

Masada



The Dead Sea's Desert Fortress

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Staff for this book:

Robin Ngo – Editor

Robert Bronder – Designer

Susan Laden – Publisher

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Biblical Archaeology Society
4710 41st Street, NW
Washington, DC 20016
www.biblicalarchaeology.org

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Introduction

Herod's desert fortress on the mountaintop of Masada has been immortalized as an enduring symbol of Jewish pride and determination. Although the stronghold was built by the megalomaniac King Herod, it was made famous as the site of the last stand between the besieged Jewish rebels and the relentlessly advancing Romans in the First Jewish Revolt in 73/74 A.D. Having spent months hemming in the rebels and hoisting a siege tower to the top of the mountain, when the Romans finally breached the Jewish defenses, they were met—so the story goes—only with silence. According to first-century Jewish historian Josephus's account, the rebels chose to commit suicide rather than be captured and enslaved by the Romans. What is the archaeological evidence for the siege of Masada?

Yigael Yadin's famous excavations of Herod's Masada desert fortress in the 1960s brought the final chapter of the First Jewish Revolt vividly to life. What was uncovered on this long-abandoned mountaintop? In "The Last Days and Hours at Masada," Ehud Netzer reviews Yadin's finds, from Herod's two palaces to the casemate wall that Josephus reports the Romans set ablaze to gain entry into the fortress. Discover how well Josephus's dramatic—and dramatized—account of the siege of Masada holds up to the archaeological evidence.

In an unprecedented breakthrough, paleographer Ada Yardeni recently identified the handwriting of a single scribe on more than 50 Dead Sea Scrolls from the Qumran caves. Remarkably, Yardeni identified the same scribal hand in a manuscript of the Joshua Apocryphon discovered in the Masada desert fortress, 30 miles south of Qumran. In "Scribe Links Qumran and Masada," Sidnie White Crawford explains what this identification can tell us about the scribal community at Qumran.

Scholars have long assumed that the ramp built by the Romans to breach the rebel stronghold at Masada required a huge effort in men and material. The Masada desert fortress sat atop a lofty mesa with cliffs soaring 300 to 1,000 feet high. But a study of the geology of the region, as described in "It's a Natural: Masada Ramp Was Not a Roman Engineering Miracle" by Dan Gill, reveals that the Romans may not have had to do much at all.

The large and diverse array of arms and armor discovered all over Masada offers a unique perspective to the Roman siege. Yigael Yadin believed that a cache of arrowheads found in two palace rooms, for example, were among the supplies the Jewish rebels set afire before committing mass suicide. Was he right? In "Masada: Arms and the Man," Jodi Magness's

investigation into the context of these arrowheads and other weapons at Masada sheds light on the Roman and Jewish warfare tactics in the final chapter of the First Jewish Revolt.

The climactic moment of the Roman siege of Masada, in which the Jewish rebels choose suicide over capture and imprisonment, comes to us from a single ancient source—Josephus. In “Questioning Masada: Where Masada’s Defenders Fell,” Nachman Ben-Yehuda reveals that the only ancient description of the mass suicide at Masada shows signs of having been tampered with—perhaps deliberately.

The articles in this eBook are a preview of the many exciting archaeological investigations covered in the pages of *Biblical Archaeology Review*.

Robin Ngo
Biblical Archaeology Society
2014

The Last Days and Hours at Masada

By Ehud Netzer



Baron Wolman

THE PRECIPITOUS CLIFFS OF MASADA, which rise more than 1,300 feet above the nearby Dead Sea, prevented the Romans from mounting a general assault all along the walls of the 20-acre fortress. Instead, the Romans built an immense ramp in order to roll their siege engine, a huge battering ram mounted like a swing in a tower with wheels, up to the base of the wall. In this aerial view to the north, the storerooms and administrative buildings of the northern palace appear at the upper point of the diamond; the Roman siege ramp rises on the left, near the middle of the diamond, to meet the outer wall beside the western palace. The double-walled casemate is still evident at many places on the mountain's periphery.

The last stand in the First Jewish Revolt against Rome took place on the nearly diamond-shaped mountaintop of Masada, site of a palace-fortress completed by Herod the Great (37–4 B.C.E.).

Jewish Zealots who occupied Masada at the start of the revolt in 66 C.E. held the site throughout the war and became the last outpost of resistance to the Romans after the fall of Jerusalem in 70 C.E. Despite a tenacious defense, the Zealots finally succumbed to the Roman siege in 73 or 74 C.E. Rather than allow themselves to be taken prisoner and enslaved, they chose to commit mass suicide.

Since Yigael Yadin's untimely death in 1984, a group of scholars^a has been working assiduously to complete the final publication of Masada, Yadin's most famous excavation. Herod's desolate mountain palace-fortress at Masada is located in the Judean wilderness near the western shore of the Dead Sea.

Although Herod built palaces, baths, cisterns, storerooms and fortifications atop this extraordinary flat-topped, diamond-shaped mountain, the best-known chapter in Masada's history is not Herod's, but the Zealots'. The Zealots, a desperate band of Jews, occupied the site during the First Jewish Revolt against Rome, which, for all practical purposes, ended in 70 C.E.^b when the Romans burned Jerusalem and destroyed the Temple.

At Masada, however, the Zealots held out for three or four years after Jerusalem fell. The relentless Roman army under Flavius Silva built eight siege camps around the site and constructed a gigantic ramp on the western side of the mountain as an entryway for their troops and as a platform for their battering rams and ballistae (missile-throwing machines).

The Roman siege of Masada is described in great detail by the first-century Jewish historian Josephus. According to his account, when all was lost, the defenders committed mass suicide rather than surrender to the Romans. Each man killed his own family. Ten men were then selected to kill the rest. One of the ten was then selected by lot to kill the remaining nine. In the words of Josephus:

"[T]he nine bared their throats, and the last solitary survivor, after surveying the prostrate multitude, to see whether haply amid the shambles there were yet one left who needed his hand, and finding that all were slain, set the palace ablaze, and then collecting his strength drove his sword clean through his body and fell beside his family" (*The Jewish War* 7.397–398).

Yadin's expedition found 11 potsherds, each inscribed with a different name, that may have been the lots cast to determine who would kill their comrades. One of the lots bore the name of Eleazar Ben Ya'ir, the Zealot leader.



Courtesy Ehud Netzer

CASTING LOTS, the Zealots in Masada "chose ten men ... to slay all the rest," says Josephus, and then "casting lots for themselves, that he whose lot it was to first kill the other nine, and after all, should kill himself." In a remarkable discovery, Yigael Yadin's excavation at Masada may have found the actual lots, including the one above, used in that final deadly lottery. Amid a vast accumulation of debris in the northern portion of room 113, Yadin uncovered eleven ostraca (potsherds with inscriptions in ink) bearing eleven different names.

When the Romans finally burst into the fortress, they expected a battle, but they found only silence.^c Food remaining in the storerooms demonstrated that the defenders had not been starved out.

