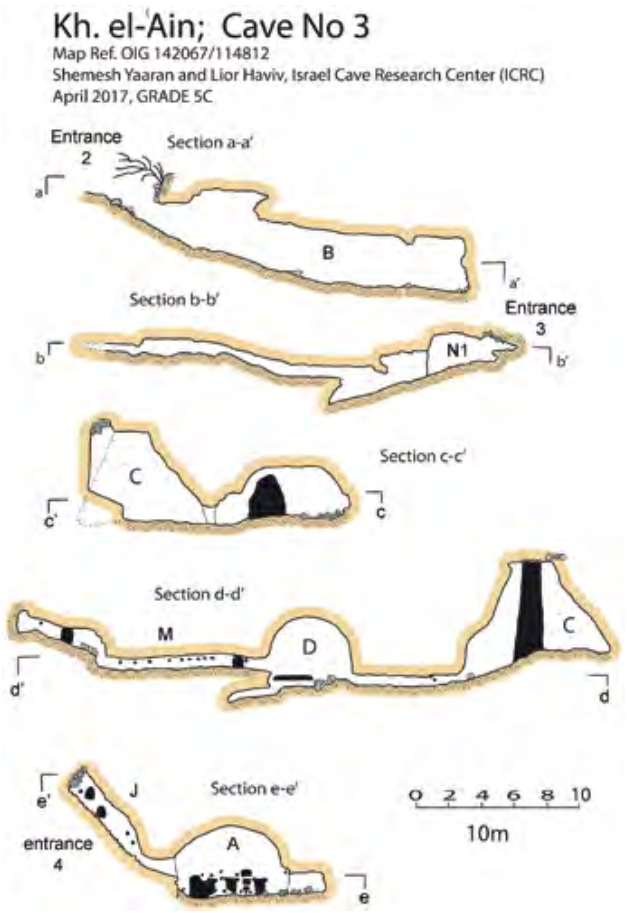

Fig. 5b – Sections of complex 3 (drawing S. Ya'aran).

Fig. 5b – Sezione del complesso 3 (grafica S. Ya'aran).

Fig. 6 – Hall A in complex 3, looking south. Notice that rock-cut wall "a," which separated two small chambers, was removed when hall A was converted into an underground olive press. Niche "b" served as a fulcrum for a lever (also known as a beam) and weight press. A beam was anchored at the fulcrum while its free end moved up and down. Stone weights attached by ropes lowered the beam, which exerted pressure on the frails of olive mash. Point "c" is an example of an original door. At point "d," stepped tunnel J cuts through the right corner. Notice the drainage channel at the bottom of tunnel J and extending along the wall of hall A. (photo B. Zissu).

Fig. 6 – Sala A del complesso 3, vista verso sud. Notare che la parete "a" scavata nella roccia, che separava due piccole camere, è stata rimossa quando la sala A è stata convertita in un frantoio per le olive. La nicchia "b" serviva per il fulcro di una leva (beam) e per il peso della pressa. La trave era ancorata al fulcro mentre la sua estremità libera poteva muoversi verticalmente. I pesi di pietra fissati alle corde abbassavano la trave che esercitava pressione sulla delicata polpa delle olive. Nel punto "c" vi è una tipica porta. Nel punto "d", il cunicolo scalinato J si inoltra nell'angolo destro: sotto l'imbocco si nota un canale di drenaggio che si estende lungo la parete della sala A (foto B. Zissu).

To sum up, this is a complex of five bell-shaped caves connected in antiquity - when they functioned as subterranean quarries - by means of horizontal passages intended to facilitate transport of the quarried material. The presence of three crosses at a significant height, engraved while cavity E was being hewn, helps us to date the creation of the cavity, and perhaps the entire complex, to the Byzantine period. Apparently, the niches for pigeons in the walls of cavity A constitute additions to the cavity, which was previously used for the extraction of chalk blocks (see discussion below).

The Large Hiding Complex (see fig. 1: site No. 3)

The large hiding complex at the center of Lower Kh. el-'Ain contains 30 interconnected rock-cut cavities (figs. 5a, 5b, 5c). The complex includes ancient cavities breached by typical hiding burrows, with small chambers in the sides of some of the burrows. After the complex fell into disuse, parts of it continued to serve various purposes. Quarries extracting chalk operated in and around the complex, damaging elements of the complex. Remains of a subterranean olive press, bell-shaped quarries, storerooms, a cavity that seems to have served as a ritual bath, and even a burial cave with three *arcosolia*, of a type common in the Late Roman and Byzantine periods, were identified in the complex. Today the complex can be entered via any of five openings. Entrance no. 1 (1.7 × 1.3 m), originally carved out of the bottom of an access corridor that eroded over time, leads southward to a rectangular hall (hall A; 9 × 18 m). Hall A used to have a meticulously dressed barrel vault ceiling (fig. 6). The present height of the hall ceiling above the sediment covering its floor is about 3.7 m. Hall A predates the hideout itself. Afterwards, when it was no longer being used as a hideout, it was converted to other uses that changed its original shape. Nevertheless, clues to its stages of use remain in its walls. Hall A, the small chambers, and the adjacent burrows and bell-shaped quarries were first documented by Macalister in his detailed plan and sections (fig. 5c), the first time such documentation was undertaken in this country (Bliss & Macalister, 1902, pl. 99). The secondary use of the hall clearly changed its original shape. Sixteen small rectangular chambers were created in its walls,

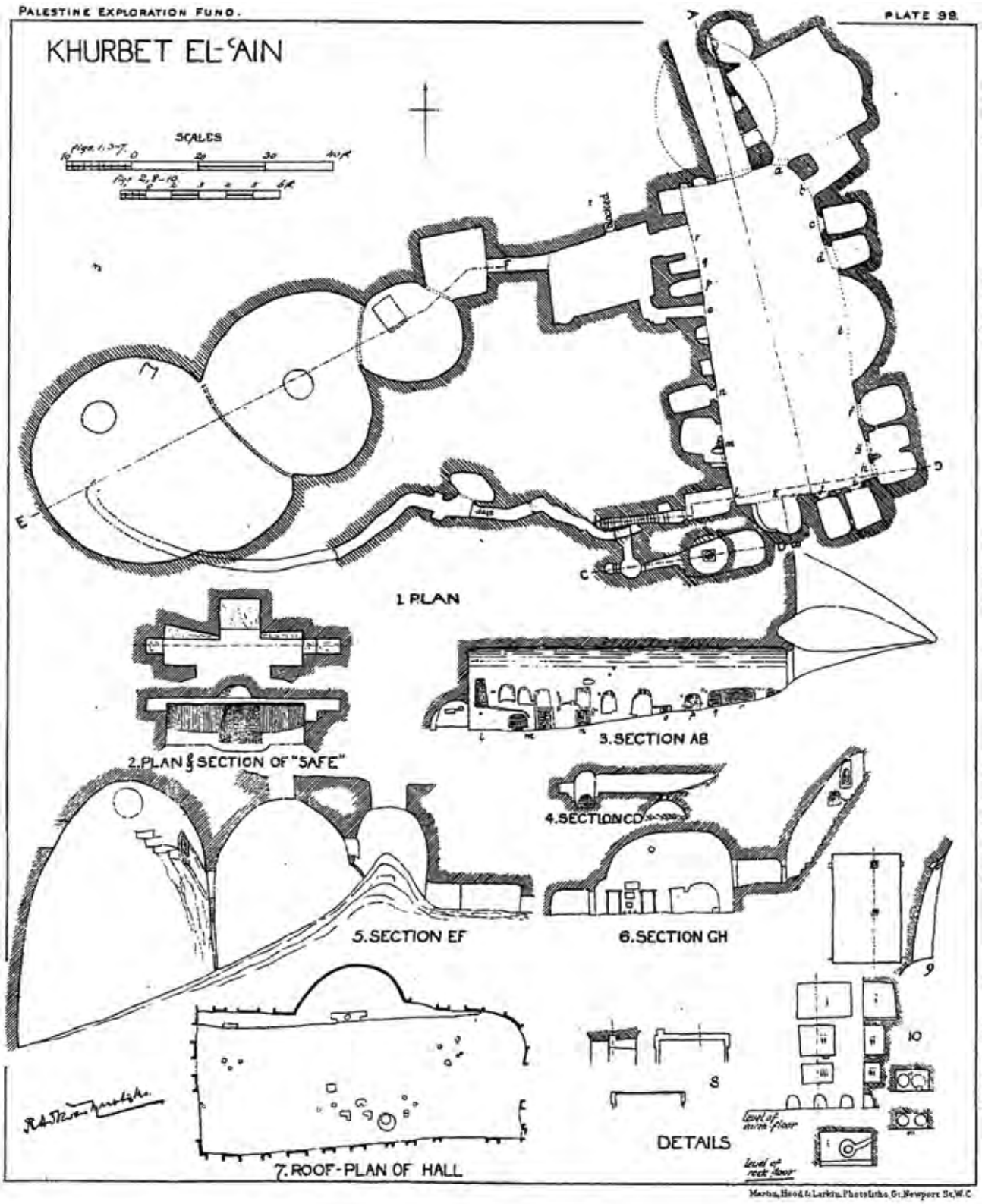

Fig. 5c – Macalister's plan and sections of hall A and adjacent cavities Q, E, and F in complex 3 (after Bliss & Macalister, 1902, pl. 99).
Fig. 5c – Pianta e sezioni della sala A e delle cavità adiacenti Q, E e F del complesso 3 (da Bliss & Macalister, 1902, pl. 99).

and the details of their design can be seen in the best-preserved chambers, located next to the southeastern corner of the hall. A typical chamber has a rectangular horizontal section with rounded corners (1.2 × 2.3 m). The entrance was a rectangular doorway (0.8 × 1.4 m) with a wooden door. The door hinges were in a wooden frame with a lintel and doorjambs, which were fixed in grooves carved around the doorway. The threshold, which was carved out of the matrix, is raised slightly above the floor of the chamber and the floor of hall A.

