

A Newly Explored Cistern on the Sacred Site of Mount Ebal

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Abstract

A cistern was recently discovered on the northeastern slopes of Mount Ebal within the enclosure identified by Zertal (1985) as the sacred compound of Joshua's altar from the thirteenth century BCE. The authors wished to determine whether the cistern could be related to the cultic site documented by Zertal. Carbon-14 tests taken from the plaster of the cistern revealed that it was active from the first century CE until the thirteenth century CE. The article attempts to date the cistern in the context of the sacred compound and according to the various uses of bell-shaped installations in that period. In addition, the article describes the characteristics of the plaster from the three periods indicated by the carbon-14 testing.

Keywords: Mount Ebal, carbon-14, plaster, cistern, Iron Age

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Introduction

In the 1980s, Adam Zertal (1985) identified a 14-dunam sacred enclosure at el-Burnat (A), surrounded by a wall, on the northeastern part of Mount Ebal (Fig. 1). In light of the findings excavated in the enclosure, Zertal proposed an identification of the site with Joshua's altar, a cultic structure from the thirteenth/twelfth century BCE.

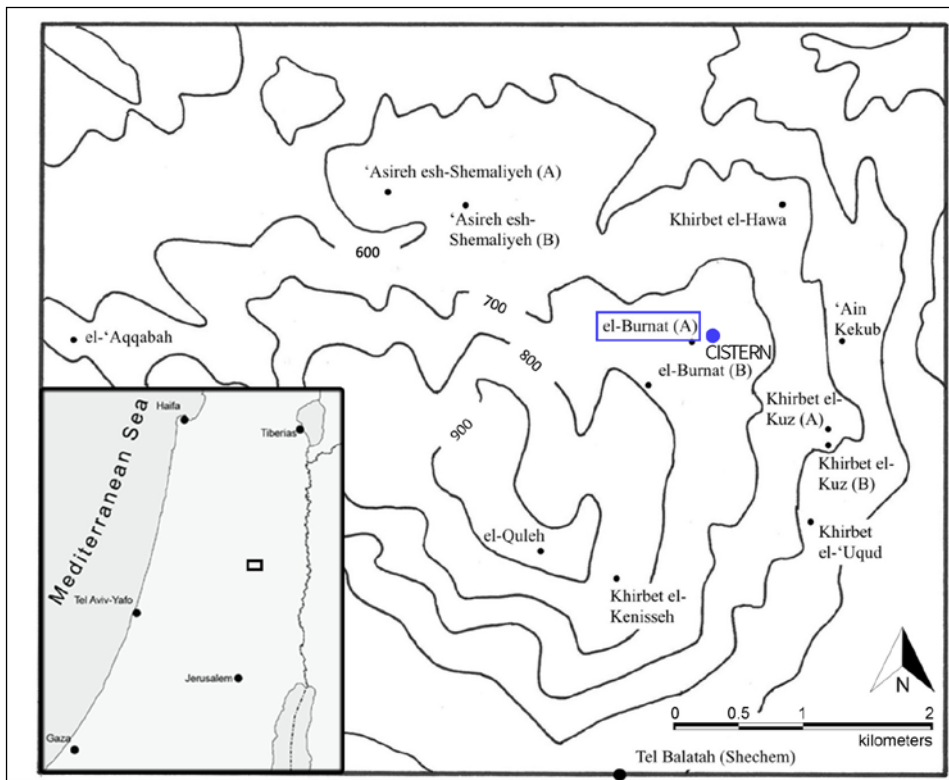


Figure 1: Area map and site location

In a recent visit to the site, the authors discovered and recorded a large cistern in the southern part of the enclosure (Fig. 2). The cistern has one central entrance. Its interior surface is lined with a base layer (Layer 1) and three layers of plaster (Layers 2–4).



Figure 2: A – Aerial photo of el-Burnat (A):
 1 – “Joshua’s Altar” (according to Zertal),
 2 – Location of the cistern;
 B – Archaeological plan of the site

Since the cistern lay within the boundaries of the sacred enclosure, it was important to ascertain whether the cistern belonged to the Late Bronze/Early Iron Age site or to a different phase in the mountain’s history. To determine the dating of the cistern, samples containing carbonized material were taken from each of the three layers of plaster (Fig. 3).

