

RAMLA, THE POOL OF THE ARCHES: NEW EVIDENCE FOR THE WATER INLET INTO THE POOL

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INTRODUCTION

The Pool of the Arches is situated about 800 m northeast of Ramla (Fig. 1), on the road between Yafo and Jerusalem. It has been studied architecturally and historically, but was never tested archaeologically. In 2009, a deterioration in the physical condition of the pool led to large-scale conservation works by the Conservation Department of the Israel Antiquities Authority (IAA), thus affording a rare opportunity for an archaeological examination. Two areas were opened (Plans 1, 2): one, in the northwestern corner of the floor of the pool (Area A), and another, half square, at roof level, outside the pool's northwestern corner (Area B). Two main questions preoccupied the scholars: how did the water enter the pool? and, why was it built in this part of the city and not in its center?

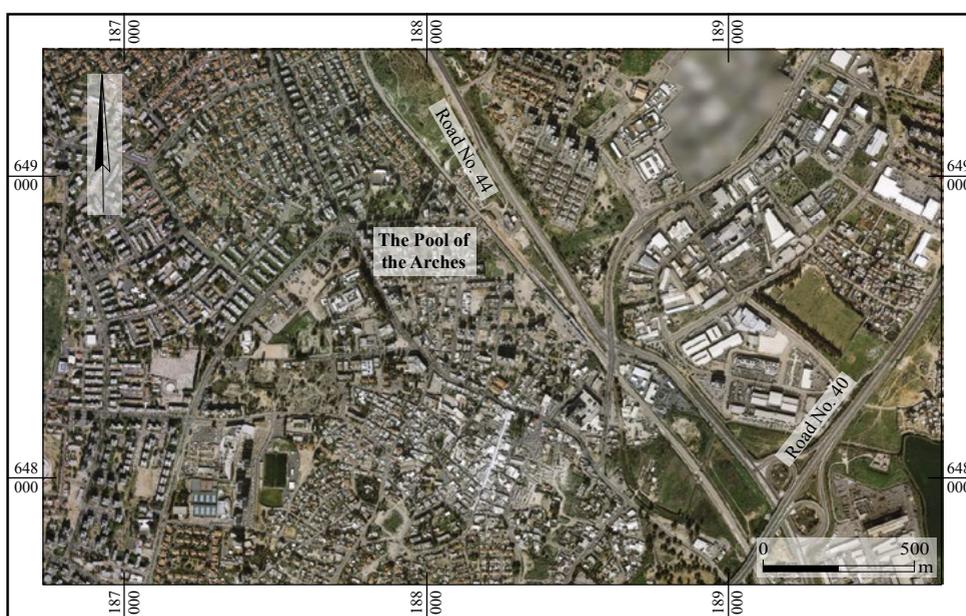
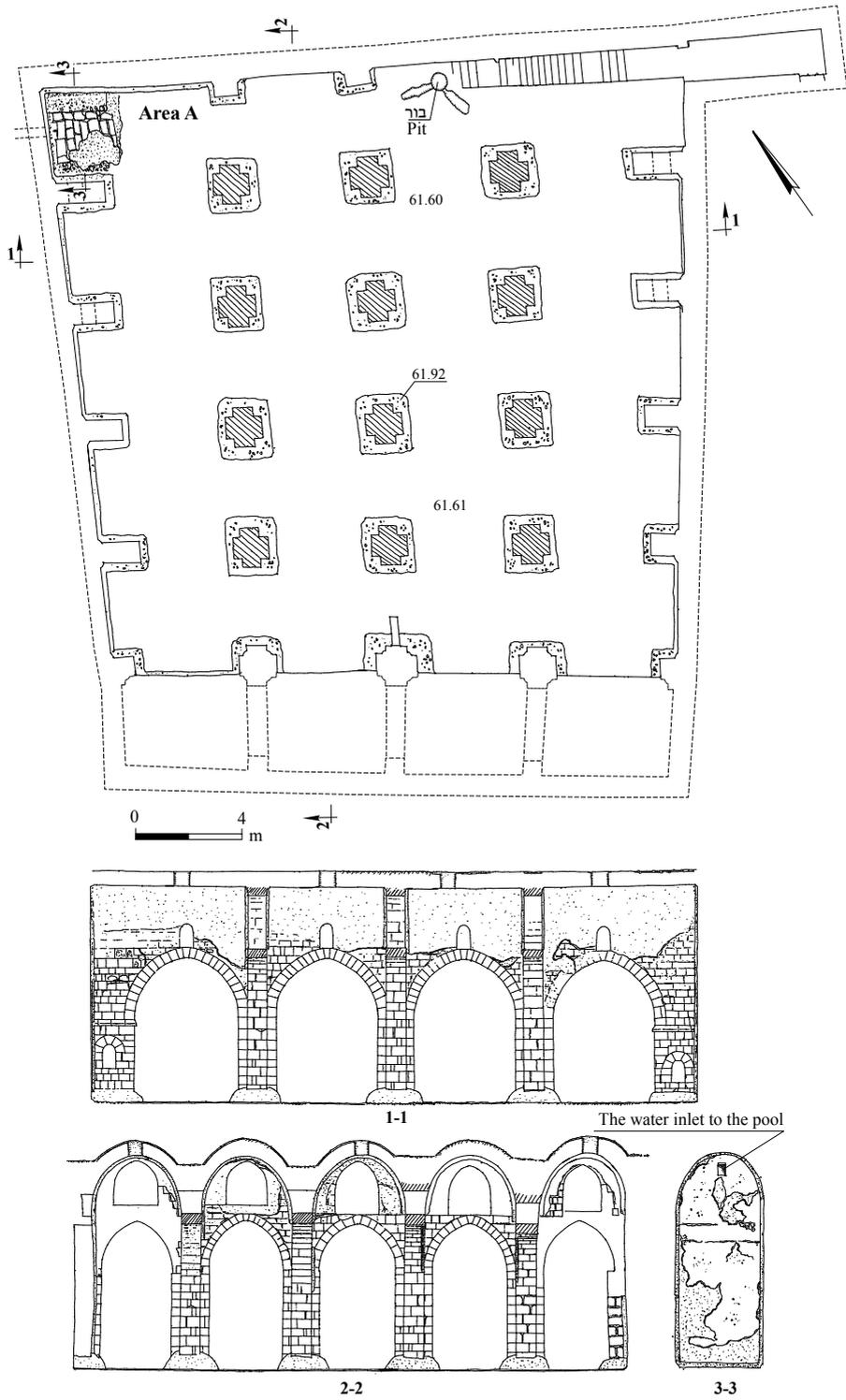


Fig. 1. Aerial photograph of Ramla with the location of the Pool of the Arches.



Plan 1. The Pool of the Arches and the probe in Area A, plan and sections.

Since 1961, when the pool was opened to the public, an almost constant leak of water was visible through the concrete wall that was built by the Mandatory Antiquities Department (see below). Some scholars thought that this indicated the existence of a nearby spring, serving as the reason for the construction of the pool far away from the city center. However, in a visit to the site prior to the excavation, Katia Cytryn-Silverman suggested that the water entered the pool through a square opening, still visible on top of the northwestern vault (Fig. 2; Plan 1: Section 3–3). The blocked opening was probably closed during the reconstruction works by the Mandatory Antiquities Department. Hence, an additional objective of the excavation was to examine Cytryn-Silverman's hypothesis. The excavation revealed new evidence concerning the history of the pool, its building techniques and materials, as well as the manner in which the water had entered the pool and its source.



Fig. 2. A square opening, visible on top of the northwestern vault, looking west.



Fig. 3. A stone staircase built next to the northern wall, descending to the bottom of the pool, looking northeast.

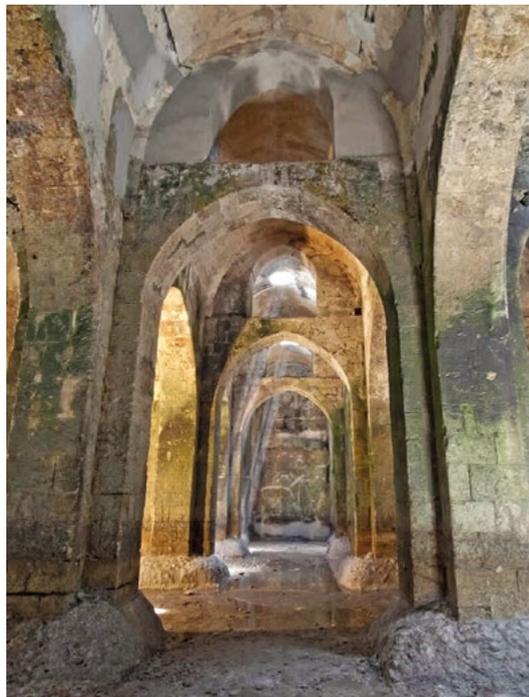


Fig. 4. A vault divided by arches, looking east.



Fig. 5. The arches, general view to the southeast.

the arch (Fig. 6; Plan 1: Sections 1–1, 2–2). Five vaults are visible today, while the sixth, collapsed vault, was blocked during the days of the British Mandate (see below). Twenty-four square openings for drawing water were originally fixed in the pool's ceiling; only twelve have survived (Plan 2). Each of the 24 openings was covered by a column base in secondary use, with a circular drilled hole, as described by de Monconys, who visited the site in 1647 (Creswell 1940:228–230). Another square opening was installed in the upper part of the western wall of the pool, near its northwestern corner.

