**Why were the roofs of the buildings in Masada dismantled?**

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Abstract: During Yadin’s excavations, it became clear that the wooden beams had been dismantled from most of the ceilings of the buildings in Masada before the Roman occupation, and about a hundred baking ovens were also exposed there. Moreover, no evidence was found of the alternative wooden wall described by Josephus Flavius built by the besiegers that the Romans burned. It seems that the besiegers used the ceiling beams as fuel to bake their bread.

**Keywords**: Masada, baking oven, casemate wall, wooden wall.

Josephus Flavius details the course of the conquest of Masada by the Romans, and writes that the Romans broke through the stone wall with an iron ram, then the Sicarii built there an alternative wall made of wooden beams which the Roman set on fire (JW 7, 311-–314).

Netzer sees confirmation of this in the fact that in during the extensive excavations conducted by the Yadin expedition at the Masada summit (in 1963-1965), and estimate that that more than 90% of the wooden ceilings of the buildings and the casemate wall that were on the mountain had been dismantled (Netzer 1989, Figures 3, 4, 6, 9). Thus, according Netzer’s estimation, the zealots had at their disposal approximately 4000 wooden beams between 4-–5 m long, several dozen longer beams, and hundreds of shorter beams 2-–3 m and with an approximate width of 20-–25 cm, with which they built the replacement wooden wall (Netzer 1989, 313-–312; Figures 2, 3; Fig. 1).

But at the same time he provides evidence that the wooden beams were not used to build an alternative wooden wall, saying that the **excavations “did not bring up direct evidence of the existence of the wooden and earthen wall**. The section of the wall in the section located in front of and above the earthen embankment that the Romans poured here... but **no unusual fire remains, or earthen were found** here more than usual” (Netzer, 1989, 311).

**Baking ovens in Masada**

The oven is built on the ground in the shape of a truncated cone, with an average inner diameter of about 60 cm and a similar height. The body of the oven is made of two layers. The inner layer is made of fine clay that becomes reddish during the oven heating. The outer layer serves as insulation and is made of local mud including pottery sherds and/or flat stones.

The oven is open at the top, in Jewish sources called “the oven's mouth” and has a portable lid called a “srida”. Another opening in the oven, round and small with the diameter of a fist, is at ground level and used to regulate the heat and allow air to enter the oven. Jewish sources call it the “eye of the oven” (Mishnah, Kelim 8: 3, 7).

The preparation of the bread in the oven takes place in three stages: heating, baking, and taking out the baked bread. In the heating phase, the fuel, wood material, is inserted through the oven's mouth, and lit, and the baker waits until the flames disappear, and glowing coals remain. When the oven is hot enough, the pita bread is stuck to the inner side and removed after a short time.

A study done in Tunisia, has shown that in an oven similar in size and shape to Masada and Ein Gedi ovens, the degree of heat during the heating stage reaches up to 780° C degrees, and, after half an hour, drops to 475° C degrees. Then the baking phase of the pita - *Khobz* begins, which lasts five minutes, allowing a dozen pitas to be baked. Two hours later, the internal temperature drops to 100° C degrees, allowing to cook in it at a slow cook mode (Portillo et al. 2017, 142; Figs 4a, 5).

In an article based on Masada's excavation plans published by Netzer, Reich lists 146 ovens and states that most of them were found in the casemate wall (Reich 2003, 141; Tables 1, 2). According my excavations at Ein Gedi (see below), I estimate the number of active ovens at the time of Masada's destruction was only about 100. Since an oven is a brittle device, a new oven is built next to it when the first falls out of use. For example, out of the three ovens visible in the plan of Room Tower 1264 at Masada, only the oven on the left was active and evident in its better preservation (Netzer 1991, Ill. 696; Fig. 2).