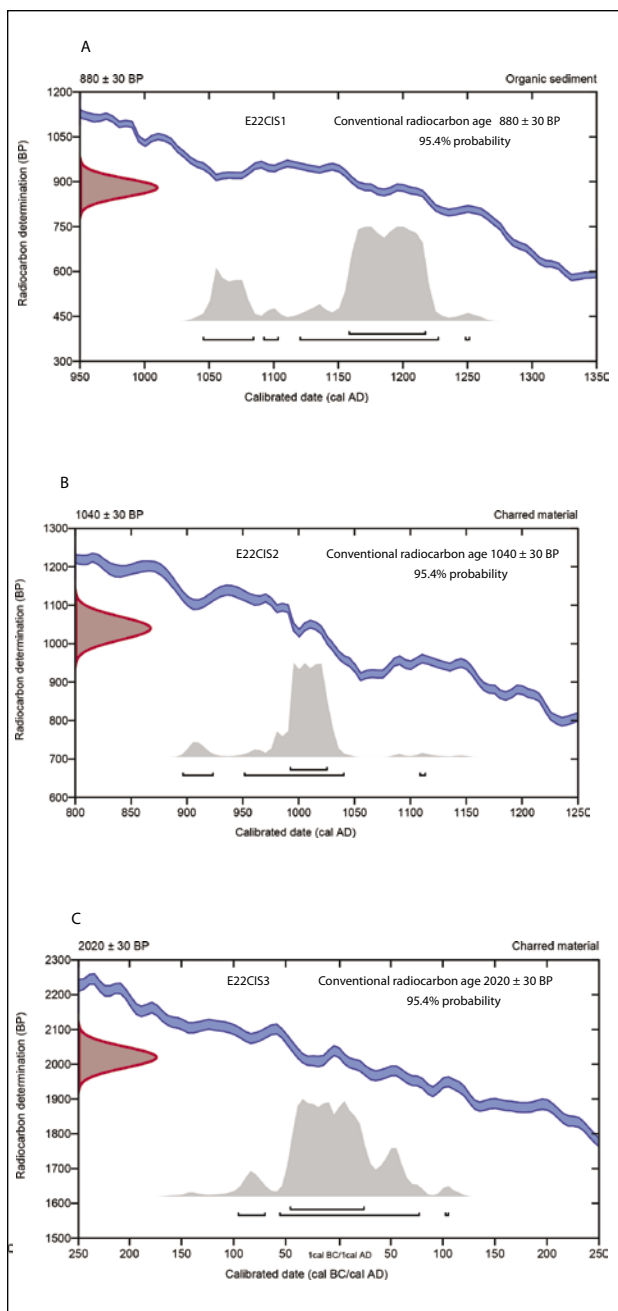


Figure 3: Carbon-14 dating

This article discusses the bell shape of the pit in relation to its possible uses. It also addresses description of the plaster from the various periods and offers hypotheses with regard to the cistern's purpose given its location within the sacred site identified by Zertal.

Description of the Cistern and Its Filling Method (Fig. 4)

The cistern lies in the southeastern part of the el-Burnat (A) site (Site 276 in Zertal's survey, 2004, 532–537) at Location 227750/679351 on the New Israeli Grid. It has one round entrance with a diameter of approximately 1.2 m. The entrance shaft is 2 m deep (Fig. 5). Dirt covers the bottom of the cistern, so that its maximum depth remains unknown. Its maximum measured depth from the ceiling to the accumulated dirt is 2.5 m, so that the total measurable depth from the top of the entrance to the soil level within the cistern is about 4.5 m. The plan view of the cistern is oval-shaped, with a width of 5.5 m and a length of 7.7 m. Thus, the known dimensions of the cistern chamber are 7.7×5.5×2.5 m (Fig. 6).