The Pool of the Arches is one of the best-preserved examples of Early Islamic architecture in the Holy Land and it is among the largest buildings from the Abbasid period. Other large structures from this period include the subterranean reservoirs beneath the courtyard of the White Mosque in Ramla (Rosen-Ayalon 2008:53) and another subterranean reservoir to the

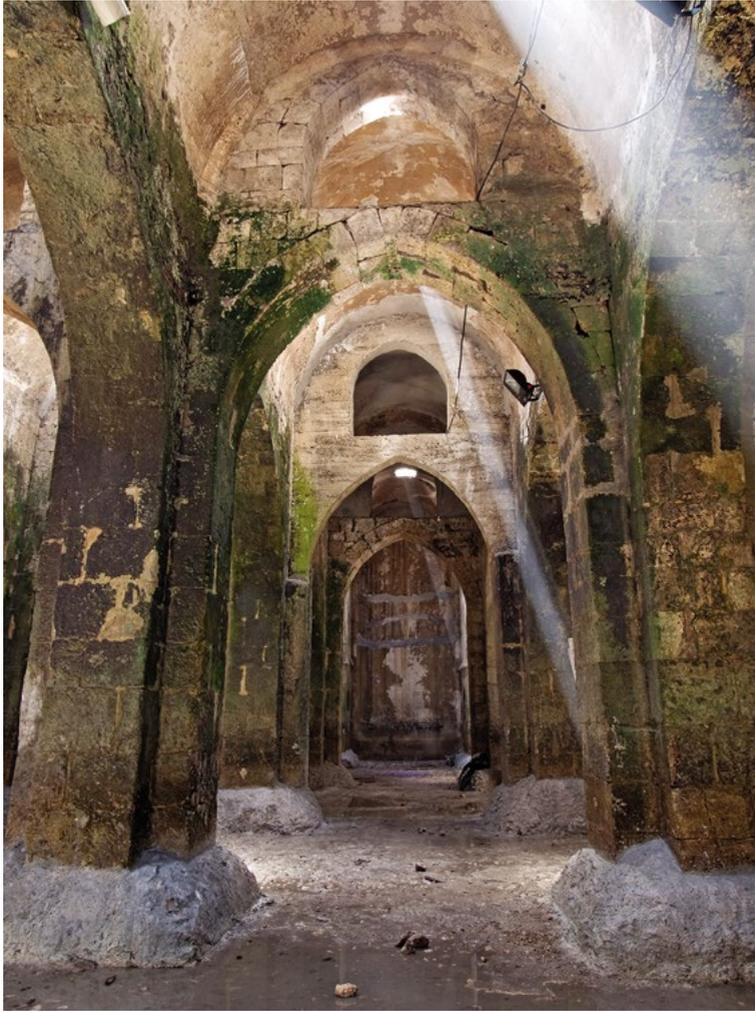


Fig. 6. A small window in the shape of a pointed arch, above the pointed arch, looking east.

north of the White Mosque (see n. 1), and the rebuilding of the Anchor Church in Tiberias (Hirschfeld 2004:112–133). The uniqueness of the pool and its architectural importance lie in the fact that it is one of the first buildings in the Holy Land to feature a pointed arch (Fig. 7). Based on the similarity in architectural style, it has been suggested that the Pool of the Arches and the three subterranean reservoirs in the courtyard of the White Mosque were contemporaneous, constructed during the reign of Hārūn al-Rashid (Rosen-Ayalon 2008).



Fig. 7. Pointed arches, looking east.

Historical Background

The founding of Ramla near the ancient city of Lod (Diospolis) by Sulaymān ibn ‘Abd al-Malik, governor of Jund Filastīn, at the beginning of the eighth century CE, is well-documented in historical sources (Nāsir-i-Khusrau:304). The city was built on virgin sand, and hence its name (*Raml* is the Arabic word for sand). It was built as the capital of Jund Filastīn with government buildings and a road system that served for commerce. The planned city also included public buildings, such as markets, mosques and an industrial zone, as well as private dwellings. Wells and cisterns could not provide sufficient water for such a vigorous civic center, and therefore, it was imperative to find additional water sources. Sulaymān ibn ‘Abd al-Malik ordered the construction of an aqueduct to convey water to the city from springs in the vicinity of Tel Gezer (Gorzaczany 2011:194–196). On the map of the British Survey of Western Palestine, from 1882, the aqueduct is referred to as *Kanāt Bint el-Kāfir* (‘The Heretic Daughter’s Aqueduct’; Conder and Kitchener 1882:422, 444; IDAM archive files: *Qanat Bint el Kafir*). Parts of it were exposed in salvage excavations over the last decade (Zelinger 2000; 2001; Zelinger and Shmueli 2002; Gorzalczy 2005; 2008; 2011; Toueg 2010).

According to an inscription inscribed in plaster above the stairs leading down to the pool (Fig. 8), the pool was built by order of the Abbasid Caliph Hārūn al-Rashid (764–809 CE) and was opened in May 789 CE. The inscription was exposed by de Vogüé and Waddington



Fig. 8. The plaster inscription above the stairs leading down to the pool, looking east.

in 1862 and was first published by van Berchem. After it had been cleaned, a new reading was offered by L.A. Mayer: "... This is among what has been ordered to be made by Dinār the client of the Commander of the Faithful... and it was executed by the hands of Abd A... in *Dhu'l-Hijja* 172" (May 789 CE; Creswell 1940:210, n. 2).

In 1068 CE, the city of Ramla was destroyed by a severe earthquake, and subsequently abandoned. It was re-established as a small-scale town by the Crusaders, leaving the Pool of the Arches outside the boundaries of the town, albeit near the Yafo–Jerusalem road, frequently used by pilgrims and travelers.

A pool named *al-Hizrane* is mentioned in a Fatimid description of a battle on the bank of the Yarqon River (368 AH/978 CE; Gil 1983:553): Caliph al-Aziz and his army camped east of Ramla, and his chief commander, al-Phatchin, and his allies barricaded themselves in the pool of *al-Hizrane*. The geographer Yāqūt al-Hamawī (1179–1229 CE), relying on an earlier source, also mentions *Birkat al-Hizrane*, a pool near Ramla (Yāqūt 1866:402). Gil (1983:553) translated the name *Birkat al-Hizrane* as 'the Reed Pool'. In 'Amikam Elad's opinion (pers. comm.), it is more likely that *al-Hizrane* is the Pool of the Arches, named after Hārūn al-Rashid's mother, Hizrane. Gat, on the other hand, relates that the pool of *al-Hizrane* and the Pool of the Arches are two different pools (Gat 2004:123–124). On Mandatory maps, the Pool of the Arches appears under the name *al-Aneziya* (The Goats' Pool) or St. Helen's Pool (Creswell 1940:228). The first term probably refers to its use for watering goats, while the second follows a local Christian tradition, not based on historical



Fig. 9. General view of the visitors' center (photography: Yaakov Sheffer).

records, attributing the pool's establishment to Helena, mother of the Byzantine Emperor Constantine. According to tradition, in her pilgrimage to the Holy Land in 326 CE, the Emperor's mother passed through Ramla on her way to Jerusalem and noticing the city's water shortage she ordered the construction of the pool.

For centuries, the pool remained outside the city's boundaries. Eventually, it went out of use and deteriorated out of neglect. In 1934 it was first cleaned and restored by the British Mandate Department of Antiquities. In 1960, the municipality of Ramla decided to clean the pool and turn it into a tourist attraction. When opened to visitors in 1961, it was named the Pool of the Arches (Fig. 9).

Despite the 1200 years that have passed since its construction, and the severe earthquakes that destroyed large parts of Ramla, this outstanding building still stands complete, silent evidence of its excellent masonry.

History of Research

In 1861, the German traveler Sepp visited the pool (Sepp 1863:81–91); his illustrations indicate the existence of a hole in the roof of the pool (Vilnay 1961:31; Fig. 10). De Vogüé was the first to study the pool thoroughly; he and Waddington first visited the site in 1862, producing a complete plan and section (de Vogüé 1914:160). De Vogüé returned to the site twice more, in 1904 and 1911, and revised the plan of the pool from his first visit (de Vogüé 1914:39, 163). He provided a detailed description of the pool, including building materials and dimensions, and illustrated the columns, staircase, pillars and arches. He also conducted a comparative study with various Medieval European structures that contained pointed arches and proved that the Muslims were the first to make an extensive use of that feature.

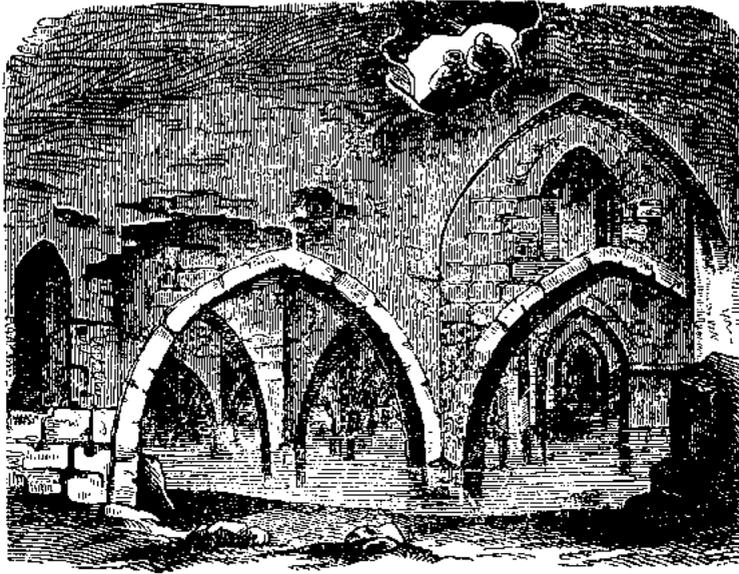


Fig. 10. Illustration of the pool by Sepp, 1861 (after Vilnai 1961:34).

In his opinion, the negligence of the Ottoman authorities led to the collapse of “the edge of the pool” (i.e., the southern vault; de Vogüé 1914:39, 163). The pool had deteriorated since his first two visits. The deterioration was also described by Guérin, who visited the site in 1863 (Guérin 1869:34). De Vogüé’s comments indicate that during his first visit in 1862, all six vaults were intact. Therefore, on the basis of Guérin’s descriptions, the collapse of the southern vault occurred between 1862 and 1863. As a result, the pool was blocked by sediment, which in some places reached the height of the arches (Fig. 11). Over the years, rainwater flowed into the pool, sometimes filling it to the brim or even overflowing.²

Restoration Works

Cleaning and restoring the pool began in 1934 by the British Mandate Authorities; it included the construction of a concrete wall between the collapsed sixth vault and the rest of the pool, and a subsequent blocking of the collapsed vault with soil. In 1930, during preparation for restoration works, photographs were taken of the collapsed vault (Fig. 12) and the accumulated sediment (Fig. 13). From these photographs, it appears that in the

² Such a case is described in a document written in 1931, in which the writer pointed out that visiting the pool was impossible because it was full of water (Israel Antiquities Authority, Israel Scientific Inspection Files ATC/122).