The same phenomenon was revealed during the excavations in every courtyard of the dwelling houses of the village of Ein Gedi of the second temple period (Hadas, 2016, 89). There, in the courtyards remains of several ruined ovens were uncovered close to each other, and next to them was a complete oven, the one that was active at the time of the destruction of the village, and even this active oven was built on top of a ruined one. (Hadas & Peleg-Barkat, forthcoming). Figs. 3, 4)

**Where did the besiegers get fuel to heat their baking ovens?**

The number of people living in Masada probably increased over time since the outbreak of the revolt in 66 CE, reaching its peak during the siege of Masada in 73 CE, counting about a thousand souls, men, women and children (JW 7: 400). It was actually a fortified refugee camp. Because Masada, a large and isolated rock cliff whose top is surrounded by a wall, was a place of refuge that did not require much strength in defense and was equipped with large water reservoirs and dry food warehouses. But they could only obtain fresh food by raiding the nearby settlements, such as Ein Gedi (JW 4: 401-405).

Therefore, the large number of ovens found on Masada's peak indicates that they were built there to provide bread to all Masada's residents. A large amount of firewood was thus needed to fire the baking ovens. The daily fuel firewood consumption per person in Masada for baking bread was calculated to be 1.6 kg (Lev-Yadun et al. 2010, 781). Assuming that a family in Masada consisted of five people, every day, all the ovens in Masada needed a large quantity of wood that could reach up to 307 kg (960:5x1.6). In fact, they consumed more fuel, to run the stoves that were used for cooking and also fuel for heating.

It is likely that until the outbreak of the rebellion, the residents of Masada collected heating materials for the baking and cooking ovens from the near desert environment, which is sparse in vegetation, consisting of *Anabasis articulata*, *Hammada salicornica* and *Zygophyllum dumosum* (Lipshitz and Lev-Yadun 1989, 28). But, during the siege, the need for fuel increased. The only way to supply fuel to their ovens was by cannibalizing the buildings at Masada, that is, by dismantling doors, door jambs, and the large roof beams, which are more energetically efficient heating materials than the desert bushes (Reich 2003, 153).

That is why in the Masada excavations, over a thousand wood samples were collected from building wood, firewood, tools, furniture, and more; from which about 23 different types of wood were identified. The most common trees did not grow in the immediate vicinity: Phoenician juniper (556 specimens) and sycamore (118 specimens), which excel in straight and long trunks and seem to have been used for roofing the buildings at Masada. Specimens of the cedar of Lebanon were also found (99), which could be used for building palaces and producing quality furniture (Liphschitz & Lev-Yadun 1989, 27-28).

In other words, the besieger’s need for a lot of firewood for baking bread was met with the wooden beams that were unloaded from the roofs of the buildings, including the roofs of the casemate wall, which caused the wall to weaken in that the outer wall of the casemate wall was left standing free and exposed to the impact of the stone ball volleys of the Roman *ballistae* that pierced it (Figs. 5, 6); Later earthquakes may also have been added to this, which contributed to the great destruction of the outer wall as is evident today.

**To sum up**, the besiegers most likely used the wooden beams from the roofs of the buildings at Masada as fuel for baking their bread. It is obvious why no evidence of the wooden wall was found - because it was never built. Although the Romans started building the siege ramp, they did not intend to complete its construction, and therefore, a siege tower was never built on it with an iron ram to breach the stone wall. The purpose of the ramp was only to mislead the besiegers in Masada regarding the pre-planned breaching location, which was through the southern gate of Masada (Hadas, 2023).

**Captions**:

1. Proposed reconstruction of a cross-section of the wooden wall built by the besiegers (Netzer 1989, Fig. 2).

2. Three baking ovens in Masada, with only the oven on the left is in excellent state of preservation (Netzer 1991, Ill. 696).

3. Three baking ovens in the Beit ha-Halukim courtyard in the Ein Gedi village (Hadas and Peleg-Barkat, forthcoming). (Hadas)

4. Two baking ovens, one built on top of the other in the courtyard of Beit ha-Halukim in the village of Ein Gedi (Hadas & Peleg-Barkat, forthcoming), (Hadas).

5. Proposed reconstruction of a cross-section in the casemate wall (Based on Fig. 1).

6. Proposed reconstruction of the cross-section of the casemate wall after dismantling the roof from its wooden beams (Based on Fig. 1).

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