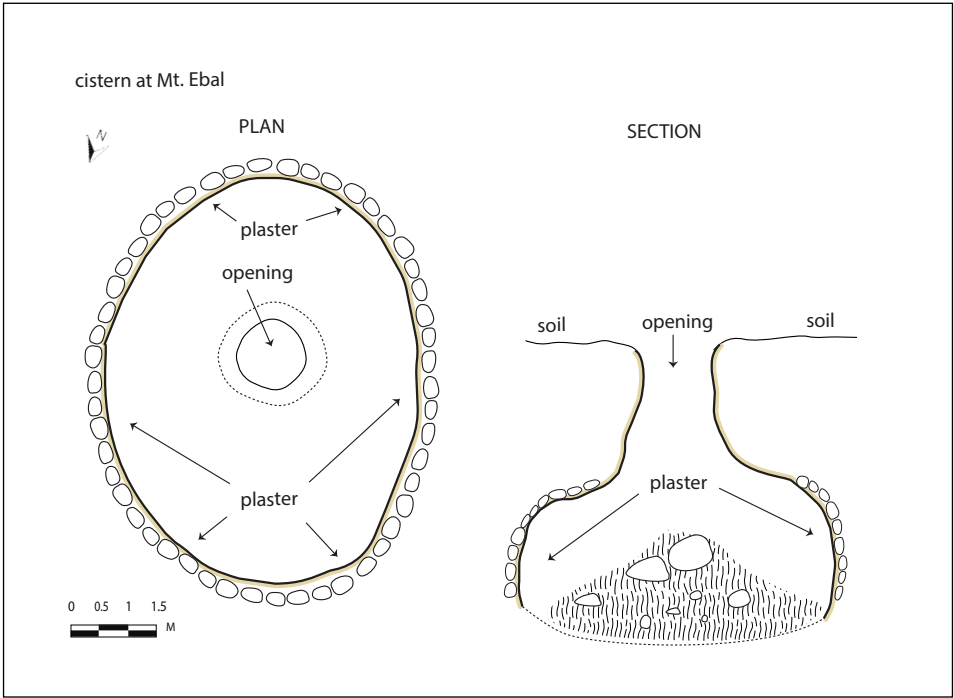


Figure 4: Plan and section of the cistern



Figure 5: Entrance to the cistern



Figure 6: A picture of the cistern

By comparing the length and width of the cistern with those of similar cisterns, we may safely estimate that the depth of the cistern is at least 3 m deeper than the current level. This means that the total depth of the cistern was likely around 5.5 m, not including the entrance (Tsuk 2011: 45). Therefore, the volume of the cistern is approximately 42 m³.

The cistern's storage capacity, at 42 m³, identifies it as an average cistern rather than a large water reservoir. A cistern of this size could function as a single-family cistern for an extended family or as part of a complex of cisterns for a small settlement.

The cistern was filled with runoff water. Although Mount Ebal averages 650 mm of rain annually (Meteo n.d.), the area is devoid of springs, increasing the importance of runoff collection. To the east of the cistern, the authors discovered a channel cut into the bedrock (Fig. 7) that collected water from above and channeled it into the cistern. Taking into account the typical precipitation on Mount Ebal and the channeling of the upslope runoff drainage, an average winter (600–700 mm of rain) would have filled the cistern well during the winter months.



Figure 7: Water channel that guided water to the cistern

Description of the Plaster (Fig. 8)

Today, the walls of the cistern are covered by four layers: a base layer and three layers of plaster. Carbon-14 testing of samples from the three plaster layers (Fig. 3) yielded the following results in connection with the description of the plaster:¹

- Layer 2 (Beta 621033, charred seed) – from the first century BCE/first century CE, the Early Roman period (Fig. 9).
- Layer 3 (Beta 621032, charred wood) – from the tenth/eleventh century CE, the Early Islamic period (Fig. 10).
- Layer 4 (Beta 621031, organic sediment) – from the twelfth/thirteenth century CE, the Crusader period (Fig. 11).