According to Josephus, the Romans gained entry into the fortress by setting fire to a wood-reinforced earthen wall. The Zealots had built this wall inside the stone fortress wall at the point where the Roman siege ramp reached the outer wall. Josephus describes this additional wood-and-earth wall in some detail. It was built hastily, he tells us, and was intended to withstand attack from the Roman battering rams, “for it was pliable and calculated to break the force of the impact.” Here is Josephus’ description of the wall’s construction:

“Great [wooden] beams were laid lengthwise and contiguous and joined at the extremities; of these were two parallel rows a wall’s breadth apart, and the intermediate space was filled with earth. Further, to prevent the soil from dispersing as the mound rose, they clamped, by other transverse beams, those laid longitudinally. The work thus presented to the enemy the appearance of masonry [the original outer stone wall that surrounded the entire fortress], but the blows of the engines [battering rams] were weakened, battering upon a yielding material which, as it settled down under the concussion, merely served to solidify it” (*The Jewish War* 7.311–314).

The wood of this partly soil wall, however, unlike stone, was not fire-resistant, a fact, according to Josephus, that did not escape Silva, the Roman commander:

“Silva, thinking it easier to destroy this wall by fire, ordered his soldiers to hurl at it showers of burning torches. Being mainly made of wood, it quickly caught fire, and, from its hollow nature becoming ignited right through and blazed up in a volume of flame” (*The Jewish War* 7.315–316).

Yadin’s extensive excavation of Masada between 1963 and 1965 uncovered no direct evidence of this wood-and-earth wall. The section of the wall located directly in front of the Roman ramp had been greatly destroyed, but no evidence of a conflagration or of an unusual amount of earth was uncovered. On the other hand, some of this area (including an outer structure—tower 1010) was not excavated because of interference from the service-cablecar constructed when the excavation was started. (It is still in use today.)

The question naturally arises as to whether this wood-and-earth wall was an invention of Josephus—or possibly of his sources. Another question: How could the desperate Zealots, in the

midst of the Judean wilderness and surrounded by the Romans, suddenly have found all the wooden beams necessary to construct and support this wall?

As I was studying this question, I noticed another anomaly. Only about ten percent of the buildings on Masada showed signs of having been burnt. Yet, according to Josephus, the last male survivor had set fire to the place before taking his own life.

Stranger still, the ten percent that had been consumed by fire was not contiguous. In other words, rooms here and there had been burnt, but for the most part they were not adjacent to one another. One would have thought that the fire lit by the last survivor would have spread from room to room. How could we account for the fact that rooms destroyed by fire seemed, instead, to dot the plan of the site?

There is no doubt that the idea of an inner wall, largely made of wood and earth, just inside the fortress wall at the top of the Roman ramp was a brilliant idea. The wall that surrounded the fortress was a stone casemate wall, consisting of two parallel walls broken at intervals by transverse walls between the two parallel walls, thereby creating casemates, or rooms. The outermost wall of the casemate was 5 feet thick; the innermost was 3 feet thick. This wall was no match for the Roman battering rams.

As the Roman ramp rose higher and the siege tower and battering rams came ever closer to the mountaintop, the siege reached a critical point. Other than escape or surrender, the Zealots had only one option: to prevent the breaching of the wall by strengthening it and possibly raising it higher, thereby making it more difficult for the battering rams to break through. Of course it could have been strengthened and heightened with stones, which were freely available (buildings could have been dismantled for this purpose). However, this would have been a difficult and prolonged process. The buildings on Masada were built with stones hewn from dolomite rock; they were hard and heavy, a fact that would have made their transfer to the probable point of breaching very difficult and would have made lifting the stones especially taxing. Moreover, if the Romans were able to remove even a few stones from the base, an entire section of the weakened wall could be knocked down.

Wood-reinforced earthen walls were common in Roman military construction. For Masada's defenders, such a wall would be much easier and quicker to construct, and even if the Roman battering rams succeeded in displacing some beams, there would be no danger of the entire wall collapsing.

But where to get the wooden beams necessary for such a wall?

The likely answer was quite simple: Wooden beams were used in the roofs of all the rooms, halls and storerooms of Masada (with perhaps one or two exceptions). Most of these structures were built during the time of Herod. The desperate defenders could remove wooden beams from the buildings as well as from the casemate wall and towers that surrounded them. The great amounts of soil required to fill the wall, as Josephus reported, could be carried to the site from elsewhere on the mountaintop, even by women, children and the elderly.

From the evidence of unburnt beams in two towers and the remains of burnt beams elsewhere, we know that the wooden ceiling beams most prevalent on Masada were about 13 to 16 feet long and 8 to 10 inches in diameter. There were also longer beams. Our calculations show that the Zealots must have dismantled more than 90 percent of the ceilings that were on the mountain. We estimate that they used about 4,000 13-foot-long beams, several dozen longer beams and hundreds of short beams (about 7 to 8 feet long). Working in haste and with many improvisations, here is how the Zealots may have constructed the wooden and earthen wall. The restoration we propose is but one of many possible forms of the wall.

The new wall would reinforce the section of stone casemate wall that faced the top of the ramp constructed by the Romans outside the wall. The ramp's purpose was to raise the Roman siege engines to the height where they could batter and breach the stone fortress wall. It is difficult to determine the exact location of the new wall and how tower 1010, located in that sector, was incorporated into it; however, we assume the tower was incorporated into the wall. It is also unclear how the newer wall related structurally to the existing casemate wall. It seems most likely to us that the inner wall of the casemate, as well as the roof that spanned the inner and outer walls, was dismantled.



Against the original outer stone wall, on the inside of the fortress, a wood-and-earth wall was constructed, probably consisting of three parts: two stacks of wooden beams—each stack held together with ropes and nails—separated by an earth fill. The outermost stack, next to the remaining casemate wall, contained the 13- to 16-foot-long wooden beams scavenged from ceilings on the mountaintop. These beams were laid perpendicular to the outer stone wall with their ends butting against it. Mortar filled the spaces between the beams. This stack of beams probably extended about 6 to 10 feet higher than the original stone wall.

Approximately 12 feet from the outer wood-beam wall, an inner wood-beam wall was built. For this inner wall, Masada's defenders probably used the shorter 7- to 8-foot-long beams, some of which were cut from the longer beams. Between the two stacks of beams, earth was packed. According to Josephus, this earth layer was as wide as "the wall's thickness" (about 8 feet). The earth layer may have contained medium- and small-sized stones to help stabilize it. Josephus, in describing the earth-and-wood wall, mentions perpendicular beams (called warp beams, as opposed to weft beams, in some translations). We assume that he was speaking about long vertical beams in the earth layer that helped stabilize the soil, especially at the edges of the wall, so that it would not spill to the sides. It is also possible that an additional column of vertical beams separated the outer stack of horizontal beams from the layer of earth. These vertical beams would have helped spread the pressure of the battering rams over a wider area of the wall, hence diminishing the effect of their blows. According to our calculations of the amount of wood available, it would have been possible to build a wall 70 to 80 feet long, about 60 feet wide and 24 to 27 feet high, that is, a wall 4 to 8 feet higher than the original stone casemate wall. The new wall would have been practically impregnable to the battering machines, whereas the original stone wall could be shaken and damaged by battering its base. By increasing the height of the wall, the Zealots forced the Romans to raise the height of the siege ramp as well. Facing a stone wall, the Romans needed only to build their ramp to reach its base; but facing the new wall of wood and earth, which could not be easily undermined, the Romans had to build their ramp much higher; the new wall was vulnerable only from a higher position. This required the Romans to widen the base of the ramp by pouring additional earth and stones, a time-consuming task that postponed the attempt to breach the wall by weeks. Certainly this delay was needed by the besieged Zealots.