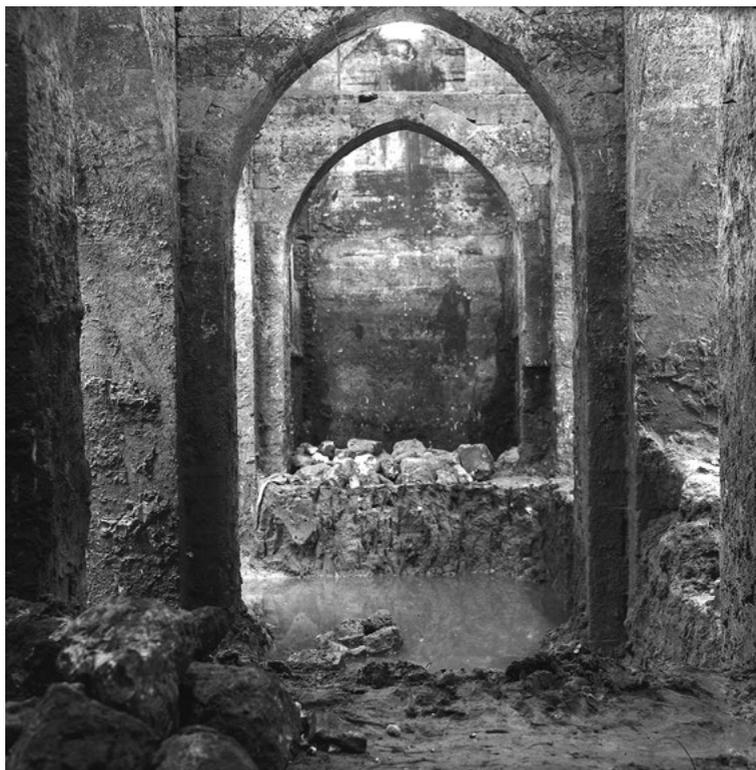


Fig. 11. The pool during the excavation in 1934 (courtesy of the IAA archives).



Fig. 12. The collapsed vault in 1934 (courtesy of the IAA archives).

southern part of the pool the sediment reached the vaults supporting the ceiling, and in the northern part, it reached the height of the cornice decorations at the bottom of the pillar. The vaults were reinforced with concrete and the plaster that covered the walls and the 24 openings was repaired.

In 1937, following these restoration works, Creswell explored the pool and remeasured it, drawing a plan and sections (Creswell 1940:161–162). In his study, he noted that the walls of the pool are not parallel, and corrected the measurements given by de Vogüé. He also noted that the 24 openings in the roof of the pool, seen by de Monconys in 1674, were still visible; however, the re-used column bases with drilled holes that covered these openings,



Fig. 13. The accumulation in the pool before the beginning of the conservation work in 1934 (courtesy of the IAA archives).

had disappeared. Creswell was of the opinion that the vaults had been originally covered by a floor, on which the pillar bases were placed to allow easy access to the 24 openings.

In a letter to the Assistant District Commissioner of Lod, written on March 12, 1942, S.N. Jones, Director of Antiquities, noted a manual pump at the bottom of the stairs, which was used to pump water out of the pool. He stated that the preparation works at the pool had come to an end (Fig. 14), the walls have been made waterproof and a caretaker had been hired to pump the water from the pool.³ In the same letter, Jones recommended that the maintenance of the pool and the responsibility thereof will be turned over to the Municipality. From this letter, it is evident that the cleaning of the pool was undertaken for the sake of converting it into a rainwater reservoir. Elderly residents of Ramla mentioned (in 2010) that the pumped rainwater from the pool was used to water public gardens and to clean dusty streets. On July

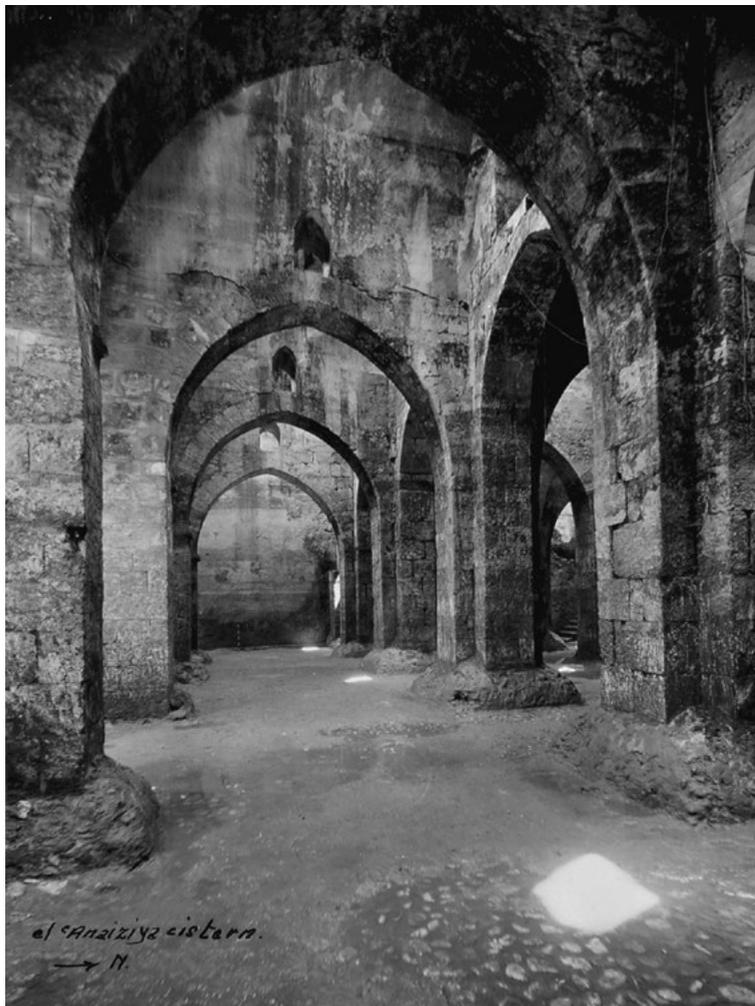


Fig. 14. The pool after cleaning, 1942 (courtesy of the IAA archives).

³ Israel Antiquities Authority Archives (Israel Scientific Inspection Files ATC/124).

25, 1948, two months after the establishment of the State of Israel, the pool was checked by Jacob Ory, inspector of the Israel Department of Antiquities and Museums (IDAM). In his report, he noted that the water level in the pool was one meter high. He located the manual pump installed by the Mandate authorities, and stated that the pool was in good condition.⁴ In another report, dated 1954, Anati mentions 24 openings, and it seems that all were visible and intact.⁵ Pumping ceased after May 1948.

The pool remained abandoned and suffered from neglect which caused severe deterioration in its condition. Maintenance and reconstruction work were carried out in 1960, when the Municipality of Ramla decided to convert the pool into a tourist attraction, in which tourists could row small boats. A concrete structure with a barrel vault was erected to enclose the staircase in preparation for the opening of the pool to the public. Nine of the 24 openings were sealed, and the rest were surrounded with a concrete belt and covered by a metal grille (Figs. 9, 15). In 1972, serious cracks were noticed in the pool. These were caused by tree roots that penetrated the structure and by the use of an unsuitable type of mortar between



Fig. 15. The roof of the pool and the probe in Area B, looking southeast.

⁴ Israel Antiquities Authority Archives (Israel Scientific Inspection Files: The Pool of the Arches ATC/124).

⁵ Israel Antiquities Authority Archives (Israel Scientific Inspection Files: P/Ramla, Pool of the Arches/X).

the stones of the pillars in 1960 (*HA* 1972:49). In 1974, after a major collapse, further conservation work was undertaken (*HA* 1974). In the early 1980s, iron stairs were placed above the original stone stairs to facilitate access of visitors. In 1990, the pool was closed to the public because of danger of collapse. The soil pressure over the southern, Mandatory concrete wall and the northern wall endangered the stability of the structure. During the years 1991 and 1992, a further deterioration occurred, which necessitated stabilization through various means, such as removing the soil outside the northern, outer wall to its full depth (8 m). Water drainage was arranged, the cracks were sealed with plaster and the pool was reopened to the public. These repairs, carried out by the IAA Conservation Department, are clearly visible today.

In May 2007, the pool was closed once again, as rainwater had penetrated the roof, causing plaster blocks to fall from the walls and ceiling. The pool remained closed until February 2009, when the IAA Conservation Department set out to remove the threat. The restoration works included: (1) repairing the drainage system of the roof to prevent rainwater from accumulating and leaking; (2) removing the concrete frames, built around the openings in 1960, which caused the wear of the vaults; (3) repairing the plaster in places where it had fallen; and (4) installing steel supports between the northern and southern walls (Sheffer 2008).

The Pool's Water Source

At present, water still enters the pool through cracks in the British Mandatory concrete wall, which separated the collapsed vault from the rest of the pool. The water flows in a thin stream, depending on the annual rainfall, sometimes through cracks located c. 6 m above the floor of the pool. In 2009, after five years of drought, the flow almost stopped. This may indicate that the cracks in the wall were caused by water pressure over the blocked part. Another possibility is that the water in the pool originated from a leakage in the municipality water system. Samples from this water were tested against samples of tap water from Ramla. It was found that both had a very similar composition, and therefore, it seems that the water source, or at least part of it, was the municipal water supply. Hydrological data from the Municipal Engineering Department indicate that in different places across the city a clay layer exists at a depth ranging from 2.5 to 8 m below the surface, also in the vicinity of the pool. Such a layer could create local, inclined aquifers. Although further research is needed, this may suggest that both rainwater and water from the municipal water system seeped into an inclined aquifer (whose length and width are unknown) near the pool. Thus, it would seem that water flowing from this inclined aquifer, even from a distance of 100 m from the water seepage, causes an uneven flow of water through the concrete wall.

To examine whether such an inclined aquifer exists below the pool, a probe was opened inside the pool at its northwestern corner. It was found that the floor of the pool was founded on dry, sterile sand (see Area A, below), thus indicating that no water-carrying layer exists near the floor of the pool. This conclusion is collaborated by two sets of data: (1) data from Mekorot—Israel National Water Company, according to which the nearest aquifer in the

vicinity of Ramla is c. 40 m deep below the surface, i.e., c. 30 m below the foundation of the pool; (2) testimony of Ramla's elderly residents, who were interviewed during the excavation, that the three nearby wells, used before 1948, were at least 30 m deep. Therefore, it seems unlikely that the water source of the pool was a spring.