Fig. 9 – Two of the three openings which allow access from the southwestern corner of hall B to the typical hideout burrow (T) connecting hall B with hall H (photo B. Zissu).

Fig. 9 – Due delle tre aperture che, dall'angolo sud della sala B, consentono l'accesso al tipico cunicolo da rifugio (T) che collega la sala B con la sala H (foto B. Zissu).

Hall A contains parts of an olive press (a weight and niches carved out of the walls and ceiling for attaching the olive crusher and beams). The olive press seems to have put an end to the use of some of the small rock-cut chambers; thus, the small chambers predate the olive press. Stepped access tunnel J was carved out of the western wall of hall A, at the southwestern corner of the hall. It is 6.5 m long, 1.2–1.4 m high, and 0.8 m wide. The tunnel was apparently hewn in two different directions: from the surface downward, via a wide, fairly convenient opening, and from hall A to the spot where the two sets of workers met.

The original opening at the top of tunnel J was sealed with large stones in antiquity. A narrow, low opening carved out of the southern wall of J allows for passage westward to a long burrow (R; about 16 m long). The burrow ends at a blockage consisting of debris and sediment. Midway along, a typical small hiding chamber was carved out of its northern wall. Another low, narrow opening was created in a wall of J near the beginning of burrow R; this opening leads to subterranean storeroom S, which includes a small burrow and an elongated small chamber with a bottle-shaped silo cut out of its floor. The mouth of the silo is round and has a groove around it for attaching the closing slab. Access to storeroom S was originally via a vertical shaft from a building in the settlement. This shaft now provides access to the complex (entrance no. 4). We can hypothesize that the deliberate closure of the top of tunnel J was part of the conversion of the subterranean complex into a hideout. J was connected to R and S, and the complex was accessible via entrance no. 4. In the hiding stage a ditch was hewn next to the western wall of hall A to drain water from tunnel J; the ditch was damaged when the olive press was installed. The entrance to chamber H was carved out of the eastern wall of the access corridor to entrance no. 1; originally, its horizontal section was rectangular (2.9 × 4 m) and its ceiling was barrel vaulted and smoothed (like that of hall A). Its walls were damaged by later hewing. This chamber is currently connected to hall A via a wide passage as a result of later hewing. Marks on the walls of chamber H attest that the ground level is lower than it once was, apparently because antiquities looters removed the dirt covering the floor. Clearing away the dirt, we also uncovered entrances to a hiding burrow heading north; this is probably why Macalister did not note the entrance to burrow T in the northern corner of chamber H. This winding burrow, which leads northward, provides access to the southwestern corner of hall B (fig. 9). Two typical hiding chambers were created on the southwestern side of the burrow; the southern one breaches the wall of an ancient bottle-shaped storage cavity that was connected to chamber H by a relatively late opening (0.5 × 0.6 m). The cavity was filled with dirt containing fragments of three jars, a cooking pot, a fragment of a "round Roman" lamp, and a piece of a glass bowl from the period between the two revolts against Rome and the time of the Bar Kokhba Revolt. Hall B has its own entrance descending from the surface (entrance no. 2).

The second-largest cavity in the complex, it has an overall rectangular shape, measuring 20 m long, 7.5 m wide, and 3.2 m high. Like hall A and chamber H, hall B had a smoothed barrel vaulted ceiling. Numerous niches were carved in its walls later, changing its original shape. A low passage (1 × 1.1 m) in the western part of hall B leads to cavity C. The ceiling

Fig. 10a – Hall D, looking south. A short burrow (1) allows access to hall C. The passage to burrow M is located opposite, at a higher level (no. 2); from point (3) there is access to a small chamber hewn lower down. (photo B. Zissu).

Fig. 10a – Sala D, vista verso sud. Dal breve cunicolo (1) si accede alla sala C. L'imbocco (2) del cunicolo M è collocato di fronte, ad un livello più alto; dal punto (3) si accede ad una piccola camera scavata più in basso (foto B. Zissu).

of cavity C is straight, with rounded corners, and the cavity widens towards the bottom (its horizontal section near the bottom measures around 7.8 × 8.5 m). The original entrance to cavity C was in its western wall. Currently, the entrance corridor is 5.2 m above the cavity floor.

The workers who dug deep to create cavity C left a sort of square shaft descending the entire length of the western wall. In our opinion, the purpose of the shaft was to gain access to the side entrance so that the extracted material could be transported upward efficiently, using a tripod, pulley block, and rope. At the bottom of the northern wall of cavity C is a typical hiding burrow that advances 5 m, turns twice at right angles, and then emerges into hall D. The burrow is blocked in the typical manner, with a rectangular stone that remains in situ.

Hall D is rectangular and has a meticulously hewn convex ceiling (5.3 × 12 m; ceiling height 4.4 m; fig. 10a). Although it is better preserved than halls A and B, it, too, has been damaged and modified; for instance, some elongated troughs and a large number of rock-cut racks were added. These later installations did not conform to the original carefully shaped plan of the hall.

The original entrance to hall D was in its northern wall. An access corridor (possibly rectangular) was carved out there, with trapezoidal openings in three of its walls. Chamber K, in the eastern wall of the corridor, was damaged by the collapse of large chunks of its ceiling, after which the ceiling was deliberately blocked with large stones to keep dirt and debris from the damaged corridor out of the complex. Chamber L, in the western wall, is fairly well preserved; its entrance, which was sealed by a built wall, has survived in full. Passages leading to additional small cavities and to a burrow were carved in the chamber walls, but we have no way of knowing their original purpose or the precise order in which they were hewn.

A winding hiding burrow about 17 m long (M) emerges from the southwestern corner of hall D and leads westward. A small hiding chamber was carved out of its southwestern wall, at a lower level. Farther along the burrow the level changes, making passage difficult, and a stone (found nearby) was put in place to block passage completely (fig. 10b). Advancing westward, the burrow forks, leading to a small hiding chamber and to an uncompleted burrow. Between the blocking stone and the fork are two graffiti left by European visitors about a century ago: one consists of the letters JC and the year 1918; the other consists of just two letters: AJ. The graffiti may have been left by soldiers who visited the site towards the end of World War I. Graffiti by Australian soldiers from that period were previously found in caves in this area (e.g., Anonymous, 2014).

A low passage in the eastern wall of hall B leads to cavity G (3 × 4 m), which is rounded in shape. A small niche was carved out of the southern part of the cavity, and a shaft - which is now blocked by stones, but once reached the surface - was carved out

Fig. 10b – Burrow M, looking east: blocking stone on the floor (1), above a point (2) where the level changes, making passage difficult. Here the tunnel was slightly enlarged so that the blocking stone could fit into the slot to the left (3) (photo B. Zissu).

Fig. 10b – Cunicolo M, vista verso est: lastra di bloccaggio (1) sul pavimento sopra il punto (2) in cui vi è un dislivello che rende il passaggio difficoltoso. Qui il cunicolo è stato allargato leggermente in modo che la lastra possa inserirsi nell'incastro (3) a sinistra (foto B. Zissu).

of the northern part. A hiding burrow emerges from cavity G, heading northeast. It descends steeply and splits into two parts. At that point the burrow is impassable, but there is airflow and sound can pass, so a person standing on the other side of the blockage, in cavity P, can easily speak with someone in cavity G through the narrow gap. Cavity P is a low cavity (3 × 5 m) with another small chamber carved out of its northern part.

A typical hiding burrow emerges from the eastern part of the cavity, heading northward; it advances 8 m and then has a step down to cavity O2.

This cavity (5 × 3.5 m) has an irregular shape; it seems to have been last used as a quarry, creating the cavity cut into the hiding burrow, but the shape of the burrow remains visible in the ceiling of cavity O2. The latter also cuts through the southern part of cavity O1, a small trapezoidal cavity (2.9 × 3.5 m). In the eastern part of cavity O1 we can see the outline of a rock-cut opening, now full of sediment, that reaches the surface. Three layers of plaster remain on the walls of the cavity (a dark foundation layer containing pebbles, dark gray hydraulic plaster on top of that, and a layer of light gray hydraulic plaster on top of that).

The cavity seems to have originally been a water-related installation; the trapezoidal shape suggests that it may have been a ritual bath. It is evident from the shape of the hiding complex that the workers creating it were careful not to damage cavity O1; in contrast,

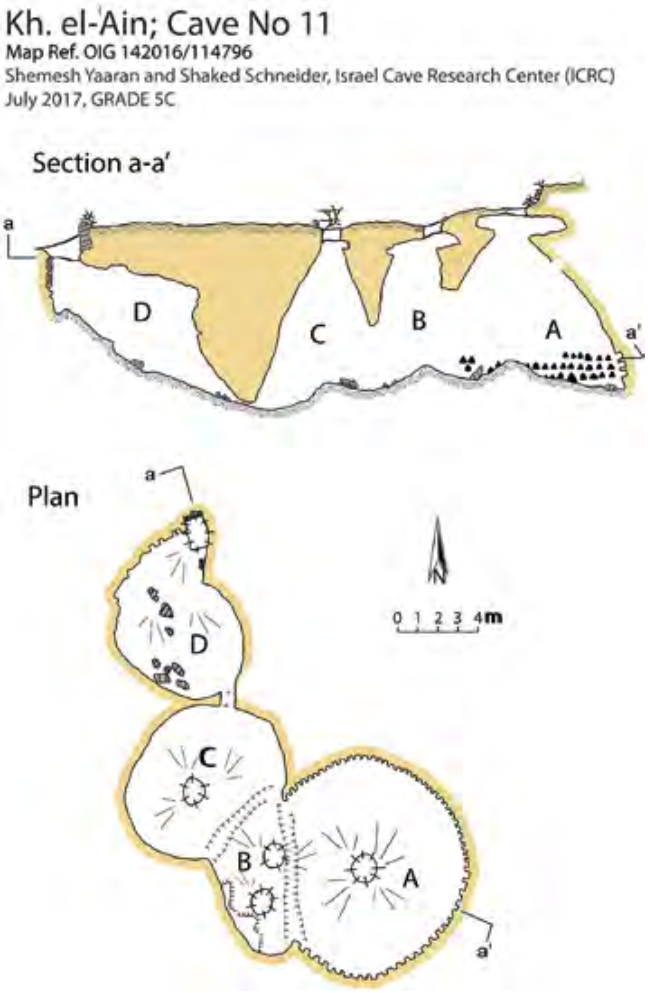

Fig. 11 – Plan and section of complex 11 (drawing S. Ya'aran).
Fig. 11 – Pianta e sezione del complesso 11 (grafica S. Ya'ran).