Impregnable as the new wood-and-earth wall was to battering, it was not invulnerable to fire. The Jewish defenders must have considered the possibility that the Romans would try to use fire to destroy the new wall they had built. Perhaps they even planned to prevent this, by covering the wooden beams with damp leather or by placing layers of mortar between the wooden beams at

intervals to prevent the fire from spreading. It seems that they believed—that by one means or the other—they could prevent the wall from burning.

When we look at the evidence on the ground, do we find confirmation for our theory? Are there signs of the Zealots' frantic last days spent dismantling wooden ceilings and of the fires that scorched the mountaintop structures before the Romans finally overcame the small band of Jewish defenders? The signs are everywhere.

Rooms, halls, corridors and storerooms with clear indications of fire are frequently seen side by side with those in which no signs of fire are to be found. We are certain that if all the wooden ceilings at Masada had been intact, fire would have spread easily and rapidly from room to room, destroying entire blocks—not single rooms or groups of rooms at random, as actually did happen.



The selective dismantling of wooden ceiling beams seems to have begun in two large groups of buildings on Masada—the western and the northern palace areas. Both areas were located near the endangered wall sector opposite the Roman ramp, and both had many storerooms that must have been empty at the time. We assume that these palace areas were under communal supervision and, therefore, it was easier to carry out the decision to dismantle the ceilings in these buildings than in private residences.

The northern zone contained the palace built by Herod on three rock terraces, his elaborate bathhouse, the large complex of storerooms and a few other edifices. The Zealots, like Herod, administered this area as a closed and protected unit. The western palace, too, was used by the Zealots as a communal area. It was the only residential building not divided by the Zealots into secondary units. It contained central, large-scale kitchen facilities and a spacious storage area where storage jars as well as domestic utensils such as jugs and plates were found. Clearly, the dwelling area of the western palace was too large for one family. We believe that it was the residence of a group, living together in a collective life-style.

When the Zealots took over Masada during the revolt against Rome they found storerooms full of supplies. During their seven years of residence on the mountain, they slowly emptied the storerooms. At first sight, it would seem that these empty storerooms would have then served as living quarters. However, since they lacked sufficient light and air, most of them were unsuitable for this purpose.

We looked closely at the pattern of destruction by fire, assuming that the presence of ash meant wooden ceilings had been in place when Masada was torched; no ash meant that the ceilings had been previously removed. We found no signs of ash in most of the rooms and storerooms of the western palace. However, at the heart of the palace, around the courtyard (441), several luxurious rooms—the throne-room (458), a room with a splendid mosaic floor (456) and a frescoed room (465)—showed clear signs of the blaze that consumed their wooden ceilings.

Did the Zealots refrain from dismantling these ceilings so as to use the rooms as sleeping quarters, or out of a reluctance to destroy such magnificent rooms? Neither explanation seems correct. The objects uncovered in the mosaic room (456) suggest the reason this room was preserved; here was poignant evidence of the defense preparations that engaged the band of Zealots during their last fateful days. Iron arrowheads were strewn on this floor and that of room 442 to its east. These two rooms had become workshops for casting arrowheads.

In the northern palace zone the pattern of the conflagration is quite clear, even though some of the storerooms have not yet been excavated. The northern zone consisted of the rooms and terraces of the dramatic three-tiered palace that cascaded down the “prow” of the boat-shaped mountain; a large Roman-style bathhouse south of the palace; 18 storerooms, from 65 to 85 feet long, ranged in parallel rows to the east and south of the bathhouse; and a western building (building 7) constructed around a central courtyard.

Several of the long storerooms (140, 141, 135) in the northern palace area were found bums, with clay jars and *pithoi* in their ashy remains. Clear signs of conflagration were also evident in corridors surrounding the storerooms: on the south (144), on the west (113 and 145) and in the north, especially in the L-shaped corridor or storerooms (121 and 126). But in most of the excavated storerooms as well as in building 8 to the south of the storeroom area and building 7 to the west, the wooden ceilings must have been removed; no signs of burning were found.

In the northeastern block of the central storage rooms, beneath the northern end of the east corridor, a bathhouse was uncovered in great disarray, although without any sign of ashes. How

had the extreme disorder occurred? We believe that the destruction at this site was not the result of the Roman garrisons seeking spoils (as Yadin assumed when he first exposed it), but rather resulted from the dismantling of the wooden ceilings of the bathhouse for use in the wood-and-earth wall.

Two small rooms, 183 and 184, to the west of the large bathhouse, were the scene of dramatic events during Masada's last days. Room 183 is known as the water gate because it opened onto the footpath that descended to eight huge water cisterns on the northwestern slope of the mountain. Just to the east of the water gate was a long room (113) running north-south. In this long room Yadin found the 11 ostraca, inscribed potsherds, that he identified as the lots cast by Masada's leaders to determine who would be the last to commit suicide before the Romans breached the walls. Great quantities of burnt ceiling debris as well as other ostraca were also found dumped into the northern section of room 113. How can we explain this?

Here is what we now think happened. After the fires set by the Zealots abated, Roman soldiers climbed the mountain by the access road that led from the huge cisterns on the flank of the hill. They entered the water gate and found the room filled with burned wood debris from its fallen ceiling. The same scene greeted the soldiers in the adjacent room 184. Expecting a battle with the entrenched Jews, the Roman soldiers rushed to ease their access onto the mountaintop by clearing away the still smoldering, charred wood. We now think that they dumped the debris into nearby room 113, carrying along with the ashy wood the 11 clay ostraca that would one day connect us to the men and events of 2,000 years ago.

In the great bathhouse in the center of the northern zone of the mountain, the signs of burning were confused, probably because the Roman soldiers emptied the building after their conquest of Masada. The only definite indication of conflagration was found in the *exedra* (102), a rectangular recess on the northern side of the bathhouse.

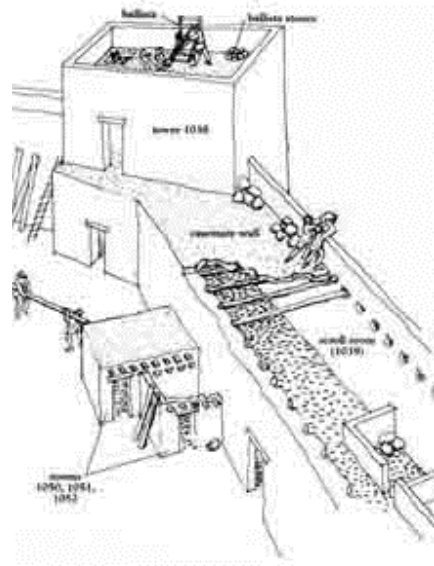
On the other hand, in the northern palace the picture is quite clear. Most of the ceilings of the lower terrace were dismantled before the fire, so we found no ash. On the middle terrace, signs of conflagration were evident in the group of rooms (most likely two-story structures) attached to the northern cliff of Masada. The main feature of this terrace—the *tholos*, or circular building surrounded by a colonnade—was probably dismantled by the Zealots *in toto* several years earlier, during their initial period of settlement on the mountain. The upper terrace of the northern palace also suffered from clearance operations, probably by the Romans in search of treasure, or possibly later, in the fifth or sixth century C.E., by Byzantine monks who occupied the mountain.

Only the southwestern corner room (88) of the upper terrace presented indisputable evidence of fire.

The pattern persists as we look at all the excavated structures on Masada: a room here, a room there show telltale ash from wooden ceilings that were intact when Masada was set fire by the Jews. But most of the rooms in the buildings and within the casemate walls contained no ash; their wooden ceilings had been removed for use in the wall thrown up to resist the Roman battering rams.