1 The carbon-14 testing was funded by Associates for Biblical Research.



Figure 8: A picture of the plaster with samples numbered

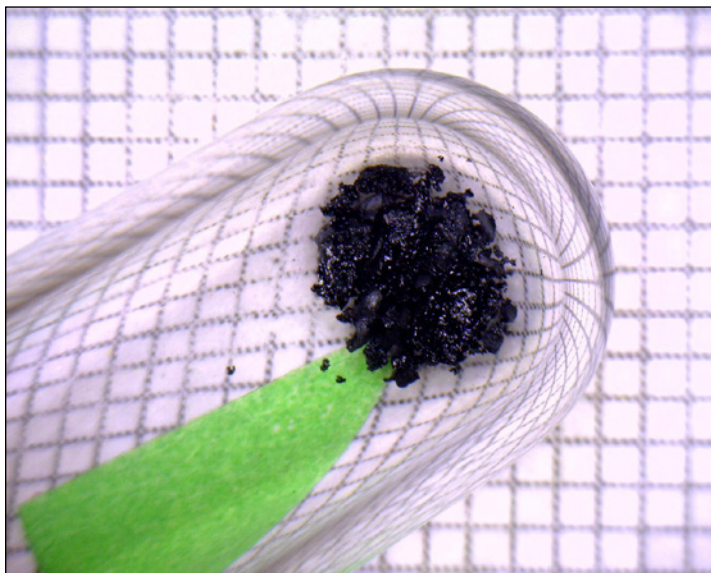


Figure 9: Sample No. 621031 – Organic material

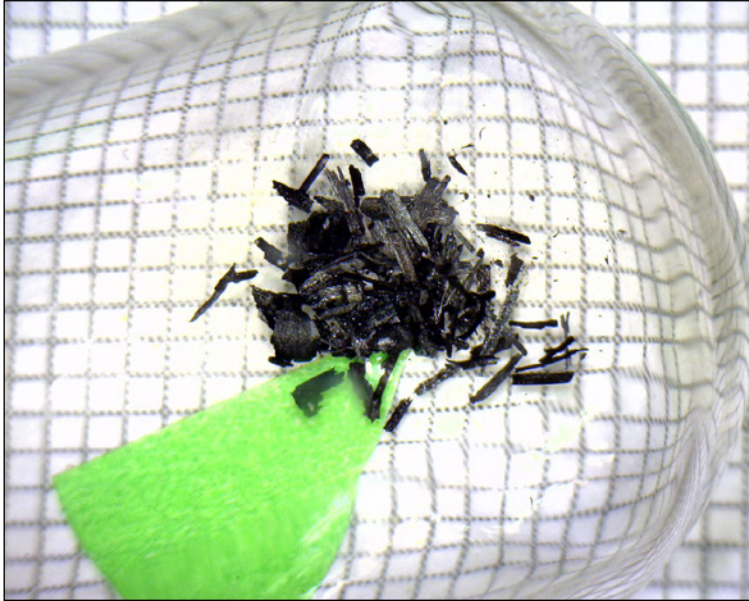


Figure 10: Sample No. 621032 – Pieces of wood



Figure 11: Sample No. 621033 – Seeds

Layer 1 was the base layer used to produce a uniform surface on which to apply the plaster (Fig. 8). It consisted of stones about 10–20 cm in diameter, meant to fill spaces in the sides of the cistern. This was to ensure the continued functionality of the cistern by enabling the plaster to cling to the sides of the cistern and by preventing seepage between cracks.² As it appears that Layer 1 was made in preparation for the first layer of plaster (Layer 2), it is likely that Layers 1 and 2 dated to the same period.

Layers 2–4:³ Plaster Layers of Different Thicknesses.

Layer 2 covered the base layer, Layer 1, that was constructed in preparation for the plaster coating. The layer of plaster itself was about 4 cm thick and dark brown/grey in color. Fragments of pottery, charcoal, and small stones served as inclusions, perhaps to strengthen the plaster. The plaster appeared to be of good quality and had survived in many places. This layer included small pieces of charcoal, apparently used to strengthen the plaster. A carbon-14 test was taken from this layer (Beta 621033) that dated the plaster to the first century BCE/first century CE (Fig. 3).

Layer 3 consisted of white/light grey plaster about 2–3 cm thick. While it contained very small grains and charcoal accumulations within the plaster, pottery and stones were absent. The thickness of the layer is uniform and was preserved in most parts of the cistern. Carbon fragments from this layer (Beta 621032) dated to approximately the tenth/eleventh century CE, the Early Islamic period.