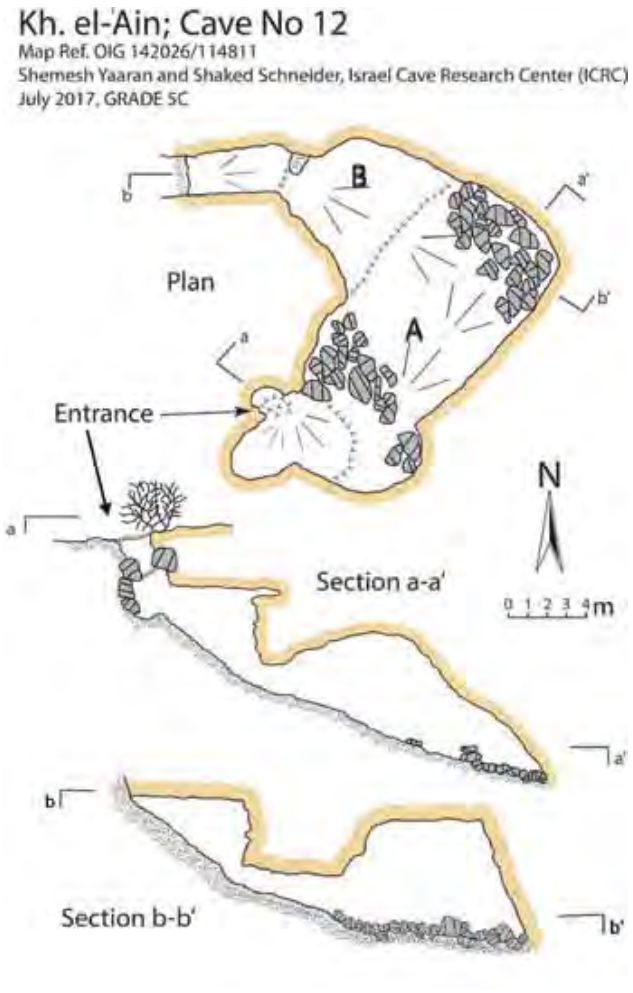

Fig. 12 – Plan and sections of complex 12 (drawing S. Ya'aran).
Fig. 12 – Pianta e sezione complesso 12 (grafica S. Ya'ran).

the workers who created cavity O2 removed the hiding burrow and damaged a wall of cavity O1.
South of cavities O1 and O2 there is a narrow passage leading to cavity N1, a rounded cavity that served as a large quarry (6 × 10.5 m).
The floor of cavity N1 is covered with a large quantity of fallen rock that creates a steep ascent leading to entrance no. 3. Northeast of the entrance is a low passage leading to cavity N2, an irregularly shaped cavity (5 × 3 m) entered from the west.
The remains of three *arcosolia* attest to its last use, apparently in the Byzantine period, as a burial cave. Another branch of the subterranean complex, west of hall A, is accessible today via burrow V and entrance no. 5.
Burrow V (about 3.5 m long) leads to chamber Q. This segment of the hiding complex is crucial to understanding the chronological order of development of the cavities in the complex. Burrow V leads westward and then turns north in order to avoid damaging niches carved out of the western wall of hall A.
We assume that all 16 of the rock-cut niches in the walls of hall A were created when the complex was used as a hideout, probably during the Bar Kokhba Revolt. It seems that when the burrows were hewn, entrance no. 1 and the original opening at the end of tunnel J were deliberately sealed. After that, hall A was accessed via tunnel R and lower part of J and burrows T and V. The rebels created a spacious cavity that could be used as a hiding complex and storeroom. In our opinion, the 16 cells were used for storage and gave people a certain degree of privacy, a personal or family storage space for equipment, food, or water in a hall that probably held a large number of people.
Chamber Q is rectangular (3.3 × 5 m). An access tunnel about 3 m long was carved out of its western wall; the numerous rocks on the tunnel floor make passage very difficult. The tunnel leads to cavity E, a rectangular cavity (3.2 × 3 m) whose southern part was damaged by a large quarry consisting of three connected bell-shaped cavities: F1, F2, and F3. The total length of the quarry is 22 m, and its maximum width is 11 m. At the top of the quarry, near the ceiling, remains of a hiding burrow that was clearly cut by the quarry are visible.

Fig. 14 – Macalister's perspective drawing of cavity 21. The crosses 1 and 4 and the graffito 3 are located very high, on the left; the cross 2 is at the bottom, on the opposite side, visible only in photo 18a (after Bliss & Macalister, 1902, pl. 97).

Fig. 14 – Schizzo in prospettiva di Macalister della cavità 21. Le croci 1 e 4 e il graffito 3 si trovano molto in alto, a sinistra; la croce 2 è in basso, sul lato opposto, visibile solo nella foto 18a (da Bliss & Macalister, 1902, pl. 97).

Bell-shaped quarries (see fig. 1: site No.11)

Several bell-shaped subterranean quarries were found at the center of the lower site, west of the Large Hiding Complex (fig. 11).

The set of quarries has a main entrance (1.2 × 1.2 m) from which one can descend with a rope to cavity A (11.2 × 9.5 m). In its walls are three rows of rock-cut dovecote's niches of varying size and shape, some arched and some triangular. A low passage full of sediment in the western wall leads to additional segments of the complex. Cavity B is a bell-shaped quarry carved out of the rock between cavities C and A. The presence of these two cavities forced the quarriers to adapt cavity B to the available volume of rock. For this reason, cavity B is irregular. The bell-shaped cavity C (8 × 8.2 m) is linked by a narrow, impassable passage to cavity D, another subterranean quarry (9.1 × 5.9 m). From cavity D, a shaft (1.7 × 2.3 m) that seems to have served originally as an entrance to the cavity ascends to the surface. The original function of cavity D is unclear due to modifications, damage, and later additions.

The Asparagus Cavity (see fig. 1: site No.12)

Two connected subterranean quarries (fig. 12) were found just south of the bell-shaped quarries. The floor of the southern one (A; 3.9 × 9 m) is covered with quarrying waste and rectangular chalk blocks that were damaged in the quarrying process and left there (fig. 13).[5] The original entrance to quarry A, located in its ceiling (diameter approximately 0.7 m), was deliberately sealed in antiquity with large stones. It was recently reopened, apparently as a result of a partial collapse of the blockage.[6]

The western quarry (B), currently connected to quarry A, is trapezoidal (3.5 × 6 m). Quarry B predates quarry A and apparently was originally a subterranean storeroom with steps (?) alongside it leading down to a rectangular entrance. One of the blocks has slits left by ropes that we believe were used to remove the blocks from the quarry via an upper shaft. The floor of the quarries is covered with dirt and quarrying waste that got in through two openings. Debris heap in quarry A came in through its present entrance. It contains dark, filtered material that slipped into the cavity through small cracks in the blockage.

Debris heap in quarry A is larger than the older debris heap in quarry B. The latter contains light-colored material that comes from crushed chalk, mostly small and medium-sized stones and large potsherds. The debris comprises of ceramic and construction waste from a structure (?) that stood over the original entrance to quarry B. Potsherds from the Byzantine and Early Islamic periods were found in the debris heap: fragments of Gaza-Ashkelon jugs, at least two sack-shaped jars, a lid, bowls, a frying-pan handle, a fragment of a roofing tile, and more. Debris heap in quarry B blocked its entrance so that it could no longer be used; it is essentially construction waste dumped into the entrance in order to seal it and make it unusable.

A subterranean quarry and dovecote (see fig. 1: site No. 21)

A rock-cut subterranean cavity with an elaborate structure (figs. 14, 15) was documented in the upper portion of Lower Kh. el-'Ain. Part of it is rectangular, a sort of shaft descending to the floor. The southern portion of the shaft was made in such a way as to widen it southward and create a bell-shaped quarry

[5] Each of the damaged blocks currently on the quarry floor has at least one worked, smoothed side. Geological flaws in these blocks are evident.

[6] We reached this conclusion by observing the directions of the collapse, the way the sediment got in, surface conditions, vegetation, and roots.