With this understanding in mind, we can better understand what may have occurred in the Scroll Room (room 1039, in the casemate). Here Yadin discovered fragments of scrolls, papyri, silver shekel coins minted by Jews and dated to the second year of the revolt against Rome (67 C.E.) and many other artifacts. Beneath these precious articles he also found hundreds of stones. On top were smaller, 5-inch-diameter, catapult stones carved from soft limestone. Below were the large rolling stones, made from harder local dolomite, each one about 1.5 feet in diameter.

Adjacent to the Scroll Room was a tower (1038), also built into the casemate wall. Most probably, the Zealots placed a firing-machine (ballista) on top of the tower to hurl stones at the Roman soldiers building the ramp. As the need for wood became critical, the ceilings of the Scroll Room, of three small rooms (1050, 1051 and 1052) beside the Scroll Room and, finally, of tower 1038 were taken apart and reused in the defensive wall. The ballista stones piled on the roofs of the tower and the casemate wall fell into, or were thrown into, these rooms when the roofs were dismantled. When the Jewish resistance ended, the Romans came onto the mountain, gathered the spoils of documents and coins and threw them on top of the mound of stones—a silent reminder of the futile defense of the mountain fortress.



F. Schonbach

RESOURCEFUL DEFENDERS. Outmanned and “outgunned,” the Zealots relied on ingenuity to stave off the Roman onslaught. Taking advantage of their high ground and the plentiful supply of rocks, they apparently set up a ballista, a powerful catapult, on top of tower 1038. With this ballista, they bombarded the Romans building the siege ramp, slowing the work and thereby gaining time for their countermeasure, the reinforcing wall being constructed at the principal point of attack.

Individual defenders on the casemate wall could also drop boulders on soldiers attempting to climb or undermine the wall. At the same time, others contributed their labor to the defense of the fortress by hurriedly stripping roofs of buildings for the sake of the wooden beams within them and carrying the beams away to reinforce the wood-and-earth wall.

Eventually, according to Netzer, even the tower roof and the roofs on the casemate wall rooms were dismantled for their beams. When that happened, the ballista stones fell or were thrown into the now open casemate. Excavators found the spherical stones resembling cannon balls in three small rooms (1050, 1051 and 1052) beside the tower.

The fate of two special structures at Masada differed from everything else we found. These towerlike structures, called *columbaria*, contained small niches that probably sheltered pigeons. The square tower (1033–1034) in the western wall and the round tower (725) at the center of the southern part of the mountaintop showed no sign of fire, yet many of the original wooden beams were unearthed among the ruins exposed on the towers' floors. It seems that the Zealots as well as the conquering Roman army chose to leave the *columbaria* intact, perhaps in order not to disturb the pigeons. We assume that another *columbaria* tower (1028–1029), also located in the western wall, was also left intact. This tower was cleared out and rebuilt later by the Byzantine monks, however, obscuring what happened at the time of the Jewish revolt.



Courtesy Ehud Netzer

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Our conclusion that hardly a single wooden ceiling remained intact on the eve of Masada's destruction is indirectly supported by the location of Roman garrisons on the mountain after the destruction. The soldiers improvised temporary constructions, apparently covered with canvas, within building ruins or between them. If the Roman troops had found many roofed buildings, they would have used them for living quarters. But we found that only in very rare cases was this actually done, for example, in several rooms in the northern part of building 7. Roman coins and installations different from those built by the Zealots signaled use of these rooms by Roman soldiers. Even here, it may well be that the rooms were roofless and that the troops had to spread canvas sheets overhead.

Some people have tentatively proposed that the Roman troops looted the missing wooden ceiling beams after the destruction. It seems unlikely to us that they would have looted beams from structures in which they might have lived, only to use those beams to build other places to live. But still more difficult to answer is the question: How would wooden beams have survived the fires that burned over large areas of Masada after the Zealots' death?

During Masada's last days the entire Zealot community was engaged in dismantling the wooden ceilings and constructing the wood-and-earth wall. As the Romans built their ramp higher and higher, ever closer to the wall they sought to breach, the Zealots worked in frantic haste. They removed layers of clay soil, branches and reeds from above the ceiling beams, extracted the beams from the walls and transferred them to the construction site. Some beams were cut; nails and ropes were gathered. To avoid the catapult stones that rained on them during the day,

the Zealots probably constructed their new wall at night. Working under these conditions, we calculate that it may have taken one to two weeks to build the new wall.

But despite the Zealots' hopes and expectations, the wood-and-earth wall did not survive the test of fire. Josephus wrote that as soon as the wall was set on fire and the fire spread with the assistance of winds, the Zealots knew that nothing could prevent the Romans from breaking through to the mountaintop. In the face of their inevitable defeat, they decided not to be taken alive by the Romans, but to leave the Romans only scorched earth.

That the Jewish defenders succeeded in burning almost everything the Romans might have used is evident from the hearths that served as pyres for valuables. Furniture, personal items and things of value fueled the fires on these hearths and left their remains in the ash. However, in the haste of the Zealots last days and especially their last night, some spoils fell into the hands of the plunderers. We have already noted the finds in the Scroll Room; in another location, in the tower of the tanner (room 1276) in the casemate wall west of the western palace, scrolls, papyri and silver shekel coins were also discovered—probably gathered and abandoned there by the Romans.

Where are the signs of the wood-and-earth wall that the Zealots threw up to face the Roman ramp? During Yadin's expedition in the 1960s, he excavated the area of the wall almost completely down to bedrock. Not anticipating the Zealots' defense wall, Yadin may have erased the subtle signs of its presence.

But there are several reasons why, even if he had been looking, Yadin might not have found anything there: The area is exposed to strong winds that would have blown away ashy remains and the earthen part of the structure. Fires in open places, rather than within the walls of rooms, leave little trace. Before the first course of long logs were laid in the wall, it was probably necessary to level the uneven bedrock by adding a layer of soil. The soil would have prevented the burning logs from leaving their charred imprints on the bedrock. Finally, the Byzantine monks may have removed the wall's remains to use in their own construction just a few dozen feet to the north.

Although direct evidence of the wood-and-earth wall is absent, there is no doubt that the Roman soldiers entered Masada at the point in front of the siege ramp. No other section of Masada's wall suffered so much damage. The huge fire set by Roman torches that blazed in the night at the western edge of Masada ended any hope the Jews may have held that somehow they could survive the Roman attack.

The destruction of Herod's palaces, storerooms and bathhouses on Masada began with their dismantling by the Zealots and with the fire they later set to consume everything that remained. After the Roman attackers were long gone, Masada's decay continued slowly in the years that followed. Wind and rain eroded the structures that remained and, in the first centuries C.E., one or more earthquakes caused major damage. By the fifth or sixth century, when Byzantine monks reached the top of Masada, they found mound upon mound of ruins—a sight not unlike the one we found when Yadin began the excavations on Masada.

Scribe Links Qumran and Masada

By Sidnie White Crawford

Recently Ada Yardeni, the foremost paleographer working in Israel today, made a startling claim: More than 50 Dead Sea Scroll manuscripts were copied by the same scribe.¹ The 54 manuscripts came from six different caves: Qumran Caves 1, 2, 3, 4, 6 and 11. Even more surprising, Yardeni identified the same scribal hand in a manuscript of the Joshua Apocryphon found 30 miles south of Qumran at the famous desert fortress of Masada, the last holdout in the Jewish revolt against Rome.