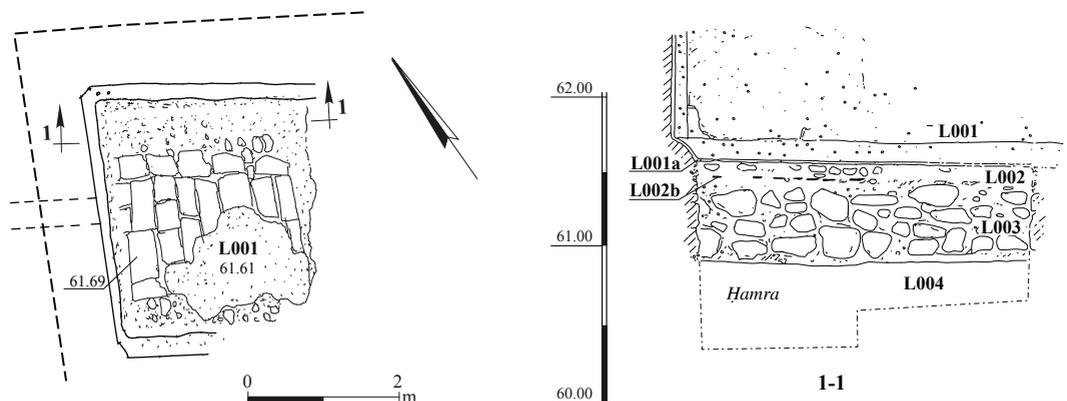
The question remains whether 'Abd al-Malik's aqueduct was the water source of the pool and whether the water entered the pool through the square opening at the top of its northwestern corner. Finds from Kaplan's excavation in the White Mosque complex revealed that water was brought from the aqueduct to two of the courtyard pools, flowing into the pools through square openings, similar to the opening in the Pool of the Arches (Kaplan 1959:110). To examine this hypothesis, a probe was opened outside the northwestern corner (Area B).

THE EXCAVATION

During the 2009 IAA conservation works in the pool, a small-scale excavation took place. Two probes (2.5 × 2.5 m each; Plans 1, 2) were opened: one in the northwestern corner of the pool (Area A) and the second, outside its northwestern corner, at roof level (Area B).

Area A (Plans 1, 3)

After the pool was emptied of water (see above), a floor made of limestone pebbles was exposed. This floor was already noticed in a photograph taken in 1942 by the Mandatory Public Works Department (Fig. 16). Cleaning the floor revealed four new details: a patch of a marble floor; plaster, which was diagonally laid on the floor and on the bottom of the walls; a settling pit; and a reinforcement built around the columns and pillars.



Plan 3. Area A, plan and section.



Fig. 16. The floor of the pool in 1942 (courtesy of the IAA archives).

The marble floor (L001) comprised marble slabs in secondary use (Figs. 17, 23). It was exposed in the northwestern corner of the pool, at the same level of the limestone-pebble floor, abutting the western wall below the vault and under the square opening (c. 7 m above the floor) on top of the western wall. When the floor was exposed, it was suspected that the water entered the pool through the square opening above it (Fig. 18; Plan 1: Section 3–3), and that the marble floor was intended to absorb the energy of the falling water.

A diagonally-laid plaster covered the marble floor and the meeting point between it and the walls to prevent the accumulation of dirt (Fig. 17). Diagonally-laid plaster is usually found in cisterns and water channels.



Fig. 17. Marble floor (L001), looking west.



Fig. 18. The opening at the top of the northwestern vault, looking west.

A circular pit was discovered near the bottom of the stairs (Plan 1). Two shallow channels dug in the bottom of the pool led to the pit, indicating that it served as a settling pit. The pit and the adjacent channels are made of light-colored molded clay. In photographs taken in 1937, the settling pit and the channels are absent; therefore, it seems that they were added in 1942 to house the manual pump (see above).

The reinforcement built around the columns and pillars (Fig. 19) was not visible prior to the reconstruction works; it is evident, however, in the 1937 photographs (see Fig. 16). In our excavation, a reinforcement on the eastern side of one column was removed (Fig. 20). It was found that the mortar covered one course of two ashlar stones, protruding c. 15 cm from the column; the pebble floor did not abut the column, and there was a 3 mm gap between the two (Fig. 21). To prevent seepage, the bottom of the column was coated with a high-quality hydraulic mortar. Since only one column was examined, it is not known whether the rest of the columns were similarly built; however, it should be noted that in two of the courtyard pools in the White Mosque, a similar thickening can be seen at the base of the pillars supporting the arches (Fig. 22).

A probe (2.37 × 1.70 m) was opened between the marble slabs and the northern wall (Fig. 23) to explore the construction technique of the pool's foundation and to discover whether groundwater or a water-carrying layer exist below the floor of the pool. The northern row of marble slabs and part of the stone pebbles (L001) were removed, and a thin layer (6–8 cm; L001a; Plan 3: Section 1–1) of hydraulic lime mortar, containing a large quantity of dark gray ash, was found; below it was a layer of undatable body sherds (L002), and below it, a layer of gray hydraulic mortar mixed with small stones (about 9 cm thick; L002b; Plan 3: Section 1–1). This mortar layer was laid on three courses (50 cm high) of medium-sized



Fig. 19. The reinforcement around the columns, looking north.

stones, built to a very high standard, embedded in a layer of hydraulic mortar (3–4 cm thick; L003). The three courses were laid directly on red sandy (*hamra*) virgin soil (L004).

The pool's foundation (c. 65 cm thick) was found to be well-constructed. The results from this probe indicate that no water-carrying layer exists near the floor of the pool, and therefore, it seems unlikely that the water source for the pool was a spring.



Fig. 20. Reinforcement of one of the columns and the pebble floor, looking south.



Fig. 21. Base of the column after the removal of the reinforcement, looking northwest.



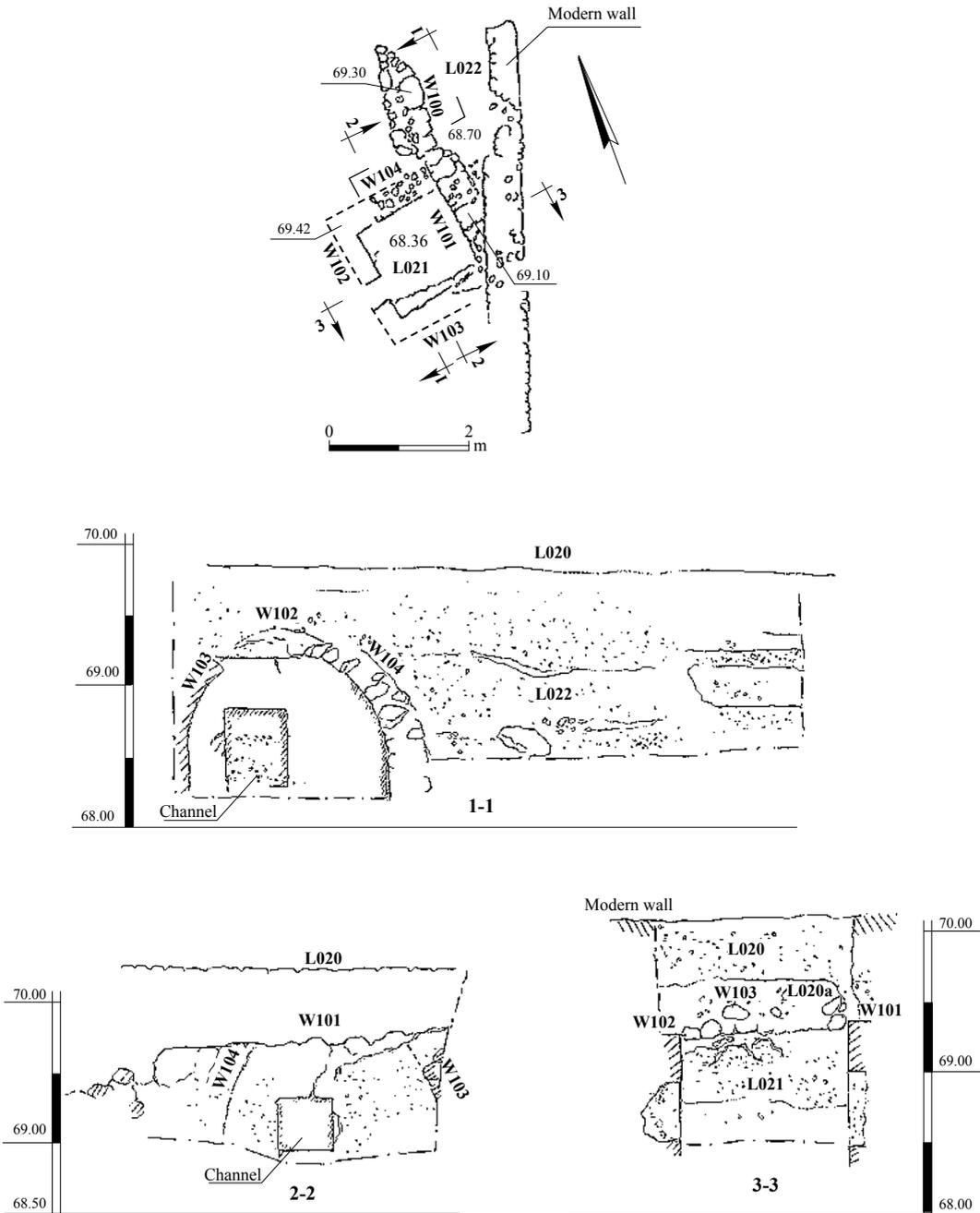
Fig. 22. Reinforcement at the base of the pillars in one of the White Mosque pools, looking west.



Fig. 23. The excavation probe in Area A, looking west.

Area B (Plans 2, 4)

A probe (4.0 × 2.5 m) was opened at roof level, outside the northwestern corner of the pool (see Fig. 15), at the estimated location of a channel which probably fed water to the pool through the square opening in the ceiling (see Plan 2). The twentieth-century pavement was dismantled, and a modern fill, found under the pavement, was removed by a backhoe.



Plan 4. Area B, plan and sections.