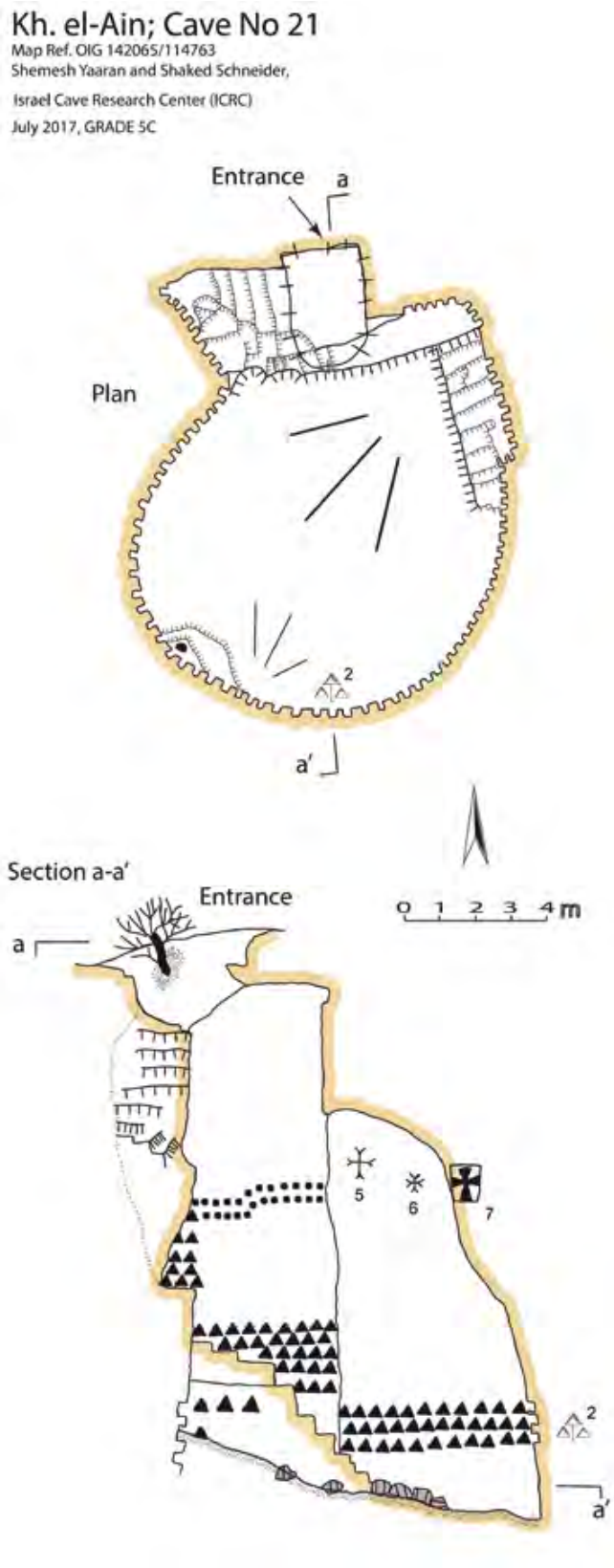

Fig. 15 – Plan and section of cavity 21. Notice the location of crosses 5, 6 and 7 shown in Fig. 18b, on the eastern wall, and cross 2, on south wall, at the bottom (drawing S. Ya'aran).

Fig. 15 – Pianta e sezione della cavità 21. Notare la posizione delle croci 5, 6, 7 visibili nella Fig. 18b, sulla parete orientale, e la croce 2, sulla parete sud, in basso (drawing S. Ya'aran).

Fig. 16 – Cavity 21, looking down to the south. The cross 2 is located at the darkest niche, in the centre, to the left of the caver (photo B. Zissu).

Fig. 16 – Cavità 21, guardando in basso, verso sud. La croce 2 si trova presso la nicchia più scura, in centro, a sinistra dello speleologo (foto B. Zissu).

Fig. 17a – Cavity 21, looking up to the north, to the entrance (photo B. Zissu).

Fig. 17a – Cavità 21, vista dell'ingresso, in alto, verso nord (foto B. Zissu).

with access steps in its northern and eastern walls (figs. 16, 17).

The cavity is about 15 m deep overall; the horizontal section of the floor measures approximately 9 × 10 m. Large crosses were engraved in a few spots on the

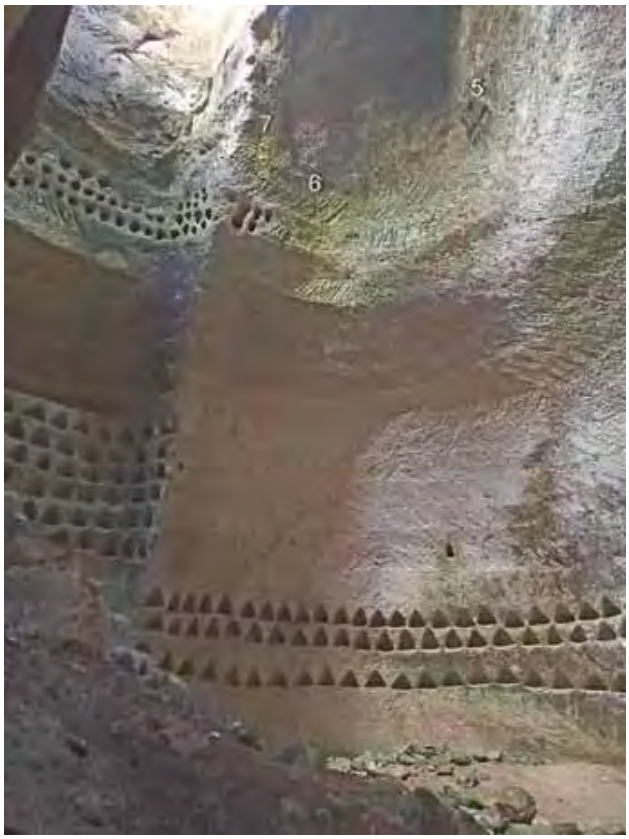

Fig. 18b – Detail of eastern wall of cavity 21, with crosses (5, 6, 7) on the upper part of the wall, accessible only during the hewing process (photo Y. Zissu).

Fig. 18b – Dettaglio della parete orientale della cavità 21, con le croci (5, 6, 7) sulla parte superiore della parete, accessibili solo nel corso del processo di incisione (foto Y. Zissu).

walls, including high up in locations accessible only during the creation of the quarry (fig. 18b, points 5, 6 and 7). Several rows of dovecote's niches were added in easily accessible (lower) places in the cavity walls. The workers who carved the niches made no effort to cover all the wall space in the cavity with as many niches as possible. The fact that at least two of the crosses were damaged by the creation of the niches (fig. 15, n. 2, bottom right) gives us important chronological information (see below). These crosses were of course observed by Macalister (fig. 14, look up to the right nn. 1, 2) gives us important chronological information (see below).

The cave was documented by Macalister in a perspective drawing of sorts, i.e., a three-dimensional view (Bliss & Macalister, 1902, pl. 97). Although Macalister did not prepare a plan or section of it, and he published only this sketch (fig. 14), he presented a few interesting details on the side: drawings of crosses adorning the walls (cross 1, 2 and 4), including two crosses damaged by the creation of niches for pigeons. The cave is mentioned by scholars of dovecotes, who emphasize that the workers who made the niches did not attribute any sanctity to the crosses. We can therefore assume that this dovecote, as well as other installations

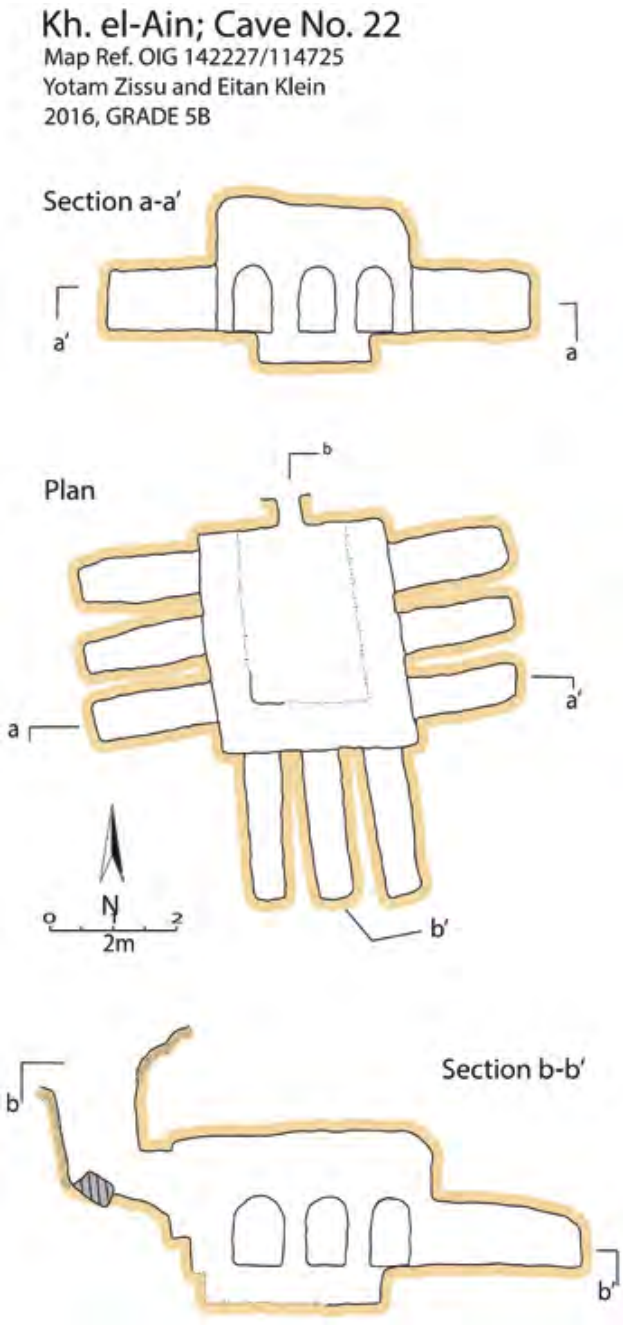

Fig. 19 – Plan and sections of tomb 23 (drawing Y. Zissu, S. Ya'aran).