Yardeni is not the first scholar to identify more than one Qumran text copied by the same scribe. After all, scribes in ancient Judea were trained professionals; it is not surprising that each scribe would have written several of the more than 900 documents that comprise the Dead Sea Scrolls. Careful study of scribal hands has shown that a number of other manuscripts were copied by a single scribe. For example, the scribe who penned one of the intact scrolls (the Community Rule—1QS) from the famous Cave 1, where Bedouin made the initial discovery of the scrolls, also copied an important text of the Biblical Book of Samuel (4QSam^c) and made corrections in what is probably the most famous of the scrolls, the Great Isaiah Scroll (1QIsaiaha).



Baron Wolman

THE MANUSCRIPTS' LAST STAND. The Romans attacked Qumran in 68 C.E. and burned Jerusalem's Temple in 70 C.E. The fortress at Masada (shown here) was besieged for almost three years afterward as the final Jewish rebel stronghold beyond the grasp of Rome. Many of the manuscripts found at Masada were discovered in the third casemate of the fortress wall, near the first-century synagogue, and several bear relation to Qumran texts. Scholars have suggested that fleeing Qumranites carried important texts to Masada. A new paleographical study by Ada Yardeni is the first to confirm that scrolls at both sites were penned by the same hand.



John Strugnell, one of the members of the original team assigned to publish the scrolls, attributed several other manuscripts to the same scribe; however, these manuscripts are small and fragmentary, and not all scholars agree on the identifications.² Other leading scholars, including Józef T. Milik and J.P.M. van der Ploeg, have made similar suggestions, but tentatively.

More recently, Eugene Ulrich identified the hand of a scribe who wrote three manuscripts found in different caves (4QIsa^c, 1QP^s^b and 11QM). He described this scribe as having “an elegant, careful, distinctive hand” that is immediately recognizable.³ Ulrich’s identification is thoroughly documented and is likely to withstand scholarly scrutiny better than some of the earlier identifications. But Yardeni is the only paleographer to attribute so many manuscripts to one scribe.



A DISTINCTIVE *LAMED*. The early Herodian script on this Hosea commentary (4Q166) matches that of more than 50 other Qumran texts and one from Masada. Yardeni analyzed each letter’s form, describing the *lamed* as the “most characteristic letter of this scribe, with its curved body, which opens to the left, creating a long, concave base ... [I]n the calligraphic book hand of this period, the letter usually lacks a base ... [A]t the top of the ‘mast,’ it has a small triangular loop or a thickening created by an additional stroke.” This commentary on Hosea interprets a passage involving analogies between God as the husband and Israel as the unfaithful wife.

Courtesy Israel Antiquities Authority/
Photographer Tsila Sagiv



Yardeni analyzed each letter's form, describing the *lamed* as the "most characteristic letter of this scribe, with its curved body, which opens to the left, creating a long, concave base ... [I]n the calligraphic book hand of this period, the letter usually lacks a base ... [A]t the top of the 'mast,' it has a small triangular loop or a thickening created by an additional stroke."

Courtesy Ada Yardeni

What are we to make of all this? First and foremost, these identifications reflect subtle achievements in the art and science of paleography by which scripts are identified and dated based on the way individual letters are formed. Letter forms change or evolve slowly over time; observing the characteristics of the letters enables paleographers to date a script within a certain range of dates. In the case of the Dead Sea Scrolls, the manuscripts can be dated within about a 50-year range. When the paleographical dating of the scrolls was confirmed by radiocarbon (carbon-14) tests,⁴ Harvard professor Frank Cross remarked that "the [carbon-14] results were remarkably in agreement with dates arrived at earlier on paleographic grounds ... paleographical analysis is more precise, and often can narrow the range of dates to a half century."⁵ In a more jocular vein, Cross said that the tests "vindicated the confidence I have always had in the accuracy of ... carbon-14 dating."⁶

The scribe identified by Yardeni who copied more than 50 texts worked in the first half of the Herodian period (late first century B.C.E. to the start of the first century C.E.), the floruit of the Qumran community. Yardeni describes the general appearance of the scribe's handwriting as "orderly, spacious and elegant, indicating a skilled, professional and trained hand, easily recognizable thanks to its peculiar *lamed*, with the 'pressed' and curved lower part."⁷

The fact that one scribe penned manuscripts found in more than one cave (and, in the case of the scribe identified by Yardeni, in six caves) provides a powerful counter to an argument sometimes made about the Dead Sea Scrolls: that the Qumran collection was simply a "general Jewish" library, rather than that of a particular Jewish sect. According to this argument, the scrolls are not a special or sectarian collection but simply a general Jewish library that was hidden at Qumran during the Great Jewish Revolt against Rome (66–73 C.E.). However, if Yardeni (and Ulrich) is correct that the same scribe copied scriptural and sectarian manuscripts, it makes sense to conclude that the scribe was a member of that sect who also copied Jewish scriptural

scrolls, countering the idea that the Qumran collection was a non-sectarian “general Jewish” library.

Another argument rebutted by the same scribe's hand appearing in different caves is that each cave reflects a separate collection belonging to a different Jewish group. If the same scribe copied manuscripts found in separate caves, then those scrolls must have originated in the same place, with the same scribe, and therefore the group to which that scribe belonged must have placed the scrolls in the different Qumran caves. To put it another way, the fact that manuscripts penned by the same scribe turned up in different caves makes it difficult to argue that the manuscripts in different caves are not connected to each other.



Courtesy of the Schøyen Collection

Bronze inkwell discovered at Khirbet Qumran.

Another question that sometimes arises in relation to Qumran is whether or not manuscript copying actually took place there at all. The presence of six inkwells serves as physical evidence that writing did take place at Qumran.^a Moreover, hundreds of scroll fasteners were found in Cave 8, one of the marl terrace caves near the building at Qumran, serving as evidence for the manufacture of scrolls at the site.^b

The first generation of scroll scholars assumed that all the scrolls were copied at Qumran. It is now clear that they weren't. About 10 percent of the scrolls—dated paleographically—were written before 100 B.C.E., when the settlement was established. It is not logically possible that scrolls that predate the site itself were copied there. But surely some of them were.

Some scrolls were copied at Qumran during its period of occupation from c. 100 B.C.E. to 68 C.E., at which time the Romans attacked the site. This is supported by evidence of a single scribal hand in multiple documents from several different caves, as in the cases of the scribes identified by Ulrich and Yardeni. Yardeni's scribe worked in the late first century B.C.E., the period from which the highest percentage of the manuscripts date and when the settlement was at its largest.⁸

Finally, what about the manuscript from Masada that Yardeni says was penned by the same scribe who copied more than 50 texts found at Qumran? Shemaryahu Talmon identifies the two Masada fragments by this scribe as the "remainder of an apocryphon woven on the Book of Joshua. More precisely, it reflects vestiges of the report of the last episodes in Joshua's life: the summary of the conquest (Joshua 21:43–45) and Joshua's final address to the people (Joshua 23) at the meeting in Shechem (Joshua 24), in which he surveys major events in the history of Israel." Talmon notes similarities to the Psalms of Joshua (4Q378, 4Q379) from Qumran Cave 4, though the dissimilar scripts prove that they are not fragments of the same manuscripts. Before Yardeni confirmed that many Qumran texts and the Joshua Apocryphon were written by a single scribe, Talmon had already suggested that the Masada text was carried to the site by Qumranite refugees.⁹



FAMILIAR HANDWRITING IN AN UNFAMILIAR PLACE. This Joshua Apocryphon on the latter part of the Biblical Book of Joshua was found at Masada but penned by the same scribe who wrote more than 50 manuscripts discovered at Qumran. The scribe is not the only indication that this text was likely penned at Qumran. The content shares linguistic and literary analogies with the Qumran text known as the "Psalms of Joshua" (4Q378, 4Q379). Joshua's military conquests may have resonated particularly with the rebels at Masada during the First Jewish Revolt.