During this work, two large ashlar stones ($0.6 \times 0.3 \times 0.3$ m) with holes on their underside (diam. c. 1 cm) were extracted. An accumulation of soil (L020; Plan 4: Sections 1–1, 2–2, 3–3) was found, and beneath it was exposed a layer of small fieldstones bound with whitish gray mortar, consisting of large amounts of lime, charred olive pits, ash and charcoal (L020a; Plan 4: Section 3–3). This layer sealed the ancient strata across the entire southern half of the probe, but was absent from its northern half. On the eastern side of the probe, beneath accumulation L020, a wall (W101; Plan 4: Sections 2–2, 3–3), coated with reddish hydraulic plaster, was exposed. Although W101 is built on a north–south axis, it is not parallel to the western wall of the pool (Fig. 24). Below the layer of small fieldstones, another soil accumulation (L021) was exposed, and a wall (W102) parallel to W101 and similarly coated with hydraulic plaster was revealed. Following the exposure of W102, the springs of a vault, founded on the southern and northern walls (W103 and W104), were discerned. This finding implies that the layer of small fieldstones and mortar (L020a) is actually a collapsed vault (Fig. 25; Plan 4: Sections 1–1, 2–2), and that the two perforated ashlars (see above) served as its keystones. Walls 103 and 104 were found 40 cm below the level of W101 and W102 (Fig. 26). The collapsed vault and the hydraulic plaster covering the walls indicate that it served as a settling tank (Fig. 27).

An opening of a channel (57×44 cm), coated on all sides with hydraulic reddish plaster (Plan 4: Section 1–1) was exposed in W102, at the southwestern corner of the settling tank. An opening of another channel (37×30 cm), coated with the same reddish plaster, was exposed in W101 (Plan 2: Section 2–2). The latter leads to the square opening at the top of the vault inside the Pool of the Arches, above the marble floor (Fig. 17; see above). Both channels were found blocked with soil accumulation. Large fragments of pottery vessels were found in the settling pool (L021). They were not eroded and seem to have been thrown into the tank after it went out of use. The vessels date from the end of the ninth to the beginning of the tenth century CE (Figs. 28, 29; see below), probably during the reign of Aḥmad ibn-Ṭulun over Jund Filastīn and Egypt.



Fig. 24. Area B, W101 and the western wall of the pool, looking southeast.



Fig. 25. Area B, W102 and the collapsed vault, looking north.



Fig. 26. Area B, the settling tank, looking north.



Fig. 27. Area B, the settling tank and the square opening of the pool, looking southwest.

To the north of the settling tank, a two-course wall (W100) was found, built on virgin soil. It is constructed on an axis different from that of the settling tank, and it is cut by it; its northern end is missing. Very few pottery sherds were retrieved from the soil below the wall (L022; see Fig. 30), dated to the eighth–ninth centuries CE. It seems to indicate that W100 was part of a building that stood there before the Pool of the Arches was erected.

It seems therefore, that the settling tank went out of use at the beginning of the tenth century CE, at the same time that the aqueduct went out of use (Gorzalczy 2011). It stands to reason that the aqueduct was still functioning when the Pool of the Arches was built, and it is likely that the pool was fed by it. If so, the water supply to the pool ceased when the aqueduct went out of use, and hence the pool also went out of use. Thus, the Pool of the Arches and the aqueduct functioned contemporarily for about 150 years. It is possible that during the first years after the water supply was stopped, the pool was fed by rainwater.

THE POTTERY

Very few pottery sherds were uncovered, dating from the eighth to the early tenth centuries CE. All the specimens were retrieved from two well-stratified sequences in Area B. One is the fill in the settling tank (L021; Figs. 28, 29), providing a *terminus post quem* for the use of the tank to the Tulunid regime, and the other, is the soil below W100 (L022; Fig. 30), providing a *terminus ante quem* for the construction of the pool in the late eight–early ninth centuries CE. The pottery was sorted in the field, and only diagnostic specimens were kept. It is presented in four categories: tableware, large bowls and basins, cooking ware and containers. The dating of the pottery is based on parallels from well-dated sites, Caesarea (Arnon 2003:12–26) and Tiberias (Stacey 2004:23–89) serving as *fossile directeurs*. The parallels are mainly given for distribution purposes, unless mentioned otherwise. The 1994 edition of Munsell Soil Color Charts was used to describe the color of the clay.

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The parallels for the pottery finds from this locus are sometimes dated to a rather wide range of dates to demonstrate the distribution of the vessels.

Tableware

Bowls

Fine Ware (‘Marble Ware’; Fig. 28:1).— This type of Fine Ware is also known as Byzantine Fine Ware (Gichon 1974:119), traditionally dated to the Byzantine and Early Islamic periods (Gichon 1974:139). The fabric is characterised by finely levigated clay in a pinkish or orange hue. It is well-made and well-fired. Light brown bands, following the marks of the wheel, often appear on the outer and inner surfaces. At Caesarea, the type was named ‘Marble Ware’ (Arnon 2003:63) to avoid the use of the term Byzantine.

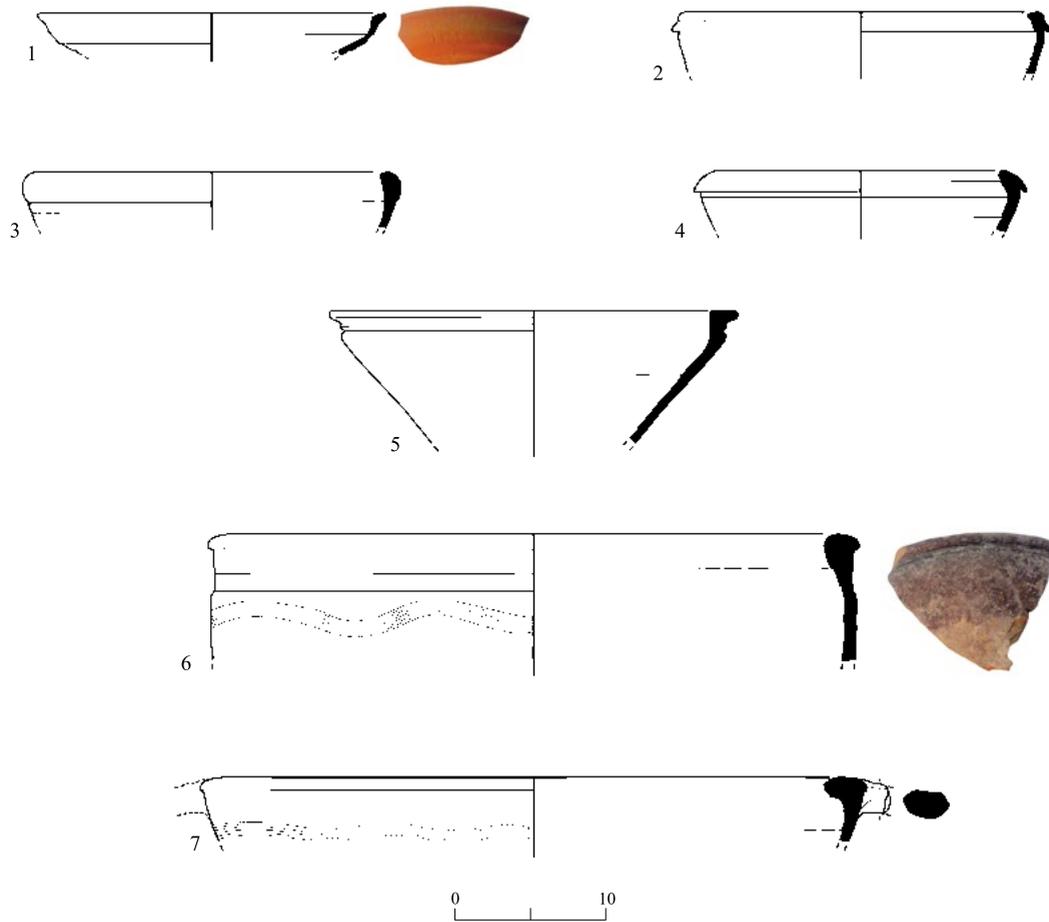


Fig. 28. The pottery from L021.

No.	Vessel	Type	Basket No.	Description
1	Bowl	1aA	0017/3	Light red 2.5YR 7/8 ware, fine and hard-fired
2	Bowl	1aB	0017/2	Reddish yellow 5YR 6/6 ware, fired to a buff 10YR 8/3 tone
3	Bowl	1aB	0019/2	Very pale brown 10YR 7/3 ware, containing white grits and grog inclusions
4	Bowl	1aB	0010/1	Light red 2.5YR 7/6 ware, fired to a buff 10YR 8/3 tone
5	Large bowl	2b	0019/1	Reddish yellow 7.5YR 7/6 ware, containing fine grog
6	Basin	2a	0017/1	Yellowish red 5YR 5/6 fabric, porous containing lime inclusion; unevenly fired, gray core
7	Basin	2a	0018/1	Reddish yellow 5YR 6/6 ware; coarse, unevenly fired; gray core

This type of bowl, designated by Gichon as Ware C Type, is frequent throughout the country (Gichon 1974: Fig. 2:7), dating from the late Byzantine to the Early Islamic periods. At Khirbat al-Mafjar, it is associated with Period 1, dated to 750–800 CE (Whitcomb 1988: Fig. 1:1g), while in Abu Gosh, it was dated to the tenth–eleventh centuries CE (de Vaux and Stéve 1950:123, Pl. XVI:4). Very few samples were recorded from Ramla (Arnon 2007:39, Type 1:1e; Tal and Taxel 2008:125), Yoqne‘am (Avisar 1996: Fig. XIII.67:2, Type 4), Jerusalem (Tushingham 1985:105, Fig. 33:7), Ḥorbat ‘Illin (Greenhut 2004: Fig. 8:8, 9) and Bet She‘an (Fitzgerald 1931: Pl. XXXIII:33). At Caesarea, this type of bowl was found in Stratum VII, dated to the late eighth–early ninth centuries CE (Arnon 2008:82–86, 119–123), and the same date was assigned to this type at Tiberias (Stacey 2004:96, Fig. 5.9:6). The presence of this type in Caesarea, Yoqne‘am and Bet She‘an casts doubt on the assumption that it was an exclusively southern type (Gichon 1974:136). Petrographic analysis of this type of bowl and cup from Caesarea revealed an abundance of *kurkar* particles. This could imply that the coast, perhaps even Caesarea, was the production locale for these vessels (Arnon 1996:80).