Layer 4 was a final layer of mottled reddish plaster. It contained fragments of small stones 2–3 mm in size, mostly flint, as well as some charcoal remains. This layer was carbon-14 dated (Beta 621031) to the twelfth/thirteenth century CE, the Crusader period.

2 This type of construction and surface treatment on the sides of the cistern appeared in many cisterns in western Samaria as part of the survey of the water reservoirs of western Samaria conducted in the author's (Elmakayes) doctoral thesis. Cisterns featuring this form of surface treatment are typically dated from the Late Roman period to the Byzantine period.

3 The numbering of the plaster layers begins with the layers closest to the wall of the cistern and proceeds outward.

Review of the Site and the Nearby Area

El-Burnat (A)

1. The Excavation

In his preliminary publication of his excavations at el-Burnat (A), Zertal identifies two strata. He suggests that the site was occupied for about a century, beginning in the mid-thirteenth century BCE and ending in the mid-twelfth century BCE (Zertal 1987: 109). Zertal (1987: 137) reports discovering primarily Iron Age I remains, as well as a smaller quantity of Late Bronze Age pottery. He does not identify remains from any other periods at the site. Although Zertal (2004: 532) mentions the presence of two cisterns at el-Burnat (A), none of his publications provide descriptions of these cisterns.⁴

Some scholarly discussion has addressed the Iron I site and Zertal's identification; however, this has been based on Zertal's preliminary report and other incidental publications, as he never published a final excavation report (Soggin 1984: 181; Kempinski 1986; Na'aman 1986; Finkelstein 1988: 82, 85; Hawkins 2012; Stripling 2021: 46–48; Leavitt 2022).

2. The Sifting Project

In 2019, Scott Stripling and Abigail Leavitt conducted an experimental project focused on wet-sifting the dump piles from past archaeological excavations to demonstrate the value of wet-sifting. As part of this project, they removed and wet-sifted about 30% of two of the dump piles discarded by Zertal's excavation team. They found many small items that had been missed by Zertal's team, including 268 diagnostic pottery sherds, 75 diagnostic flints, and 79 small objects (Stripling and Leavitt, forthcoming). Most of the finds from Stripling and Leavitt's sifting project dated to the early Iron Age, with some from the Late Bronze Age. The project yielded only a limited number of artifacts from later periods.

4 Attempts to locate the second cistern have not been successful.

There were a few finds dating to the Early Roman period, including three diagnostic pottery sherds (0.46% of the total number of diagnostic sherds from the sifting project) and three hobnails. Additionally, the project unearthed one coin of Alexander Jannaeus that had been minted in 85–80 BCE (Stripling and Leavitt, forthcoming). This type of coin was circulated until 70 CE (Syon 2015: 45–46; Peterson 2023: 26). Therefore, it likely belonged to the Early Roman collection of finds.

The sifting project yielded no remains from the Early Islamic period. Only one artifact dated to the Crusader period: an iron arrowhead of the type used for hunting or in battle for disabling horses (Stripling and Leavitt, forthcoming). There was no pottery from either the Early Islamic period or the Crusader period.

Related Sites

Because there was very little activity at el-Burnat (A) during the periods indicated by the carbon-14 dating of the cistern plaster, a broader look at the sites on Mount Ebal may shed light on activity in that region relevant to the cistern at el-Burnat (A). These sites have been surveyed multiple times, with Zertal's survey the most thorough and informative (Conder and Kitchener 1882: 155, 186, 196–197; Bull and Campbell 1968: 23–24; Porath 1968: 27, 32; Gophna and Porath 1972: 224; Kallai 1972: 165; Zertal 2004: 527–548).

Mount Ebal is relatively steep. Thus, most of the sites on the mountain lie on the lower slopes, while a few are near the summit and on the stepped eastern side of the mountain (Conder and Kitchener 1882: 147–148; Zertal 2004: 40). El-Burnat (B) lies the closest to el-Burnat (A), but it has no connection with the Late Bronze/Iron Age site or the cistern, and contained only flint tools and no pottery. Zertal (2004: 532) interpreted it as a prehistoric site.