Fig. 19 – Pianta e sezioni della tomba 23 (grafica Y. Zissu, S. Ya'aran).

in disused bell-shaped quarries (Byzantine-period), should be dated to the Early Islamic period (Bliss & Macalister, 1902, 188–270; Tepper, 1986, 172–181, n. 17, and bib. cit. there).

The eastern burial cave (see fig. 1: site No. 23)

A square, rock-cut tomb (2.7 × 2.7 m; cavity height 1.7 m) with loculi was found near the top of the knoll east of Lower Kh. el-'Ain (fig. 19). The entrance is a narrow

Fig. 20 – Tomb 23, looking west (photo B. Zissu).
Fig. 20 – Tomba 23, vista verso ovest (foto B. Zissu).

opening (0.4 × 0.45 m) carved out of a rock-cut wall (quite likely the remnant of a vestibule). Three loculi were installed in each of the walls other than the one with the entrance in it, for a total of nine loculi. The average length of the loculi is 1.8 m, the average width is 0.6 m, and the average ceiling height is 0.75 m. The closing slabs for the loculi were left in the centre of the cave (fig. 20). The tomb had been looted, but its architecture is typical of the first and second centuries CE.

The upper hiding complex (see fig. 1: site No. 24)

A ramified subterranean complex was found at Upper Kh. el-'Ain (fig. 21). The complex includes cavities predating the creation of the hideout (e.g., cisterns and perhaps a ritual bath), with two long burrows containing typical elements of hideouts all along their length branching out from them. The western burrow (between rooms V-XV) is about 20 m long, and it leads to a large rectangular cavity with four small chambers on its sides. The eastern burrow winds for about 30 m, at which point it is blocked by dirt. On its sides are eight small, typical hiding chambers. The burrows and chambers were meticulously hewn. Various locks and means of blocking off areas were found in the complex. Additional branches of the complex have been blocked by dirt.

At present, this ramified complex appears to be independent; we did not find the remains of any walls belonging to ancient buildings that may have stood above it, although a survey of the surface did identify rock-cut foundations, and it is likely that buildings once stood above the chambers of the complex. Various installations and shafts can be seen in the complex that probably connected it to buildings on the surface. This complex was documented by Macalister (Bliss & Macalister, 1902, pl. 98).

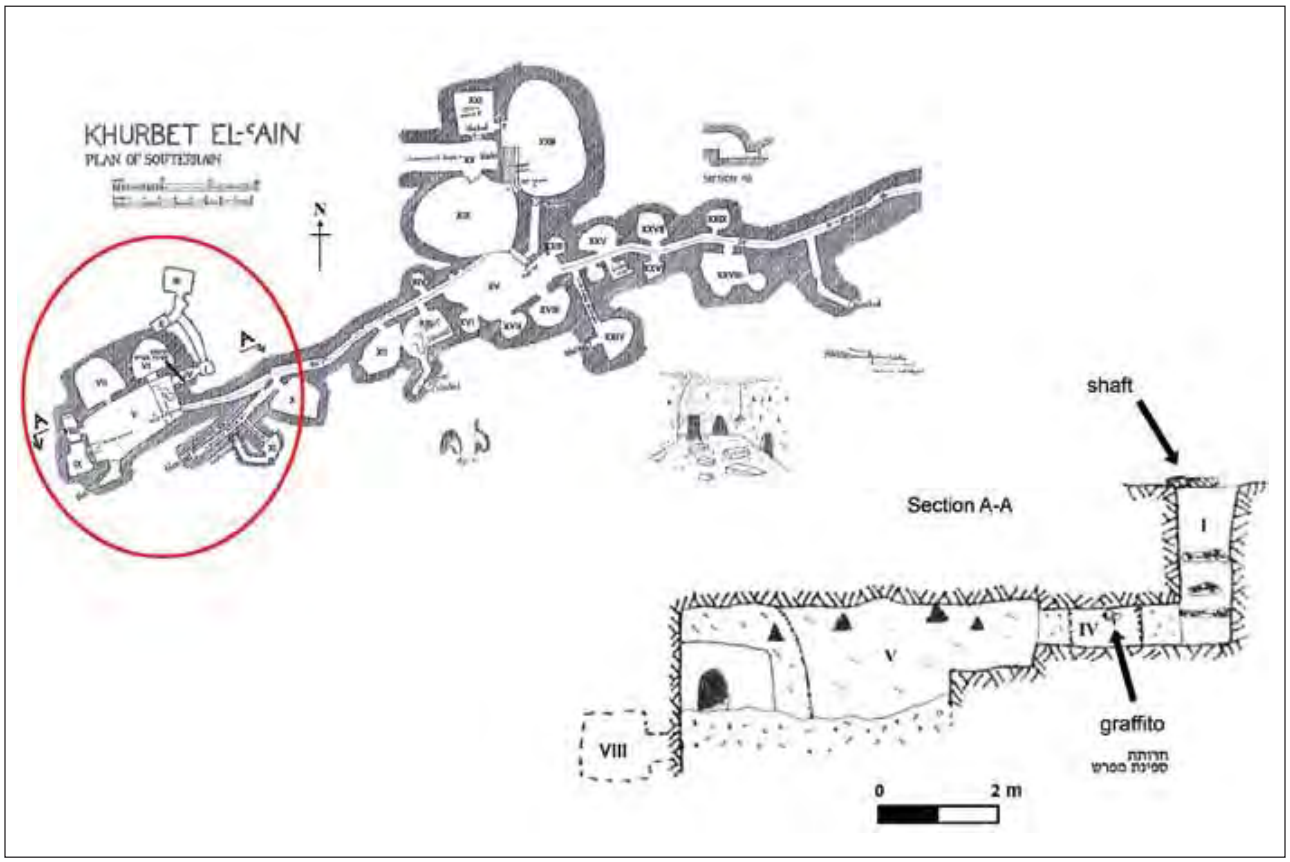

Fig. 21 – Plan and section of complex 24 (R. A. S. Macalister; additional data and section of newly discovered wing: E. Klein).
Fig. 21 – Pianta e sezione del complesso 24 (R. A. S. Macalister; dati aggiuntivi e sezione del ramo appena scoperto: E. Klein).

Fig. 22 – Complex 24: chamber V, looking northeast (photo B. Zissu).
Fig. 22 – Complesso 24: camera V, vista verso nordest (foto B. Zissu).

More recently, antiquities looters broke into another section of the complex, at a spot at the bottom of shaft I (figs. 22) that Macalister had marked as "blocked," northeast of small chamber IV. This "new" section includes a rock-cut burrow leading northward and connected to a shaft (II) that originally led to a square subterranean storeroom (III). The shaft and storeroom functioned as an independent unit attached to the hiding complex. Various artifacts were found in the small chamber: potsherds (fragments of three storage jars, two cooking pots, and a jug), a piece of a knife-pared lamp, and fragments of chalk vessels, a measuring cup, a bowl made on a lathe, and a knife-pared chalk basin/bathtub from the first and second centuries CE.

While exploring sections I, II, and III, Israel Antiquities Authority inspector Alon Klein discovered a graffito overlooked by previous scholars (figs. 23a, b). The graffito, on the southern wall of cavity IV, includes a schematic sailboat and an indecipherable Hebrew/Aramaic inscription—probably a name (Klein & Zissu, 2017).

Fig. 23a – Complex 24. Graffito of sailboat and Hebrew/Aramaic inscription on the southern wall of chamber IV (ph. B. Zissu).
Fig. 23a – Complesso 24. Graffito di un veliero e iscrizione ebraica/aramaica sulla parete meridionale di camera IV (foto B. Zissu).

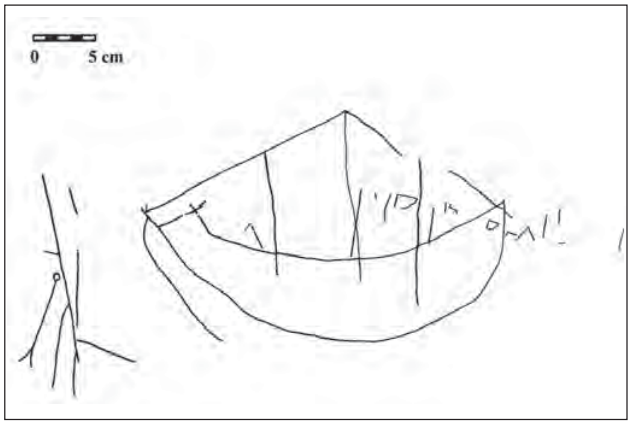

Fig. 23b – Reproduction of the graffito in photo 23a (drawing B. Zissu).
Fig. 23b – Riproduzione del graffito nella foto 23a (grafica B. Zissu).

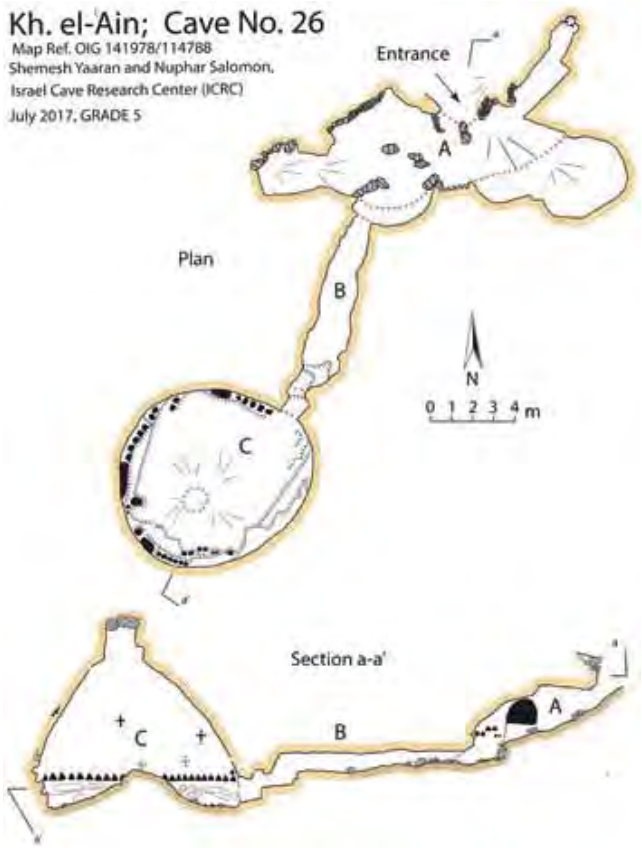

Fig. 24 – Plan and section of complex 26 (drawing S. Ya'aran).