Buff Ware Plain Bowls (Fig. 28:2–4).— This group is mainly distinguished by the buff/cream hue of its fabric. The shape of the bowls is globular, with an everted, out-folded rim (Fig. 28:2, 4), or an inverted rim (Fig. 28:3). Bowls similar to the one in Fig. 28:4, dated to the ninth–tenth centuries CE, were uncovered in Ramla, ‘Ofer Park (Kletter 2005: Fig. 14:10), Khirbat es-Suyyagh, located between Ramla and Jerusalem (Taxel 2009: Fig. 3.28:2), Caesarea (Arnon 2008:166) and Tiberias (Stacey 2004:92, Fig. 5.5.3). At Yoqne‘am, these bowls were dated from the seventh to the ninth century CE (Avisar 1996:119, Fig. XIII.68:1, Type 5), but the well-stratified sequences from Caesarea (Arnon 2008:166) and Tiberias (Stacy 2004:130–137) confirm a ninth–tenth-century CE date.

Large Bowls and Basins

All the samples under this category were made of the same type of reddish yellow porous fabric.

Large Bowl (Fig. 28:5).— Only one specimen was found. It has bevelled walls and is conical in shape. The fabric is finely levigated and well-made. A similar bowl was unearthed in Tiberias, dated there to the ninth–tenth centuries CE (Vincenz 2008: Fig. 3.7:4).

Basins (Fig. 28:6, 7).— Two basins of the same type were found. They were unevenly fired, leaving a gray core. Combed incisions decorated the outer surface below the rim. Similar vessels were retrieved from Ramla, ‘Ofer Park, dated to the Abbasid and Fatimid periods (ninth–tenth centuries CE; Kletter 2005: Fig. 13:3, 4; Tal and Taxel 2008: Fig. 6:85, 3).

Jugs

Pale Yellow Buff or Buff-Slipped Ware (Fig. 29:1–3).— These jugs are mainly characterised by the hue of the clay, which ranges from light yellowish white or gray to very light gray

or greenish gray. These jugs are relatively thin and well-made, finely levigated and well-fired. They were widely distributed—from Syria (Lane 1937: Fig. 3:F, G and Pl. XIX:2, 2B, C) through Palestine (de Vaux and Stève 1950:27) and Transjordan (Sarre 1925: Abb. 6; Walmsley 1988: Ill. 9:7–12; Northedge 1992: Fig. 137:2) to Egypt (Scanlon 1966: Pl. XV:9), as well as in Mesopotamia and Iran (Rosen-Ayalon 1974: Figs. 2, 3; Morgan and Leatherby 1987: Fig. 47:24). They appear in various shapes: globular or carinated body; funnel neck, with or without stylistic strainers; and straight flat or string-cut disk base (Fig. 29:1). In the east, these jugs appeared in the seventh century CE (Adams 1970: Fig. 6, Strata IV, V; Rosen-Ayalon 1974:205), but in most of the Middle Eastern sites, they arrived in the second half of the eighth century CE and became one of the most common unglazed-ware types following the Abbasid expansion (Walmsley 1988: Ill. 9:7–12; Avissar 1996:155, Types 2, 3, 4; Eisenberg and Ovdia 1998: Fig. 15:3; Arnon 2008:36, Stratum VII).

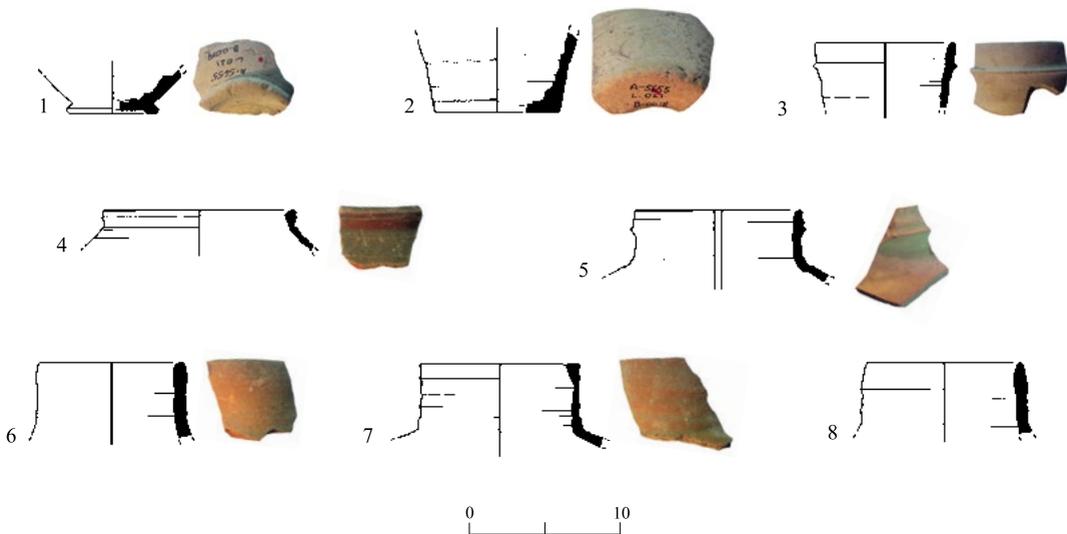


Fig. 29. The pottery from L021.

No.	Vessel	Type	Basket No.	Description
1	Juglet	1ba	0019/5	Pink 7.5YR 7/3 ware, fired to a buff 2.5Y 8/3 hue
2	Juglet	1ba	0018/3	Buff 2.5Y 8/3 ware
3	Juglet	1ba	0019/6	Pink 7.5YR 7/3 ware, fired to a buff 2.5Y 8/3 hue
4	Cooking pot	3a	0017/4	Red 2.5YR 4/8 ware, fired to a dark brown, 2.5YR 3/6 hue; brown glazed drops visible near the rim
5	Storage jar	4a2	0019/4	Very pale brown 10YR 8/3 ware; well-made
6	Storage jar	4a3	0018/2	Red 2.5YR ware containing white grits and grog inclusions
7	Storage jar	4a4	0019/3	Red 2.5YR 5/6 ware containing white grits; gray core
8	<i>Zir</i>	5a	0010/2	Light pinkish brown 7.5YR 7/4 ware, hard-fired

Carinated jugs (Fig. 29:2) first appeared in the late ninth–early tenth centuries CE (Arnon 2008:41); however, throughout Bilad al-Sham, they were dated to the tenth century CE, for example at Ramla, Marcus Street (Arnon 2007: Fig. 7:1), Yoqne‘am (Avissar 1996: Fig. XII.135:1, Type 9), Caesarea (Arnon 2008:204), Khirbat al-Mafjar (Baramki 1944: Fig. 14:9; Whitcomb 1988: Fig. 1:4.c), Abu Gosh (de Vaux and Stéve 1950: Pl. XVII:21–24), Pella (Walmsley 1991: Fig. 1:14) and in the eastern provinces of the Abbasid empire (Rosen-Ayalon 1974: Fig. 23).

Cooking Wares

Glazed Globular Cooking Pot (Fig. 29:4).— The glazed globular cooking pots have a groove below the rim and occasional dark brown glazing drippings appear on the outer surface near the rim. At Caesarea, this type of cooking pot first appeared in Stratum VI, dated to the end of the ninth–beginning of the tenth centuries CE (Arnon 2008:219). Similar specimens, also dated to the ninth–tenth centuries CE, were found in Ramla, Marcus Street (Arnon 2007: Fig. 15:10, 11), Yoqne‘am (Avissar 1996: Fig. XIII.89: Types 2, 4), Tiberias (Stacey 2004: Fig. 5.32:9) and Amman (Northedge 1992: Fig. 137:7).

Containers

Storage Jars

Four subtypes of bag-shaped jars were found.

Pale Brown Ramla-Type Jar (Fig. 29:5).— This type of jar has a short neck and a collar near the rim. It is characterized by a well-made, hard-fired fabric, fired to a light pinkish brown (5YR/7/4 or 7.5YR 7/4) hue. The type dates to the ninth–tenth centuries CE, and was found only in Ramla, perhaps indicating a local production (‘Ofer Park—Kletter 2005: Fig. 197:8; Marcus Street—Arnon 2007:12:13, 14; Ramla South—Tal and Taxel 2008: Fig. 6:94.19) and its vicinity (Nes Ziyayona—Singer 2004: Fig. 7:3; Lod—Messika 2006: Fig. 15:1). This type was the largest group of storage jars (50 out of 69) retrieved from Ramla, Marcus Street (Arnon 2007:65).

Brown Ware Bag-Shaped Jar (Fig. 29:6).— This type of jar is characterized by a sandy brown fabric, and it seems as if it is the swan song of the Southern Palestinian Storage Jar. It was the most common type in Ramla South (Tal and Taxel 2008:146) and was uncovered also in Caesarea (Arnon 2008:158–159), dated in both sites to the ninth century CE.

Red Ware Bag-Shaped Storage Jar (Fig. 29:7).— This bag-shaped jar is made of red ware containing an abundance of medium-sized white grits. It is characterized by a vertical ribbed neck and a straight rim. Similar vessels were found at Ramla, ‘Ofer Park Phase II (Kletter 2005:81, Fig. 19:3) and in Caesarea Stratum VI (Arnon 2008:221), both dated to the ninth–tenth centuries CE.

Zir

Coil-Made Zir (Fig. 29:8).— The most pre-eminent detail designating this vessel is its dimensions, which make it static and immovable. The vessel was made in two parts, the body was coil-made, finished on the wheel, and the rim and neck were thrown on the wheel. This type of vessel is characterised by its excellently levigated clay and high-quality production. The fabric is fired to a light pinkish brown 7.5YR 7/4 hue at a high temperature, which results in a very dense texture resembling that of stone. Similar vessels were dated to the Byzantine/Umayyad era (Aharoni 1964:38; Avissar 1996:148, Type 1; Yannai 2006: Fig. 8:3), the ninth–tenth centuries CE (Eisenberg and Ovadia 1998: Fig. 16:10; Singer 2004: Fig. 3:5, 6, 8; Arnon 2007: Fig. 13; 2008:39, 42; forthcoming: Fig. 13:3; Tal and Taxel 2008: Fig. 6:94.3).