Zertal documented twelve sites in his survey of Mount Ebal, six of which were occupied in one or more of the periods relevant to the cistern at el-Burnat (A) (Fig. 1). Three of these sites – El-'Aqqabah, Khirbet el-Hawa, and Khirbet el-Kenisseh – yielded Early Roman pottery in addition to that of other periods, while three sites – 'Asireh esh-Shemaliyeh (A), Khirbet el-Kuz (A), and Khirbet el-'Uqud –

included both Early Islamic and Medieval pottery in addition to that of other periods. Zertal (2004: 527–548) noted that a Crusader-era estate called *Asine* was located at 'Asireh esh-Shemaliyeh (A), and that a Crusader-era fief known as *Kafekos* was associated with Khirbet el-Kuz (A).

Eight of the twelve sites on Mount Ebal had at least one cistern. 'Asireh esh-Shemaliyeh (A) had the most, with 60 cisterns (Zertal 2004: 527). Due to the nature of the survey, Zertal could not provide dates for any of the cisterns.

Discussion

Three significant aspects of the cistern must be considered: the design of the cistern, the plaster, and the location of the cistern.

The Design of the Cistern

The cistern is formed in a classic bell shape; it has a relatively narrow opening that widens into a large space. The entrance to the cistern is well carved and appears to have functioned both for the entry of water and for the maintenance of the cistern. While there is no covering at the entrance to the cistern today, it is likely that the entrance was originally covered.

There are two common types of bell-shaped cisterns in antiquity; the most prevalent of these is a classic cistern. Another use for pits of this kind was the storage of agricultural produce in a bell-shaped underground space. A notable example of this type of pit was found by Pritchard (1960) at Tel Gibeon, where a series of pits were discovered that had been used for wine storage. Similar systems of pits have been discovered at other sites in Samaria, such as Tel Aroma, Deir Dekla, Khirbet al Hammam, and Khirbet Sheikh 'Issa (Fumkin 2002; Elmakayes and Tavger 2021, and see additional bibliography there). A comparison between the el-Burnat (A) pit and the Gibeon pits reveals several differences.

Table 1: A Comparison Between the Gibeon Cisterns and the Cisterns in Ibal

	El-Burnat (A)	Gibeon
Number of pits	1	At least 7–8 in close proximity
Opening of pits	Normal without an inset opening; long entrance shaft	A clear inset for the lid; small openings up to 90 cm; direct entry
Plaster	Yes (although it may not date to the original construction of the pit)	None
Pit depth	At least 4.5 m	Maximum of 2 m

These differences appear to be significant. It may indeed be said that the plastering and deepening of the pit was completed in a later period, converting earlier pits into water systems or hiding systems, as in other sites (for example, Deir Dekla in western Samaria; Elmakayes and Tavger 2021). However, the fact that there is only one pit here and that there is no inset at the entrance to the pit makes the possibility that it is a Gibeon-style pit system less likely.

Another possibility is that the el-Burnat (A) pit may have functioned as a bell-shaped pit for the storage of agricultural produce, similar to pits mentioned by Franklin in ancient Samaria and Tel Jezreel (Franklin 2004; 2020). The pits found by Franklin in ancient Samaria (Fig. 12) are solitary, unplastered pits of considerable depth, with one even reaching a depth of 10 m. These pits are more like the el-Burnat (A) pit than the Gibeon pits in form (compare Figs. 4 and 9). Indeed, it is possible that the el-Burnat (A) pit functioned similarly in its earliest form, then was converted later into a cistern, at which point the channel was cut. However, it is impossible to either prove or disprove this possibility.