Fig. 24 – Pianta e sezione del complesso 26 (dis. S. Ya'aran).

The Artisan's Cavity (see fig. 1: site No. 26)

West of the bell-shaped quarries is a series of subterranean cavities (A; fig. 24) entered via an opening (1.4 × 2.5 m); the original purpose and order of development of the cavities cannot be determined due to erosion and further hewing. The cavities have supporting walls, carved racks, and one wall with niches for pigeons at three levels.

Access tunnel B (total length 10 m, width 0.8 m at the northern end and 2 m further on, height at the beginning 0.5 m) emerges from these cavities. The tunnel is connected to the bell-shaped cavity C (horizontal section measuring 8.3 × 9.5 m, height 9 m; fig. 25). The upper (original) entrance to the cavity was deliberately sealed. Among the stones sealing the entrance is a large fragment of a column (made of marble?). Crosses are engraved on the walls of the cavity at two levels. The upper crosses are tall and erect, whereas the lower ones are dwarfish and carelessly executed.

In a second cavity there are two kinds of sediment: light chalk from quarrying activity covering the cavity floor, and dark brown, filtered material on top of it that spilled into the cavity from the blocked entrance above.

The access tunnel to the bell-shaped cavity was carved out in a secondary stage; the rock-cut stairs in it indicate that the height of the tunnel was changed so that it would meet the floor of the bell at its present location.

Fig. 25 – Quarry C, looking east. Notice the rock-cut step and opening of the tunnel connecting rooms B and C in complex 26 (photo B. Zissu).

Fig. 25 – Cava C, vista verso est. Notare il gradino scavato nella roccia e l'imbocco del cunicolo che connette i vani B e C del complesso 26 (foto B. Zissu).

Arched or triangular niches for pigeons are arranged in the cavity on three levels; the uppermost one encircles the bell with a long, uniform line of niches. Beneath the niches there are stepped channels and other marks created in the bedrock by quarrying. Additional niches and troughs were hewn meticulously above these channels.

One of the channels in the eastern wall of the bell-shaped cavity created a large step 6.4 m long and 1.3 m wide (fig. 25). This step was left by the quarriers, who discovered a crack in it that would interfere with the extraction of the rock. The workers who made the dovecote put only three niches in the step, apparently due to the nature of the rock. Some letters (?) were engraved on the step in a thin, hard-to-read line; very likely they are part of an Arabic (?) graffito.

The western burial cavity (see fig. 1: site No. 27)

A rock-cut burial complex containing a courtyard, a cistern, a vestibule, a burial chamber, and another small chamber was found on the slope between Upper Kh. el-'Ain and Lower Kh. el-'Ain (fig. 26). The complex was broken into by antiquities looters in the mid-1990s, and a subsequent salvage excavation found few artifacts from the first and second centuries CE (Zissu, 2005).

To reach the rectangular courtyard, one would walk down rock-cut stairs covering its entire width. Most of the courtyard was covered in dirt. A bell-shaped pit with steps in its wall was carved out of the southern wall of the courtyard. The pit, which measures about 6 m in diameter and is 7.5 m deep, was used as a chalk quarry when the burial complex was no longer in use. An opening 1.6 m wide (and apparently arched) was

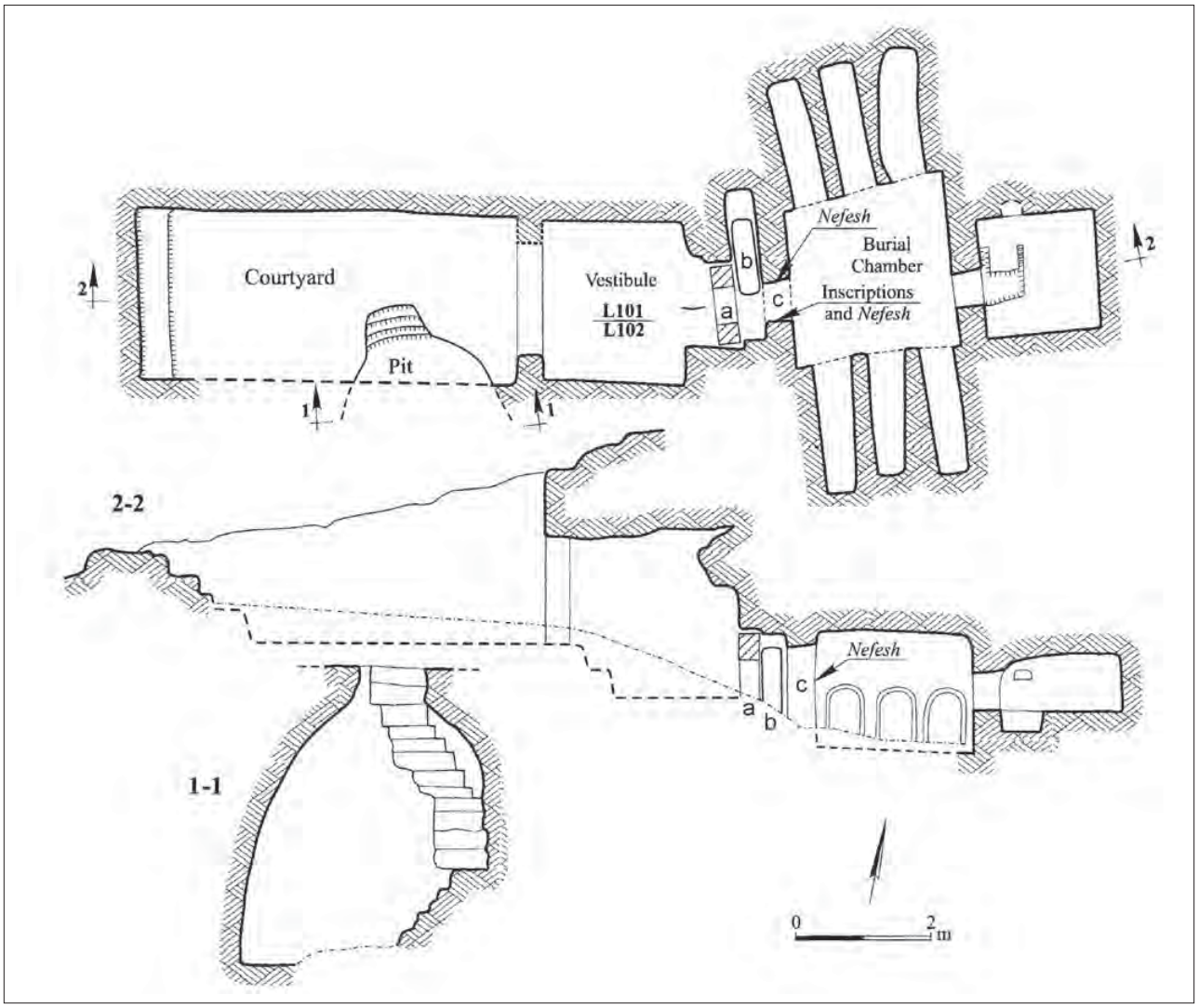

Fig. 26 – Plan and section of burial complex 27 and adjacent bell-shaped pit (after Zissu, 2005).

Fig. 26 – Pianta e sezione del complesso sepolcrale 27 e dell'adiacente pozzo a campana (da Zissu, 2005).

carved out of the eastern wall of the courtyard. This opening led to a square vestibule. The entrance to the burial chamber, located in the eastern wall of this vestibule, was partly hewn and partly built, and it consisted of several pieces:

a) a dressed limestone slab 0.35 m thick had an arched opening carved in its center leading into the burial chamber. The slab was stuck into a matching rectangular groove in the rock with an arch carved above it;

b) a round rolling stone made of limestone (0.55 m in diameter) moved within a track cut out of the floor;

c) the inner section of the opening cut in the soft chalk was rectangular. The jambs, delicately smoothed with a broad chisel, were decorated with a long inscription in Greek letters and two tomb markers, discussed below. From inside the slab a small rectangular opening was carved out of the chalk (fig. 27). The burial chamber is trapezoidal and has six rock-cut loculi in its northern and southern walls, three in each wall. The loculi have barrel vaults and were sealed with chalk slabs. An entrance to a small chamber was carved

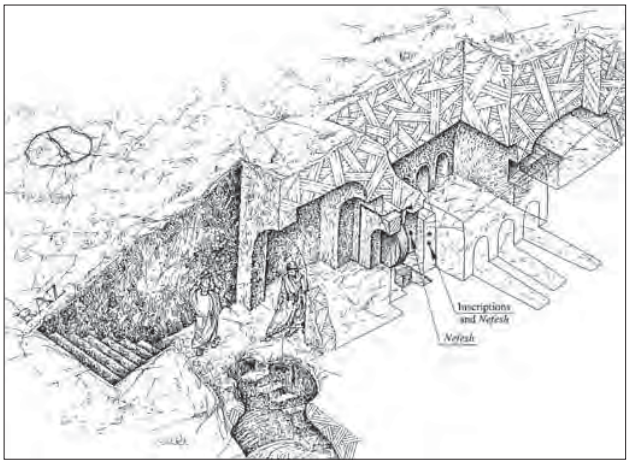

Fig. 27 – Reconstruction of burial complex 27 by Raz Niculescu (after Zissu, 2005).