LOCUS 022

Egyptian Red-Slipped Bowl (Fig. 30:1).— Egyptian Red-Slipped bowls (ERS) are characterised by a light red/pinkish, micaceous fabric, and a reddish brown/orange slip inside and on the upper part of the outer walls. This type was well-known in Egypt from the Ptolemaic period onward (Rodziewicz 1983:73). It was studied by Hayes and was dated to the seventh–eighth centuries CE (Hayes 1972:387). Excavations in Alexandria (Kom el-Dikka) and Fustat revealed that the date of these bowls extended into the ninth and even the tenth centuries CE (Rodziewicz 1983:74; Kubiak and Scanlon 1989:37). Similar bowls were found in Ramla, Marcus Street, beneath Floor 072, related to the first occupation layer, dated to the eighth century CE (Arnon 2007: Fig. 25:3); in Umayyad fills at Tiberias, Area D (Stacey 2004:89); and at Khirbat es-Suyyagh (Taxel 2009:99). In Caesarea, ERS bowls appeared in Stratum IX and extended into Stratum VII, hence dated from the early seventh to the ninth centuries CE (Arnon 2008:29). Based on the stratigraphy from Caesarea and on the other samples in the context, an eighth–ninth century CE date is suggested for this type, confirmed by the plaster inscription found above the stairs leading down to the pool, which dates the construction of the Pool of the Arches to May 789 CE (see Fig. 8). A petrographic

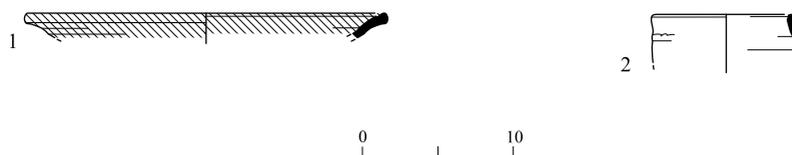


Fig. 30. The pottery from L022.

No.	Vessel	Type	Basket No.	Description
1	Bowl	1aC	0012	Pink 10R 6/6 ware; red-slipped on int. and ext., containing mica inclusions
2	Storage jar	4a1	022.0016	Gray 2.5YR 4/1 ware; unevenly fired; brown core and white grits

thin-section analysis from Caesarea indicates that these bowls originated in Egypt (Arnon 1996:89).

Gray Ware 'Northern Palestinian' Storage Jar (Fig. 30:2).— This type of jar is distinguished by its thin, hard-fired ware, gray hue and white painted ornaments executed on the outer surface. The gray hue is a result of fire reduction, not of a different clay mixture. This type originated in the late Byzantine period, although some scholars have suggested an earlier date, in the second century CE (Johnson 1988:214–215). Its main distribution is in northern Israel and Jordan, and it seems that the southern limit of its appearance is the Dead Sea. The late Byzantine specimens differ from the Early Islamic ones in thickness, the hue of the surface and the length of the neck. The Early Islamic jar is thicker than the late Byzantine one, a phenomenon already observed in Jordan (Sauer 1986:305–306). It has a higher neck and a light red/gray surface with a reddish core. Adan-Bayewitz (1986:88–101) suggested that it contained olive oil rather than wine. A late Byzantine date was attributed to this type in Capernaum (Loffreda 1974: Fig. 8, Class B; Peleg 1989:60.3), Khirbat Karak (Delougaz and Haines 1960:34), Kursi (Tzaferis 1983: Fig. 7:1, Pl. XIV:1, 3), Tel Kisan (Landgraf 1980:69–80), Yoqne'am (Avisar 1996:147–148) and Mount Nebo (Schneider 1950:21–24). At Pella (Smith 1973: Pl. 45:281; Riley 1975:31; McNicoll, Smith and Hennesy 1982: Pls. 146, 148:4, 6; Walmsley 1995: Fig. 1:3), as at Caesarea (Adan-Bayewitz 1986:99; Magness 1992:131), this type was dated to the late Byzantine period, but its appearance extended into the eighth century CE. An Umayyad date was suggested at Ramla (Kletter 2005: Fig. 19:10; Arnon 2007:62, Type 3:1b; Tal and Taxel 2008:146; Type 4), Tiberias (Stacey 2004: Fig. 5:35), Newe Ur (Shalem 2000: Fig. 10), Khirbat al-Mafjar (Baramki 1944: Fig. 3:1–3) and Jordan (Sauer 1986: Fig. 3; Uscatescu 1996: Fig. 112:808).

DISCUSSION AND CONCLUSIONS

The excavation revealed that a great deal of effort was invested in the construction of the Pool of the Arches, and that high-quality materials were used. It brought to light the construction technique of its foundation and offered a better understanding of the column-base reinforcements. The excavation outside the pool (Area B) exposed the external water inlet to the pool: a settling tank that was fed by a channel, and a second channel that led from the settling tank into the Pool of the Arches through a square opening at the top of the northwestern vault. The new data reinforces the assumption that the Pool of the Arches received its water from an external source rather than from groundwater, as was previously assumed. The eighth–ninth-century CE date of the pottery sherds from the fill below W100 indicates that the wall was part of an earlier building that stood there before the Pool of the Arches was erected. The date of the pottery from the fill in the settling tank suggests that the pool ceased to be used during the Tulunid regime, in the late ninth or the beginning of the tenth century CE. This dating matches the date in which the Umayyad aqueduct ceased to function.

Therefore, it seems possible that the springs in the region of Tel Gezer were the pool's water source, and that 'Abd al-Malik's aqueduct was its carrier. Hence, when the aqueduct went out of use, the water supply of the Pool of the Arches and to the pools in the courtyard of the White Mosque ceased, and the pools went out of use. The settling tank then became a refuse pit, and pottery sherds dating from the end of the ninth–beginning of the tenth century CE were discarded into it. Historical documentation supports this interpretation, as there is no mention of the aqueduct in the tenth-century CE description by the geographer al-Muqaddasi. He wrote that the city's water supply relied on cisterns and deep wells with salty water: "...in the summer... no water flows... the wells are deep and salty and the rainwater is held in closed cisterns..." (al-Muqaddasi 2001:139). Today, the water supply to the Pool of the Arches is from rainwater and the Ramla municipal water system.

ACKNOWLEDGMENTS

The excavation was carried out on behalf of the IAA, and was funded by the Government Tourism Corporation and the Municipality of Ramla. We wish to thank all those who contributed to this article: Amit Re'em, Central District archaeologist, who gave us the opportunity to excavate the pool; Vadim Essman, Mark Kunin, Mark Kipnis and Avi Hajian (surveyors); Boris Antin (drafting); Natalia Zak (plans); Asaf Peretz and Ron Toueg (photographs); Noga Carmin (Archive photographs); Arieh Rochman-Halperin (IAA Archive), Helena Shor (metallurgical laboratory) and Marina Shuiskaya (pottery drawing). Special thanks are due to David Menahem of Mekorot (Israel National Water Company) and Avraham Burg, who helped transfer the water samples for laboratory tests and analyzed the results. The conservation works were conducted by Eyal Kakho of the IAA Conservation Department. The article was skillfully edited by Shoshana Israeli.

REFERENCES

- Adams R.McC. 1970. Tell Abū-Sarīfa: A Sassanian-Islamic Ceramic Sequence from South Central Iraq. *Ars Orientalis* 8:87–119.
- Adan-Bayewitz D. 1986. The Pottery from the Late Byzantine Building (Stratum 4) and Its Implications. In L.I. Levine and E. Netzer. *Excavations at Caesarea Maritima 1975, 1976, 1979—Final Report* (Qedem 21). Jerusalem. Pp. 90–129.
- Aharoni Y. 1964. *Excavations at Ramat Raḥel II: Seasons 1961 and 1962* (Centro di studi semitici, serie archeologica 6). Rome.
- Arnon Y.D. 1996. *The International Commercial Activity of Caesarea during the Early Islamic II Period (749–969 C.E.) according to the Ceramic Evidence*. M.A. thesis. University of Haifa. Haifa (Hebrew; English summary, pp. I–VII).

- Arnon Y.D. 2003. *Development and Continuity in the Early Islamic Pottery Types from the 7th Century to the 12th Century C.E.: The Caesarea Data as a Study Case*. Ph.D. diss. University of Haifa. Haifa.
- Arnon Y.D. 2007. Excavation in Marcus Street, Ramla: Pottery, Oil Lamps and Carved Stone Vessels. *Contract Archaeology Reports* 2:38–99.
- Arnon Y.D. 2008. *Caesarea Maritima: The Late Periods (700–1291 CE)* (BAR Int. S. 1771). Oxford.
- Arnon Y.D. Forthcoming. Pottery and Oil Lamps of the Early Islamic Period. In E. Stern ed. *Excavations in the Old City of 'Akko* (IAA Reports).
- Avissar M. 1996. The Medieval Pottery. In A. Ben-Tor, M. Avissar and Y. Portugali. *Yoqne 'am I: The Late Periods* (Qedem Reports 3). Jerusalem. Pp. 75–172.
- Baramki D.C. 1944. The Pottery from Kh. el Mefjer. *QDAP* 10:65–103.
- Conder C.R. and Kitchener H.H. 1882. *The Survey of Western Palestine II: Samaria*. London.
- Creswell K.A.C. 1940. *Early Muslim Architecture: Umayyads, Early 'Abbāsids and Ṭūlūnids II*. Oxford.
- Delougaz P. and Haines R.C. 1960. *A Byzantine Church at Khirbat al-Karak* (OIPLXXXV). Chicago.
- Eisenberg E. and Ovadiah R. 1998. A Byzantine Monastery at Mevo–Modi'im. *'Atiqot* 36:1*–19* (Hebrew; English summary, pp. 123–124).
- FitzGerald G.M. 1931. *Beth-Shan Excavations 1921–1923 III: The Arab and Byzantine Levels* (Publications of the Palestine Section of the University Museum, University of Pennsylvania III). Philadelphia.
- Gat S. 2004. *The City of Ramla in the Middle Ages*. Ph.D. diss. Bar Ilan University. Ramat Gan (Hebrew; English summary).
- Gichon M. 1974. Fine Byzantine Wares from the South of Israel. *PEQ* 106:119–139.
- Gil M. 1983. *Palestine during the First Muslim Period (634–1099)* (Publications of the Diaspora Institute 41, 57, 58) (3 vols.). Tel Aviv (Hebrew).
- Gorzalczany A. 2005. Qanat Bint el-Kafir. *HA–ESI* 117 (May 8). http://www.hadashot-esi.org.il/Report_Detail_Eng.aspx?id=178&mag_id=110 (accessed July 11, 2014).
- Gorzalczany A. 2008. The Ramla Aqueduct. *NEAEHL* 5. P. 2010.
- Gorzalczany A. 2011. The Umayyad Aqueduct to Ramla and Other Finds near Kibbutz Na'an. *'Atiqot* 68:193–220.
- Greenhut Z. 2004. Early Islamic Remains at Ḥorbat 'Illin (Upper). *'Atiqot* 47:15*–32* (Hebrew; English summary, pp. 210–211).
- Guérin V. 1869. *Description géographique, historique et archéologique de la Palestine I: Judée III*. Paris.
- HA 1972. Conservation Work: The Pool al-'Aneziya in Ramla. *HA* 41-42:49–50.
- HA 1974. News in Brief: Ramla. *HA* 50:28.
- Hayes J.W. 1972. *Late Roman Pottery*. London.