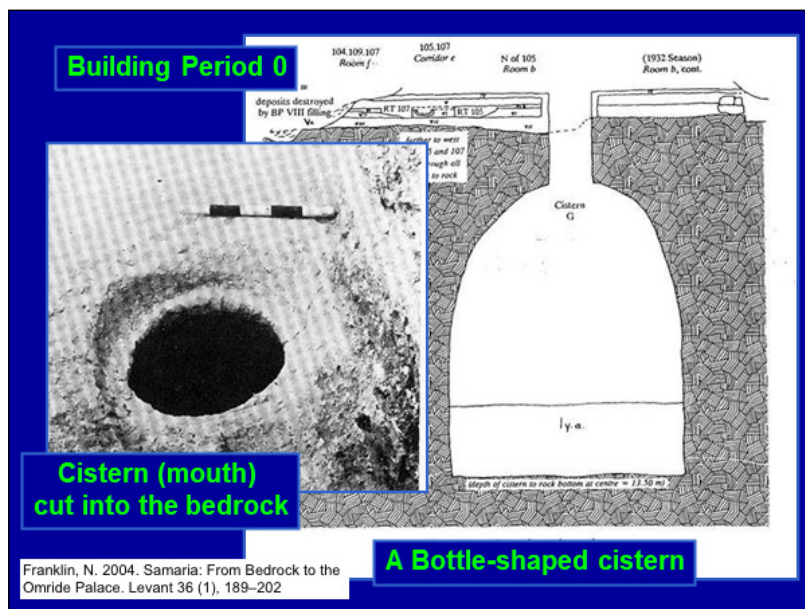


Figure 12: A bell-shaped pit from ancient Samaria (Source: Franklin 2004)

In its current form, the characteristics of the cistern – its bell shape, its mode of entry, the amount of water stored in it, and its ability to be closed with a cover – all suggest that this is a cistern dating to the classical periods, that is, from the Hellenistic period onwards (Tsuk 2011: 44–45).⁵ Analysis of the plaster suggests a date in the Early Roman period.

The Plaster

The use of plaster dates at least as far back as the Natufian period, when builders used it to seal floors and walls (Friesem et al. 2019). However, the use of plaster for storing water in reservoirs and the full plastering of cisterns began in the Late Bronze Age. However, cisterns dating to this period and the following centuries were often carved into soft Eocene chalk, which prevented water seepage to a certain degree.

5 Bell-shaped cisterns with full plastering first appeared in the Hellenistic period, then became widespread in the Byzantine period.

The use of fully-plastered cisterns seems only to have become common in the Iron Age II (Frumkin and Shimron 2006; Angelakis and Mays 2014: 154–155).

According to the results of the carbon-14 dating of the plaster, the cistern was in use in the first century CE, the tenth/eleventh centuries CE, and the twelfth/thirteenth centuries CE. Porath (2002) and later Tsuk (2011: 75–76) have systematically carried out a study of the characteristics of the plaster in cisterns at sites that have been dated with certainty.⁶ However, Tsuk does not describe plaster from all periods, and the shades of color he describes are subjective.

A comparison of the plaster from the cistern at el-Burnat (A) with Porath and Tsuk's descriptions reveals that a shade that they ascribe to the Roman period is relatively similar to the earliest layer of plaster in the el-Burnat (A) cistern (Layer 2). Tsuk and Porath characterize plaster from the Roman period as a layer of grey plaster beneath uniform red plaster. In the case of the el-Burnat (A) cistern, the base layer (Layer 1) is grey, while the layer above it is brown/red. This composition corresponds to the Roman-period plaster described by Porath.⁷

With regard to Layer 3, which dates to the tenth/eleventh century CE, neither Porath nor Tsuk provide any parallels. In fact, the current research may be able to help characterize plaster from this period. Layer 3 consists of white/greyish plaster containing minuscule stone fragments and a relatively large number of charcoal pieces.

Layer 4, dating to the twelfth/thirteenth century CE and consisting of red plaster mottled with grey, does not match any descriptions provided by Porath or Tsuk. From the analysis of the plaster and the carbon-14 dating performed thereon, it is reasonable to assume that the pit was first used as a plastered cistern in the Early Roman period. However, it is possible that the pit was in use before it was first plastered; in light of the fact that el-Burnat (A) is a site from the Late Bronze/Early Iron Age, the cistern may have had an earlier phase of use in which it was not plastered.

6 For an additional description of plaster from the Iron Age and the Roman period, see Elmakayes et al., forthcoming.

7 Although the plaster dates to the Early Roman period, it does not match well-dated Herodian plaster. It seems that a number of different plastering techniques were in use during the same period.