Masada VI (Israel Exploration Society, Jerusalem)

A connection between Qumran and Masada has long been known. Nine copies of the liturgical cycle Songs of the Sabbath Sacrifice were discovered at Qumran—eight in Cave 4 and one in Cave 11—suggesting its importance to the Qumran community. Another was also found at Masada, in the same locus as the Joshua Apocryphon fragments!¹⁰ Moreover, this is a sectarian composition, not a composition of mainstream Judaism.

Masada was occupied by Zealot refugees from Jerusalem during the Great Jewish Revolt against Rome (66–73 C.E.). They constructed a synagogue in the fortress, where their manuscripts were found.

It's anyone's guess how the Songs manuscript—and the Joshua Apocryphon written by Yardeni's scribe—got to Masada. It seems likely that some manuscripts from Qumran were carried south by refugees fleeing the Roman destruction of Qumran in 68 C.E. But that's only a best guess.

It's a Natural

Masada Ramp Was Not a Roman Engineering Miracle

By Dan Gill



Garo Nalbandian

THE GREAT CLIFFS OF MASADA rise from the desert floor, nearly unapproachable except for a spur on the mount's western side. Masada served as a palace/fortress for Herod the Great in the first century B.C. and then as a rebel stronghold during the Great Revolt against Rome that began in 66 A.D. The Romans were able to storm the fortress a few years later by building a ramp on the spur. But how much did the Romans have to add to the spur? The answer, provided in the accompanying article by author and geologist Dan Gill, overturns the conventional wisdom regarding the siege of Masada.

Hollywood could not have scripted it better: A band of 967 Jewish rebels retreats to a desert mountaintop fortress following the destruction of Jerusalem by the Romans in 70 A.D. Two years later the Roman army sets out to quell this last vestige of the Great Jewish Revolt. Finally, in a massive construction effort, the Romans build a large assault ramp, wheel a battering ram to the top of the mount and destroy the fortress's defenses.

But when the Roman soldiers burst through, they were met neither by fierce resistance nor by meek surrender—they were met by silence. On the previous night, the leader of the rebels, Eleazar Ben Yair, had gathered his followers and made a passionate plea that they not allow themselves to become enslaved. Heeding Ben Yair's call, the rebels cast lots and chose ten men to kill all the others; these ten then cast lots to pick one who would kill the other nine and then kill himself. The Romans captured the fortress, but they captured none of the rebels alive. The only survivors were two women and five children who hid themselves to escape the collective suicide and later related the events to the conquerors.

This is the stirring story of Masada. For nearly 2,000 years, we have known this tale of bravery and defiance from the writings of Josephus Flavius, the first-century A.D. Jewish historian who

himself led a rebel force during the Great Jewish Revolt but who was captured and later moved to Rome and composed a history of the war.

In the 1960s, Yigael Yadin's excavations brought the defense and fall of Masada vividly to life. Masada had originally served as one of a string of desert palace-fortresses for Herod the Great, the first-century B.C. king of Judea who ruled with Rome's approval. Yadin uncovered Herod's two palaces, decorated with beautiful wall frescoes and floor mosaics. He unearthed the Herodian bathhouse, a large complex of storerooms and the defense wall that encircled the fortress. The site also yielded artifacts from the rebel occupation of the fortress and several skeletons (which Yadin identified as the remains of rebels), as well as small pottery pieces inscribed with names, which he believed had been the lots the defenders had drawn to select who would kill the others. Masada became a powerful symbol for the then-young State of Israel. At swearing-in ceremonies atop the mountain, new recruits to the army swore, "Masada shall not fall again!"

In recent years, questions have been raised about the reliability of Josephus's account. Some historians, for example, doubt whether the defenders committed mass suicide; others have suggested that the skeletons found by Yadin were not those of Jewish defenders but of later Roman soldiers.^a

Another aspect of the Masada story that has to be carefully reexamined is the prevailing myth about the size of the Roman assault ramp.

The Masada fortress sits atop a lofty mesa, an isolated hill with steeply sloping sides and a level top. Save for one spot, Masada is separated from its surrounding terrain by precipitous cliffs that are 300 to 1,000 feet high. According to Josephus the Romans were able to breach the defenses of Masada by building a gigantic ramp on the west side of the mountain.

The west side of Masada is the only relatively convenient way to reach the top of the mountain. There, a moderately sloping (about 20 degrees) narrow spur descends from 40 feet below the top to the western approaches to Masada, which lie 300 feet below the top of the mount. This western spur is 740 feet long at its base, 650 feet wide at its widest along the side of Masada and 80 feet wide at its narrowest in the west. By a rough and conservative estimate, the volume of rock and earth within the spur is about 8.8 million cubic feet.

From Josephus's somewhat literary, rather than strictly technical, account of the building of the ramp one might conclude that the western spur, in its entirety, is the man-made ramp built by the Romans. Indeed, many authors accepted Josephus's account of the ramp at face value and

spread the view that the entire western spur is the Roman earthwork.¹ The ramp at Masada is often hailed as the largest assault ramp ever built by the Roman army and is considered a phenomenal feat of military engineering.

Constructing such a huge earthwork would have required a labor force of thousands of workers and many months of work. In line with this "huge-ramp scenario," one finds in histories of Masada the widely perpetuated myth that the siege began after the fall of Jerusalem in 70 A.D. and lasted three years.² To support this scenario, many authors also inflate the number of Roman Legionnaires and Jewish slave workers who took part in the siege.³

The building of the ramp was undoubtedly a demanding project, but it was not nearly as demanding as has often been assumed. My study of the geology of the spur and the nearby area shows that the ramp is a layer of man-made earthwork, several feet thick, that was added on top of what is a large natural spur.⁴ This finding is important to understanding the story of Masada because it shows that the building of the ramp could have been completed in a few weeks rather than many months.

How can we tell that the spur is for the most part a natural topographic feature? To answer that question, one has to be familiar with Masada's geological setting. Masada is located on the eastern edge of the Judean Desert. This region sits on the western elevated margins of the Dead Sea Rift, which is a segment of the great Syrian-African fault. This shear zone starts in northern Syria, passes through the Bek'aa Valley in Lebanon, goes down through the Jordan Valley to the Dead Sea, passes through the Aravah Valley to the Gulf of Elat/Aqaba, and continues southward into the Red Sea and down to eastern Africa. This fault separates the Arabian plate, in the east, from the Levant-Sinai sub-plate of Africa, in the west.

The elevated margins of the Dead Sea Rift, and the Masada area in particular, are cut by many fault lines, most of them running north to south. A geological fault is a fracture in the Earth's uppermost crust along which blocks of terrain have shifted relative to each other. The movement, or displacement, of the blocks can be either horizontal (where the two blocks remain on the same plane, but move sideways past each other along the fault) or, as is the case with Masada, vertical (where one block moves down relative to another). Geologists call the block that has moved up the uplifted block (or footwall) and the block that has moved down the downfaulted block (or hanging wall). The amount of vertical displacement is called the throw of the fault. A downfaulted block flanked by uplifted blocks is called a graben; an uplifted block flanked by downfaulted blocks is called a horst.