Fig. 27 – Ricostruzione del complesso sepolcrale 27 realizzata da Raz Niculescu (da Zissu, 2005).

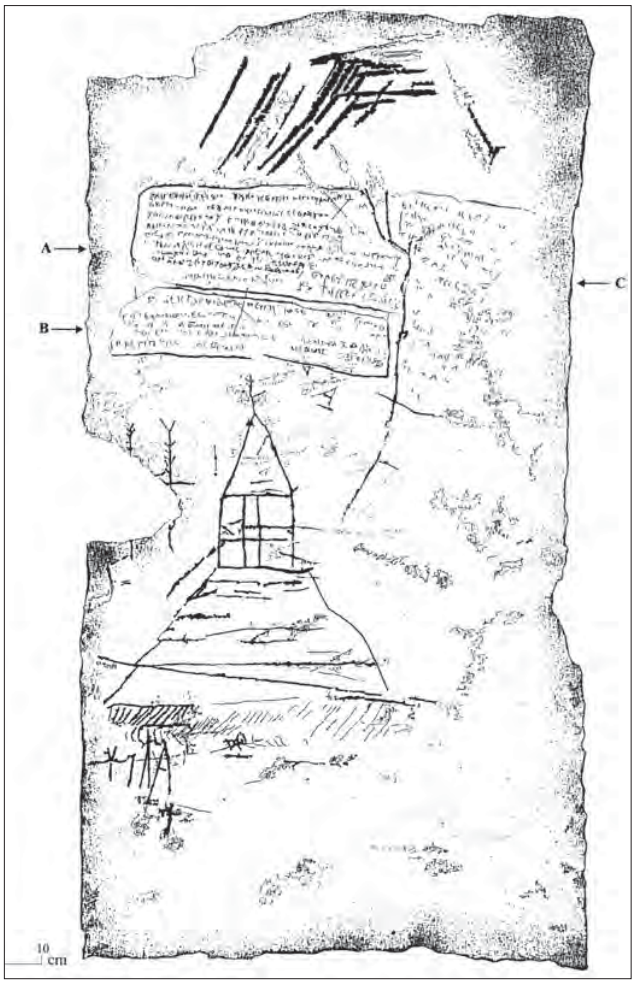

Fig. 28 – Complex 27. Reproduction of the southern jamb of the entrance, showing Greek inscription and pyramidal structure (drawing by Haim Kaptsits; after Zissu, 2005).

Fig. 28 – Complesso 27. Riproduzione dello stipite meridionale dell'ingresso, con iscrizione greca e struttura piramidale (grafica Haim Kaptsits; in Zissu, 2005).

out of the eastern wall, across from the entrance to the *loculus* chamber, but was never completed. A few ossuary fragments were found on the chamber floor. Engraved on the southern jamb of the entrance is a 32-line Greek inscription, arranged in three frames (fig. 28). Some X's were incised over the inscription in antiquity, apparently as a way of blotting out the inscription. The inscription has been examined by experts in Israel and abroad, but unfortunately it has not been deciphered. It may have served a magical function; the formula and exact meaning are difficult to understand. Greek and Aramaic abecedaria, as well as obscure inscriptions, are known from Roman-period burial caves in Jerusalem and Judea (Zissu, 2005). At the bottom of the jamb, underneath the inscription, a pyramidal structure was incised. The base of the structure is shaped like a trimmed, stepped trapezoid with numerous diagonal lines drawn close together at the bottom. Above the trapezoid is a square with two vertical lines crossed by two horizontal lines. Above the square is a triangle, with a palm frond or branch with schematic leaves at its vertex. Two more branches are engraved on the left, detached from the structure. The incision is apparently a depiction of a *nefesh*, a tomb marker or burial monument of a kind known from Hellenistic- and Roman-period funerary art and architecture. Another *nefesh* is engraved in thin lines on the northern entrance jamb. This one has a rectangular base and a gabled roof filled with a net pattern and having jutting corners. Presumably, these depictions of *nefashot* were inspired by actual burial monuments in Jerusalem, Judea, and elsewhere in the Mediterranean Basin (Triebel, 2004).

Discussion and conclusions: Rock-cut cavities at Kh. el-'Ain

The built structures at the Kh. el-'Ain sites are not visible on the surface or in sections left by looters. Without excavating, we could not have said anything about their layout, chronology or function. The rock-cut cavities at both Kh. el-'Ain sites are fairly well preserved, however. An architectural and typological analysis of the artificial cavities carved out underneath these areas enables us to reconstruct, albeit partially, a picture of settlement at the two sites throughout the Hellenistic, Roman, Byzantine, and Early Islamic periods, times from which few potsherds were found on the surface (see above). A few of the rock-cut cavities were apparently created in the Hellenistic period, based on typological features that have parallels in the city of Maresha, destroyed around 108 BCE (Kloner & Zissu, 2013). These include the three rooms (XIX, XXI, and XXII) that are entered from corridor XX in the subterranean complex No. 24 at Upper Kh. el-'Ain, and perhaps also halls A and D in the subterranean complex No. 3 at Lower Kh. el-'Ain. When these and other cavities were incorporated in typical hiding complexes, they could no longer be used for their original purpose. In general, the earliest hiding complexes known today in Judea are dated to the second half of the first century BCE or the early first century CE (Zissu & Ganor, 2009; Farhi & Melamed, 2014). The hiding complexes reached their peak of sophistication and their widest geographical distribution during the Bar Kokhba Revolt (Kloner and Tepper 1987; Kloner & Zissu, 2009; Kloner & Zissu, 2016). The few artifacts we found in the hiding complexes at Kh. el-'Ain and described above fit in with this chronology. The residents of the two sites during the relevant periods were buried in rock-cut tombs with *loculi*. Next to the Upper Kh. el-'Ain site there is one tomb with *loculi* (Zissu, 2005); two such tombs have been documented next to the Lower Kh. el-'Ain site. *Loculi* are a common characteristic of rock-cut tombs in Israel and the vicinity from the Hasmonean period (c. 2nd century BCE) to the second century CE, i.e., in the Hellenistic and Roman periods. Loculi were especially convenient for the two-stage burial method used by Jews in the late Second Temple period: First the deceased was placed in a loculus, and after the soft tissues decayed the bones

could be gathered and moved to the place designated for secondary burial. Secondary burials of individuals and groups (i.e., several generations of family members) have been found in rock-cut niches or ossuaries (Rahmani, 1994; Kloner & Zissu, 2007). Ossuary fragments were found in the western burial cave but not in the eastern burial cave or in cave 17 next to the lower site. It should be stressed that the vast majority of the cavities that we surveyed at Lower Kh. el-'Ain are bell-shaped subterranean quarries. These quarries were intended primarily for extracting rectangular blocks of chalk for use as construction material. One byproduct of the quarrying was crushed chalk, used in the cement industry. After the quarrying had been completed, a subterranean cavity remained that could be used for various purposes. A "bell shaped cavity" was made by first hewing a shaft with a relatively small diameter (about 1 m) through the hard *nari* (limestone) crust. When they reached chalk, the quarriers started widening the shaft, moving downward in a circular fashion to produce a largely symmetrical cavity. The result was the characteristic bell shape. In some of the cavities the bell shape was lost because the workers had to change direction due to cracks, fear of collapse, and/or the discovery of preexisting cavities. Sometimes adjacent bells were linked to make it easier to transport the quarried material (Ben-Arieh, 1962; Zissu & Kloner, 2014). Near the bottom of some of the bell cavities there are rock-cut niches of various sizes and rock-cut racks and hooks for hanging or tying up animals. These devices constitute evidence of later uses, as corrals, dovecotes, or residences, or for water storage or agricultural activity. Dating the quarrying operations was difficult due to the paucity of references in the written sources and the almost complete absence of finds from the period when the quarries were created and used (Zissu & Kloner, 2014). Overall, the data indicate that bell-shaped quarries generally date from sometime later than the Roman period. The bell-shaped cavities cut through, damaged, or are otherwise clearly later than subterranean installations created and used by the local population before the Bar Kokhba Revolt, such as hiding complexes, burial caves, and agricultural installations. In the lower hiding complex, for example, a set of three medium-sized bell-shaped cavities damaged the eastern section of the hiding complex. In the upper section, parts of a typical hiding burrow and installations predating the bell-shaped cavities are still visible. A small flared cavity was carved out of a rainwater-drainage pit (ritual bath?) in the courtyard of the western burial cave. It is clear that the bell-shaped quarries are from a time when the burial caves were no longer in use. In the Serin Complex and at other sites in the region, such as Luzit, graffiti at a significant height showing crosses and sometimes inscriptions in Arabic and Greek support the dating of the quarries to the Byzantine and Early Islamic periods (Ben-Arieh, 1959; Ben-Arieh, 1960; Zissu & Kloner 2014). Dovecote's niches were created in some of the bell-shaped cavities at Lower Kh. el-'Ain (for details, see Appendix A).

Dozens of rock-cut or underground dovecotes are known in the vicinity of Maresha and Beth Guvrin. Scholars now agree that the dovecotes in the Judean Foothills were used to raise pigeons for food, fertilizer, and perhaps also cultic purposes from the Hellenistic period until the Early Islamic period (Tepper, 1986; Zissu, 1995; Tepper, 2007; Hirschfeld & Tepper, 2006). Some of the cavities at Hellenistic Maresha were created as dovecotes (Tepper, 1986), whereas at Lower Kh. el-'Ain and many sites in the Judean Foothills the dovecotes are later additions to disused quarries or other types of underground chambers (Tepper, 1986). In cavity 21 at Lower Kh. El-'Ain, for instance, crosses incised in the walls and a cross partially obliterated by the carving of niches for pigeons indicate that the workers carving the niches did not ascribe special sanctity to crosses. Thus this dovecote, like others in the Judean Foothills that were created in disused bell-shaped quarries, is dated to the Early Islamic period.