After the Early Roman period, the cistern appears to have fallen out of use until the Early Islamic period.⁸ It was likely used continuously from the tenth/eleventh century CE until the twelfth/thirteenth century CE.⁹

The Cistern's Location

The discovery of this cistern, which is dated to periods much later than the architecture at the site, raises questions regarding the possible usage of the site in the Early Roman, Early Islamic, and Crusader periods. As noted above, archaeological findings from these periods are extremely limited at el-Burnat (A). If Zertal discovered any artifacts dating to these periods in his excavation of the site, he did not mention them in either his survey or his preliminary report (Zertal 1987; 2004: 532–537). Stripling and Leavitt's sifting project yielded only minimal finds from later periods, as discussed above.

The extremely small number of finds at el-Burnat (A) from the periods associated with the use of the cistern suggest that the site was not occupied during these periods. There may have been limited activity at the site in the Early Roman period, perhaps a campsite. There is no evidence of occupation during the Early Islamic and Crusader periods.

Meanwhile, it is possible but unlikely that the el-Burnat (A) cistern is related to the thirteenth century BCE occupation at the site, as there is no evidence to suggest that it was in existence before the Early Roman period.¹⁰ Therefore, the fact that the cistern lies within the enclosure of the site is likely coincidental.

However, as discussed above, multiple sites on Mount Ebal were occupied during these periods, although there are no sites from the relevant periods close to

8 The cistern provided no evidence for plaster from the Byzantine period.

9 Since the cistern was replastered in the tenth/eleventh century CE, it was probably fully cleaned at that point, then once again before the application of its final layer of plaster in the twelfth/thirteenth century CE.

10 As noted above, it is possible that the cistern was in use, but unplastered, before the date of the earliest plaster layer.

el-Burnat (A). Rather, most of the sites lie on the lower fringes of the mountain.¹¹ All of these sites have cisterns, and many have agricultural installations, particularly winepresses. Cisterns often appear at farm sites and in conjunction with agricultural installations (Gibson and Edelstein 1985: 151; Haiman 1995: 34). They can also be associated with herding activity (Braemer et al. 2015: 462).

None of these late period sites have been excavated, and all of them yielded pottery from multiple periods in the survey. This makes it difficult to assign any features at these sites to a specific period. However, it is probable that at least for some interval of time, the lower slopes of the mountain may have been cleared and cultivated to serve as an agricultural or pastoral area. By contrast, according to the paleobotanical analysis from Zertal's excavation, the area may have been carpeted with Mediterranean marquis in the Iron Age (Liphschitz 1987: 190).

Due to the steep terrain of the upper part of the mountain and the scarcity of sites there, it is less likely that this part of the mountain was cultivated. However, the farmers living on the lower slopes may have used this area for pastoral grazing. The cistern may have belonged to shepherds from one of the larger settlements on the mountain, or it could represent a joint project between the shepherds from several small settlements. Another possibility is that the cistern belonged to nomadic shepherds. Today, shepherds from as far away as Hebron seasonally bring their flocks to graze on Mount Ebal. It is possible that a similar situation existed while the cistern was in use.

Conclusion

The cistern that the authors explored and documented at el-Burnat (A) has three layers of plaster, each of which yielded a carbon-14 date. These plaster layers cover a base layer of small stones that likely dates to the same period as the earliest plaster layer. The style of the cistern fits the typology of the classical period. This comports well with the carbon-14 dates, which place the first plaster layer in the first century

11 The closest site from a relevant period is Khirbet el-Kuz (A).

BCE/first century CE. The cistern was likely temporarily abandoned during the Byzantine period, as there is no plaster layer dating to that period.

Based on the carbon-14 testing, the cistern was reused in the tenth/eleventh century CE and continued to be used into the twelfth/thirteenth century CE. The dates provided by the carbon-14 testing, together with the descriptions of the plaster from the el-Burnat (A) cistern, may help to fill in gaps in the known typology of cistern plaster.

It is possible that in its original form, the cistern was associated with the main archaeological ruins at el-Burnat (A), which date to the thirteenth/twelfth century BCE. However, it is impossible to either prove or disprove this theory, since there are no carbon-14 dates from this period.

There is also no strong link between the cistern and any of the other sites on Mount Ebal, as most of these sites lie on the lower slopes of the mountain. Given the terrain of the mountain and the location of the cistern, it seems plausible that the cistern may have been used by shepherds grazing their flocks on the mountain.

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