Masada is a horst. It is the northern edge of a 1,600-to-3,000-foot-wide horst that extends in a north-south direction for some 6 miles to the south of Masada. Masada was isolated from the southern part of this horst by the intensive down-cutting caused by water flowing through Nahal Masada. (Nahal is the Hebrew word for wadi, the Arabic name for a desert riverbed that is usually dry but is prone to flash floods, which are responsible for a great deal of erosion.)

The Masada horst is bounded by faults on the east and west. The East Masada Fault is the most western of the faults that delimit the western margins of the Dead Sea Rift. These faults run all along the west side of the Dead Sea and beyond and are responsible for the spectacular 650-to-1,000-foot-high cliffs that bound the Jordan Valley and the Dead Sea all the way from north of Jericho to south of Sodom.

The West Masada Fault, which will be our focus here, separates the Masada horst from the graben to the west. The difference in height between the uplifted horst and the downfaulted graben—the throw of the fault—is about 360 feet.

The terrain in the Masada area is made up of three bedrock formations. From older to younger and from bottom to top, these formations are called, in Israeli geological terminology, the Bina,⁵ Menuha and Mishash formations.

The Bina Formation, about 500 feet thick, consists of thick, massive brown-colored layers of very hard limestones and dolomites, dating to the Turonian stage (93 to 89 million years ago).

The Menuha Formation, dating to the early Santonian stage (86 to 83 million years ago), consists mostly of white chalk. It is about 150 feet thick and can be subdivided into three sections: a lower (M₁) and an upper (M₃) layer of massive chalk, and a middle section (M₂) of distinct thin layers (each only 12 to 20 inches thick) of hard chalk. The middle section of the Menuha Formation (M₂) can be readily recognized in the landscape and provides an important stratigraphic marker that helps to unravel the geology around Masada.

The Mishash Formation, about 165 feet thick and dating to the Campanian stage (83 to 71 million years ago), consists of alternating thin layers of dark gray chert (flint), soft chalk and soft marl.

A trained geologist will have no trouble distinguishing the Bina, Menuha and Mishash formations from one another, thanks to their different rock types, colors and susceptibility to erosion, which give each formation a unique fingerprint in the landscape. The massive layers of

hard dolomites and limestones of the Bina Formation are much more resistant to erosion than the softer chalks and thin chert beds of the Menuha and Mishash formations.

The key feature of Masada's western spur is that most of it is composed not of a jumble of rock and loose earth, as you would expect of a man-made fill, but of nicely layered local bedrock: a layer of the Menuha Formation topped by the Mishash Formation. What is notable about the spur is that these Menuha and Mishash layers are directly next to a block of Bina Formation hard rock—the Masada horst itself. Clearly, the rock units have shifted to their present position as a result of the displacement of blocks of terrain along the West Masada Fault: Masada is the uplifted footwall and the spur is part of the downfaulted hanging wall of the fault.

The spur today is covered by a talus (rock debris) and by the Roman earthwork that formed the assault ramp. There are, however, several spots where the natural bedrock layers of the spur can be inspected.

The best outcrop is found along the upper part of Nahal Nimmer,⁶ where the spur's northern flank abuts Masada's western side. Facing the top section of Nahal Nimmer, the steep cliff edge to the left—the western side of Masada—is the plane of the West Masada Fault and consists of Bina Formation hard rock. The spur is to the right and the sloping line at the top is the crest line of the Roman assault ramp. It is important to note that the bulk of the spur, up to about 16 feet below its top, consists of natural bedrock. This is one of the few spots where the contact between the bedrock and the man-made earthwork can be seen. Note that Nahal Nimmer begins at this contact, rather than at the very top of the ramp.



Dan Gill

THE ROMANS HAD IT EASY. The natural ridge projecting from the west side of Masada meets with the cliff face approximately 43 feet below the top of the mount—not 450 feet as a quick reading of Josephus has led many to believe. In this photograph, the west cliff of Masada is the vertical formation on the left; the northern face of the western spur abuts the cliff from the right. The deep gully between them is Nahal Nimmer, through which water flows after rare rainfall in the desert. How do we know the Romans added a man-made ramp to the natural spur? Look closely at the rocks near the top of the slope and you'll find that the slope's surface can be distinguished from the solid layers of rocks below it.

Another outcrop is the white elevated bank at the lower, western, end of the spur. It consists of the relatively hard white chalk layers in the middle part of the Menuha Formation (M2). The continuation of these beds as they slope eastward toward Masada is clearly visible on both the northern and especially the southern flanks of the spur. This bank is the spot that most scholars identify, in my opinion erroneously, as the site referred to by Josephus as the "Leuce," which means white in Greek. As I will discuss later, it is more likely that this name designated the entire spur.

Between these two outcrops, the natural bedrock of the spur is concealed by a covering of rocks that had formed the Roman earthwork. This covering consists of small, square and rectangular blocks (about one foot long) of white chalk from the prevalent Menuha Formation layer and brown chalk, also of the Menuha Formation, that were quarried from an area west of the spur. The talus also includes angular cobbles and rock debris of two kinds: brown dolomite, from the cliffs of the Bina Formation that tower over the spur, and dark brown to gray chert from the Mishash Formation, which forms the bedrock underneath the upper part of the spur.

As we noted above, the relatively soft Menuha and Mishash formations erode more readily than do the hard and massive rocks of the Bina Formation. Over a very long period, the streams in the Masada area have been carving out their courses at the expense of the Mishash and Menuha formations, while the rocks of the Bina Formation in the Masada horst have remained more or less intact. This process formed the dramatic high cliffs around the Masada horst.

The drainage system and the shape of the landscape of the Judean Desert have evolved over the last five million years in response to the rapid sinking of the Dead Sea graben, the level that local streams must reach. The principal phase of this process began only about two million years ago. Thus, geologically speaking, the local erosion cycle is still young and has not had enough time to erode all of the Menuha and Mishash material in the graben immediately west of Masada. Eventually (in several hundred thousand years, give or take) all of the remnants of the Menuha and Mishash formations, including the western spur, will be cleared away. Thus, the spur along the western side of Masada is simply a part of this not-yet-eroded rock mass.

If the spur is a natural formation, how do we know that the Romans augmented it at all?

The spur forms the water divide between the ephemeral streams of Nahal Nimmer, to the north, and Nahal Masada, to the south. Nahal Nimmer begins as a very narrow and deep gully about 16 feet below the crest of the spur. That it does not begin at the top of the spur is unusual.

It indicates that the water divide—the spur—was raised at least 16 feet after Nahal Nimmer was formed. Moreover, the crest of the spur has a peculiar shape. Rather than having a smoothly rounded-off profile, which is what we would expect as a result of prolonged erosion, it is a pointed triangular prism that was superimposed on top of the spur. This prism-shaped artificial addition does not consist of solid bedrock but of loose pulverized chalk and small, square and rectangular blocks of white and brown chalk, identical to the ones we find in the talus that covers the sides of the spur.