- Hirschfeld Y. 2004. *Excavations at Tiberias, 1989–1994* (IAA Reports 22). Jerusalem.
- Johnson B.L. 1988. The Pottery. In G.D Weinberg ed. *Excavations at Jalame: Site of a Glass Factory in Late Roman Palestine*. Columbia, Mo. Pp. 137–226.
- Kaplan J. 1959. Excavations at the White Mosque in Ramla. *'Atiqot (ES)* 2:106–115.
- Kletter R. 2005. Early Islamic Remains at 'Ofer Park, Ramla. *'Atiqot* 49:57–99.
- Kubiak W. and Scanlon G.T. 1989. *Fuṣṭāṭ Expedition Final Report 2: Fuṣṭāṭ-C* (ARCE Reports 11). Winona Lake.
- Landgraf J. 1980. Keisan's Byzantine Pottery. In J. Briend and J.-B. Humbert eds. *Tell Keisan (1971–1976): Une cité phénicienne en Galilée* (OBO.SA 1). Fribourg. Pp. 51–99.
- Lane A. 1937. Medieval Finds at al-Mina in North Syria. *Archaeologia* 87:19–78.
- Loffreda S. 1974. *Cafarnaon II: La ceramica* (SBF Collectio Maior 19). Jerusalem.
- Magness J. 1992. Late Roman and Byzantine Pottery, Preliminary Report, 1990. In R.L. Vann ed. *Caesarea Papers: Straton's Tower, Herod's Harbour, and Roman and Byzantine Caesarea* (JRA Suppl. S. 5). Ann Arbor. Pp. 129–153.
- McNicoll A., Smith R.H. and Hennesy B. 1982. *Pella in Jordan 1: An Interim Report on the Joint University of Sydney and the College of Wooster Excavations at Pella 1979–1981* (2 vols.). Canberra.
- Messika N. 2006. An Early Islamic Period Site at Kafr Jinnis near Lod. *Salvage Excavation Reports* 3:84–112.
- Morgan P. and Leatherby J. 1987. Excavated Ceramics from Sirjan. In J. Allen and C. Roberts eds. *Syria and Iran: Three Studies in Medieval Ceramics* (Oxford Studies in Islamic Art IV). Oxford. Pp. 23–172.
- al-Muqaddasī Muhammad ibn Ahmad. *The Best Divisions for Knowledge of the Regions (Aḥsan al-taqāsīm fī ma'rifat al-aqālīm)*. (B.A. Collins transl.). Reading 2001.
- Nâsir-i-Khusrau. *Diary of a Journey through Syria and Palestine* (G. Le Strange transl.; PPTS IV). London 1896. Pp. 1–72.
- Northedge A. 1992. *Studies on Roman and Islamic 'Ammân: The Excavations of Mrs C.-M. Bennett and Other Investigations I: History, Site and Architecture* (British Academy Monographs in Archaeology 3). Oxford.
- Peleg M. 1989. Domestic Pottery. In V. Tzaferis ed. *Excavation at Capernaum I: 1978–1982*. Winona Lake. Pp. 31–113.
- Riley J.A. 1975. The Pottery from the First Session of Excavation in the Caesarea Hippodrome. *BASOR* 218:25–63.
- Rodziewicz M. 1983. Egyptian Glazed Pottery of the Eighth to Ninth Centuries. *Bulletin de la Société d'archéologie copte* 25:73–75.
- Rosen-Ayalon M. 1974. *Ville royale de Suse IV: La poterie islamique* (Mémoires de la délégation archéologique en Iran L). Paris.
- Rosen-Ayalon M. 2008. On the History of the White Mosque. *Qadmoniot* 135:51–55 (Hebrew).

- Sarre F. 1925. *Die Ausgrabungen von Samarra II: Die Keramik von Samarra* (Forschungen zur islamischen Kunst II). Berlin.
- Sauer J.A. 1986. Umayyad Pottery from Sites in Jordan. In L.T. Geraty and L.G. Herr eds. *The Archaeology of Jordan and Other Studies Presented to Siegfried H. Horn*. Berrien Springs, Mich. Pp. 301–330.
- Scanlon G.T. 1966. Fustāt Expedition: Preliminary Report 1965 I. *JARCE* 5:83–112.
- Schneider H. 1950. *The Memorial of Moses on Mount Nebo III: The Pottery* (SBF Collectio Maior 1). Jerusalem.
- Sepp J.N. 1863. *Jerusalem und das Heilige Land: Pilgerbuch nach Palästina, Syrien und Aegypten*. Schaffhausen.
- Shalem D. 2000. Nevé Ur: An Early Islamic Period Village in the Bet She'an Valley. *'Atiqot* 43:149–176.
- Sheffer Y. 2008. *The Pool of the Arches in Ramla: Survey and Documentation*. Jerusalem (Hebrew).
- Singer K. 2004. The Pottery Assemblage from the Excavations at Şarafand el-Kharab, Nes Ziyiyona. *'Atiqot* 46:49–58: (Hebrew; English summary, p. 131*).
- Smith R.H. 1973. *Pella of the Decapolis 1: The 1967 Season of the College of Wooster Expedition to Pella*. Wooster.
- Stacey D.A. 2004. *Excavations in Tiberias 1973–1974: The Early Islamic Period* (IAA Reports 21). Jerusalem.
- Tal O. and Taxel I. 2008. *Ramla (South): An Early Islamic Industrial Site and Remains of Previous Periods (Salvage Excavation Reports 5)*. Tel Aviv.
- Taxel I. 2009. *Khirbet es-Suyyagh: A Byzantine Monastery in the Judaean Shephelah (Salvage Excavation Reports 6)*. Tel Aviv.
- Toueg R. 2010. Qanat Bint el Kafir. *HA–ESI* 122 (March 15). http://www.hadashot-esi.org.il/report_detail_eng.aspx?id=1371&mag_id=117 (accessed July 11, 2014).
- Tushingham A.D. 1985. *Excavations in Jerusalem 1961–1967 I*. Toronto.
- Tzaferis V. 1983. *The Excavations of Kursi–Gergesa ('Atiqot [ES] 16)*. Jerusalem.
- Uscatescu A. 1996. *La cerámica del Macellum de Gerasa (Y'araš, Jordania)* (Informes arqueológicos IA/E 5). Madrid.
- Vaux R. de and Stève A.-M. 1950. *Fouilles à Qaryet el-'Enab Abū Gōsh, Palestine*. Paris.
- Vilnay Z. 1961. *Ramla: Present and Past*. Ramla (Hebrew).
- Vincenz A. de. 2008. The Pottery Assemblages. In Y. Hirschfeld and O. Gutfeld. *Tiberias: Excavations in the House of the Bronzes; Final Report I: Architecture, Stratigraphy and Small Finds* (Qedem 48). Jerusalem. Pp. 107–165.
- Vogüé M. de. 1914. *La citerne de Ramleh et le tracé des arcs brisés. Mémoires de l'Institut national de France: Académie des Inscriptions et Belles-Lettres* 39:163–180.
- Walmsley A. 1988. Pella/Fihl After the Islamic Conquest (AD 635–c. 900): A Convergence of Literary and Archaeological Evidence. *MA* 1:142–159.

- Walmsley A. 1991. Architecture and Artifacts from Abbasid Fihl: Implications for the Cultural History of Jordan. In M.A. Bakhit and R. Schick eds. *Bilād al-Shām during the Abbasid Period (132 AH/750 A.D.–451 AH/1059 A.D.) (Proceedings of the Fifth International Conference on the History of Bilad al-Sham, 7–11 Sha’ban 1410 A.H./4–8 March, 1990)* II. Amman. Pp. 135–159.
- Walmsley A. 1995. Tradition, Innovation and Imitation in the Material Culture of Islamic Jordan: The First Four Centuries. In K. ‘Amr, F. Zayadine and M. Zaghloul eds. *Studies in the History and Archaeology of Jordan: Art and Technology throughout the Ages* V/2. Amman. Pp. 657–668.
- Whitcomb D. 1988. Khirbet al-Mafjar Reconsidered: The Ceramic Evidence. *BASOR* 271:51–58.
- Yannai E. 2006. A Settlement from the Middle Ages and Byzantine Period at Khirbat Ibreika. *Atiqot* 53:37*–47* (Hebrew; English summary, pp. 199–200).
- Yāqūt ibn ‘Abd Allāh al-Ḥamawī. *Kitāb mu’jam al-buldān* 1. Beirut 1866.
- Zelinger Y. 2000. Ramla, Yehezqel Street. *HA–ESI* 111:57*.
- Zelinger Y. 2001. Yashresh: Yashresh, The Ramla Aqueduct. *HA–ESI* 113:123*–124*.
- Zelinger Y. and Shmueli O. 2002. The Aqueduct of the Heretic’s Daughter: Remains of the Early Arab Aqueduct to Ramla. In E.C.M. van den Brink and E. Yannai eds. *In Quest of Ancient Settlements and Landscapes: Archaeological Studies in Honour of Ram Gophna*. Tel Aviv. Pp. 279–288.