In view of the information presented above, it seems that a settlement existed at Kh. el-'Ain from the Hellenistic period until the Early Islamic period and was part of the rural hinterland of Maresha. In the Early Roman period (and until the Bar Kokhba Revolt) the site was populated by Jews, as attested by characteristic "ethnic finds": stone vessels (see fig. 23 above), ossuaries, one or more ritual baths, and ramified underground hiding complexes (Reich, 2013; Eshel & Zissu, 2019). From the results of the survey, there is no way to know the dynamics at the sites following the Bar Kokhba Revolt: Were the sites resettled by new settlers immediately after the destruction or only after a certain period of abandonment? Crosses engraved in the walls of a few of the cavities, including in a dovecote, indicate that Christians lived in the area in the Byzantine period. The typology of the quarries, and the niches for pigeons that clearly obliterate crosses attest to activity in the Early Islamic period. The absence of finds from later periods implies that the site was abandoned after the Early Islamic period. We still have the question of the nature of the two sites. Based on their location and dimensions, together with the distribution of the rock-cut or undeground cavities, we propose that Upper Kh. el-'Ain was an estate or farm. In contrast, Lower Kh. el-'Ain was built at the bottom of the slope in an inferior spot. Its location was determined by proximity to the nearby water source that gave the site its name, the agricultural fields in the valley between the site and adjacent H. Tabaq and Tel Goded (on the way to Beth Guvrin), and proximity to the ancient road leading from the coastal plain to Jerusalem via Beth Guvrin. Perhaps the rise of neighboring Beth Guvrin, which received the status of a Roman city in 199/200 CE (Urman, 1988), the capture of the spring water that flowed at the foot of the site, and the transport of the water along an aqueduct to Beth Guvrin beginning in the third century CE caused the decline of the settlement at Kh. el-'Ain. According to this scenario, the activity in the Byzantine and Early Islamic periods had to do with quarrying the high-quality chalk rather than actual settlement. We hope archaeological excavations will be able to answer these questions.

Appendix A

No	Coordinates (Israeli Cassini-Soldner)	Elev. a.s.l.	Type	Brief description
1	141874/114856	299 m	Rock-cut cavity	An opening measuring 0.7 × 2.2 m leads to an irregular rock-cut cavity measuring 5.3 × 3.9 m. The purpose of the cavity is not clear.
2	141966/144858 Serin Cave	303 m	Sub. quarry and dovecote	See detailed description in the paper.
3	Large Hiding Complex	311 m	Ramified hiding complex	See detailed description in the paper.
4	142136/114811	318 m	Rock-cut cavity	A fairly wide opening (1.8 × 7.3 m) leads to an irregular subterranean space (7 m long and of varying width) with a built terrace in the front.
5	142143/114815	314 m	Subterranean quarry	Two connected, bell-shaped rock-cut cavities. To enter, one currently passes through a large opening (5 × 5 m) and then descends (with a rope) about 4.6 m to the floor of the bell-shaped cavity (7 × 7 m). A low passage carved out of its southern wall leads to a rectangular rock-cut chamber (6.2 × 3.9 m).
6	142169/114812	316 m	Subterranean quarry (?)	A spacious cavity, probably a subterranean quarry damaged by collapse. It is now possible to pass through an opening measuring 1.6 × 6.8 m into an elongated cavity (at least 16 m long) covered with a large quantity of sediment.
7	142202/114803	319 m	Subterranean quarry	A narrow opening (0.6 × 1.2 m) covered by the roots of a large oak tree leads to a trapezoidal, rock-cut subterranean cavity (6.8 × 5.8 m). A buildup of calcareous sediment on its eastern wall may attest to the flow of water in the past. We cannot rule out the possibility that the cavity was a water-related installation.
8	142315/114823	322 m	Rock-cut cavity	An irregularly shaped rock-cut cavity. An opening measuring 0.5 × 1.7 m leads to an elongated cavity (6.7 × 4.4 m). A wall built of field stones is in the opening. Remains of charcoal in the cavity may attest to its most recent use for charcoal production.
9	142306/114752	326 m	Subterranean quarry	A bell-shaped quarry reached by passing through a round opening (1 m in diameter) and then descending into the quarry. The horizontal section is an oval (6 × 5.9 m). The total depth of the cavity to the sediment covering its floor is 5.4 m.
10	142016/114778	315 m	Subterranean quarry	A partially collapsed rock-cut subterranean cavity, at least 5.2 m long. To enter, one currently passes through an opening measuring 2.5 × 5.2 m and then descends. Near the bottom are several dovecote's niches.
11	142016/114796 bell-shaped quarries	312 m	Sub. quarry and dovecote	See detailed description in the paper.
12	142026/114811 Asparagus Cave	311 m	Subterranean quarry	See detailed description in the paper.
13	141967/114796	309 m	Hiding complex (?)	Five small cavities blocked by sediment are accessible via a central cavity (4x7 m) whose ceiling has collapsed. The section of one of the small cavities resembles a hiding burrow.
14	141947/114791	310 m	Water-related installation	An oval cavity (horizontal section 4.1 × 7.1; depth 4.2 m) reached by walking down a staircase carved in its wall. Light-colored hydraulic plaster remains on its walls, indicating that it was used as a water-related installation.

No	Coordinates (Israeli Cassini-Soldner)	Elev. a.s.l.	Type	Brief description
15	141918/114778	311 m	Water-related installation	An opening (1.2 × 1.2 m) was carved out of the top of a small, bell-shaped cavity that is currently 3.8 m deep. Its walls were plastered. In several spots dovecote's niches from an earlier use of the pit are visible. These niches were filled with rocks and mud and coated with hydraulic plaster in the water-storage stage.
16	141898/114784	306 m	Subterranean quarry	A wide opening caused by a collapse (2.2 × 5.5 m) leads to a subterranean quarry (7.4 × 7.8 m) with a bell-shaped section. The original mouth of the quarry is visible at the top, and a few dovecote's niches remain in its walls. East of the bell-shaped cavity is a depression caused by the collapse of a large cavity—probably another quarry.
17	142002/114724	322 m	Burial cavity	An opening leads southwest into a wide subterranean cavity with a square burial room (2.8 × 2.8 m) carved out of the wall. The cavity contains three loculi (each about 2 m long). Around the mouth of each loculus (0.5 × 0.7 m) is a frame for a closing slab. The cavity was looted in the past and no artifacts remain.
18	142066/114728	328 m	Subterranean quarry and dovecote	Two dovecote installations linked by a rock-cut subterranean passage. To reach to the southern cavity, one descends by rope from a rectangular opening (1.8 × 0.9 m) carved out of its ceiling. The cavity is oval-shaped (6.7 × 4.8 m) and has dovecote's niches in its walls, arranged in seven horizontal rows. A passage carved out of the northern wall leads to the northern cavity, although there is currently so much sediment in the passage that it is impassable. The section of the cavity is bell-shaped (3.4 × 3.5 m) and there are niches for pigeons in its walls arranged in at least six rows. The floor of the cavity is covered with dirt and debris.
19	142021/114773	317 m	Subterranean quarry and dovecote	A bell-shaped cavity with a few niches for pigeons in its walls. It is covered with a great deal of sediment and vegetation. One enters through a side entrance covered in vegetation. The original entrance, which was sealed long ago with stones, is visible at the top of the cavity.
20	142078/114739	328 m	Subterranean quarry	One enters through a wide opening (3.7 × 4.1 m) and then descends with a rope into a large bell-shaped cavity that served as a subterranean quarry. In its walls are channels created by quarrying; rope grooves can be seen around the entrance from the removal of the chalk blocks.
21	142065/114763	322 m	Sub. quarry and dovecote	See detailed description in the paper.
22	142218/114756	321 m	Subterranean quarry	A stepped corridor (1.3 × 7.8 m) leads to a subterranean bell-shaped cavity with several niches of various sizes carved in its walls.
23	142227/114725 eastern burial cavity	328 m	Burial cavity	See detailed description in the paper.
24	141981/114521 upper hiding complex	327 m	Hiding complex	See detailed description in the paper.
25	141916/114499	324 m	Rock-cut cavity	An irregular opening (0.6 × 2.1 m) leads into a subterranean cavity (6.3 × 4 m).
26	141978/114788 Artisan's Cave	313 m	Sub. quarry and dovecote	See detailed description in the paper.
27	142021/11462 western burial cavity	329 m	Burial cavity	See detailed description in the paper.

No	Coordinates (Israeli Cassini-Soldner)	Elev. a.s.l.	Type	Brief description
28	142018/114524	319 m	Rock-cut cavity	A rock-cut cavity covered with a mastic tree. From the entrance (4 × 3.5 m) one can descend about 3.5 m to the floor of the facility, which is covered with dirt and rock (horizontal section: 3.5 × 5.14 m).
29	141951/114459	328 m	Rock-cut cavity	A deep, wide pit resulting from a collapse. One can descend from the main entrance (12.3 × 7.5 m) to the sloped floor (9.3 × 6.7 m), which reaches a depth of 6.7 m.
30	141720/114687	291 m	Rock-cut cavity	The cavity is located next to the ancient road at the foot of the site. An opening (0.8 × 3.2 m) leads to an irregular cavity (5.5 × 5.6 m) with a gaping natural opening in its ceiling.

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