Moreover, at several places along the ramp, there are short (mostly 2-to-3-foot-long) pieces of timber and tree branches embedded in the soil. These had been noted by earlier investigators; Adolf Lammerer, who surveyed the ramp for an expedition led by Adolf Schulten in 1932, suggested that they were part of a framework constructed by the Romans to support the loose earth used for building the ramp.⁷ More recently, Ha'im Goldfus of Ben-Gurion University conducted a trial excavation in the ramp. He dug a shallow ditch in a 320-square-foot area on the southern flank of the ramp and exposed many tree branches embedded in the soft soil. Most of the wood is of tamarisk trees, which grow in the area.⁸ The wood was dated by the carbon 14 method and yielded a date of 119 A.D., plus or minus 47 years.⁹ The date of the construction of the ramp, 73 (or 74, according to some scholars) A.D., falls at the far end of this range.



Dan Gill

AND THERE'S MORE: As Gill notes, the western slope contains pieces of wood, which date as far back as the late first century A.D.; this timber was probably used by the Romans as a framework for the ramp.

So we know the spur is a natural formation and the Romans augmented it to build their ramp. The next question, naturally, is how much material did the Romans add to the spur? Our answer will tell us how much human effort and how much time was required to build the ramp.

Although there is no certain answer, we can make a reasonably accurate estimate. To be exact, we would need to know the precise configuration and level of the natural bedrock along the surface of the spur and the exact layout of the Roman ramp. The surface of the natural spur is no longer exposed. How far it lies below the present surface can, however, be inferred by making shallow borings or by digging shallow trenches (a shallow geophysical survey would be best, but none has been carried out yet). As for the Roman ramp, most of it, particularly along its sides, has eroded over the last 1,900 years and we can make only a rough guess of how it may have looked.

We cannot use Josephus's description to reconstruct the layout and dimensions of the ramp. First, the heights given by him for the ramp (200 cubits, or 300 feet), the stone platform at the top of the ramp (50 cubits, or 75 feet) and the siege tower (60 cubits, or 90 feet) are wrong. Josephus's figures add up to 310 cubits (465 feet), while the actual difference in height between the top of Masada's defensive wall and the base of the spur is only 315 feet. Also, at the top of the spur there is not enough room for a 75-foot-wide platform, as Josephus claims, and no remains of large masonry blocks, of which the platform was allegedly built, can be found nearby. It is more reasonable to assume, as already suggested by Lammerer, that the installations on the spur included only a ramp and a tower, without a stone platform.

The dimensions of the ramp and the height of the tower were interdependent. A lower ramp meant a higher tower. The Romans, naturally, would have chosen the dimensions that required the least effort. With this premise and the actual topography in mind, we can propose probable dimensions for the ramp and tower.

The height of the tower was determined by the elevation at which the eastern end of the ramp met the western face of Masada. Today the end of the spur meets Masada 43 feet below the mountain's top. Due to erosion, the ramp is lower today than it was at the time of the siege, but probably by no more than 3 feet. Because the Roman tower had to be at least ten feet higher than Masada's defensive wall to be effective, I estimate that the tower was 70 feet high: 40 feet to reach from the top of the ramp to the top of Masada, 20 feet to reach the top of the wall and another 10 feet to operate above the wall. Such a tall tower was probably some 25 to 30 feet wide at its base. I assume that to move such a wide tower up the ramp, the ramp had to be about 50 feet wide. (We should note that the total volume of the ramp is dependent on how wide the ramp was, yet the width is the one dimension we are least sure of.)

I estimate that today the average thickness of the extant ramp along the crest of the spur is about 16 feet. To build a level ramp, the thickness of the ramp at its flanks had to be greater than along its crest. Since the flanks of the spur slope at a 30 degree angle, at the edges of the ramp, 25 feet away from the middle, the fill had to be 30 feet deep (the formula is: 25 multiplied by the tangent of 30 [0.577], which equals 14.4; add that to 16 and you get about 30). According to this scheme, the average thickness of the fill across the width of the ramp would have been 23 feet (16 feet at the crest plus 30 feet at the edges, divided by 2). To this we have to add the 3 feet that were presumably eroded away, giving us an average thickness of 26 feet.

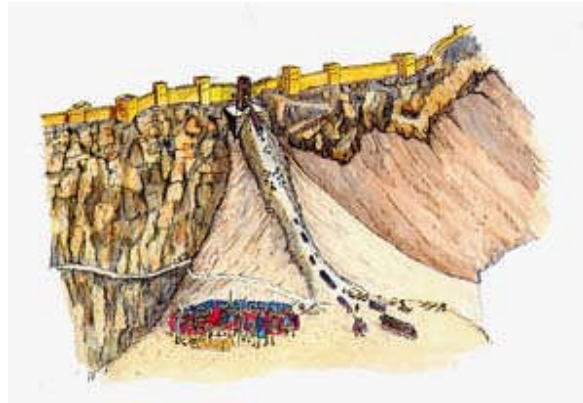
The length of the artificial earthwork today is 510 feet. This is very likely the length of the original ramp because it leads from the western approaches to the top of Masada; there is no reason for it to be any longer. We now have estimates for all three dimensions: 50 feet wide, 26 feet deep and 510 feet long, giving us a total volume for the manmade ramp of 663,000 cubic feet. In view of the uncertainty about the width of the ramp, any estimate in the range of 500,000 to 1.4 million cubic feet is reasonable.

I want to emphasize that these estimates are based on the assumption that the tower and the battering ram were assembled at the base of the spur and were wheeled up the ramp in one piece. It is possible, however, that these war machines were carried up the ramp in parts and assembled somewhere higher on the slope, or perhaps even at its top. If that were the case, the ramp could have been much narrower for most of its length and the volume of earth needed for its construction would have been considerably smaller.

Based on various sources regarding the logistics of Roman siege-work building, Jonathan Roth of San Jose State University estimated the construction rate for the various siege installations at Masada.¹⁰ For the ramp he assumed a construction rate of 35 cubic feet per laborer per day. Roth further assumed that the project was carried out by three shifts of 800 workers each, who worked around the clock (the narrow spur could not accommodate more men than that). According to these estimates, the construction rate of the ramp would have been about 84,000 cubic feet per day. At that rate, a 663,000-cubic-foot ramp could have been built in just eight days. Such a short time span may well be overly optimistic. However, even if we cut the construction rate in half and assume a volume of 1.4 million cubic feet, the ramp could have been built in about one month.

According to Roth, the rest of the siege works (including the building of roads, the 2.25-mile-long siege wall that encircled Masada and the eight army camps) could have been completed in just 31 days. Even if we double this to two months, all the siege installations around Masada

could have been constructed in about three months—one month for the ramp and two months for everything else.



Leen Ritmeyer

THE SIEGE OF MASADA famously described by Josephus is captured in color in this drawing by Leen Ritmeyer. The Roman forces are gathered at the base of the spur; their tower “cased in iron” is already in place, waiting to host the Romans’ “volley of missiles” and battering rams. (Ritmeyer has followed Josephus’s description and has included a stone base for the tower; author Gill notes that no massive stone blocks have been found in the area and believes that this may have been an exaggerated detail.) The drawing underscores Gill’s major finding: The ramp used to bring about Masada’s downfall was a relatively narrow and thin strip of man-made earthwork added atop a large natural spur.

Such a duration is in agreement with often-overlooked passages in Josephus that, taken together, indicate the siege lasted only a matter of months. Josephus does not provide the dates of the beginning or end of the siege, nor its duration. He does state that the mass suicide occurred on the 15th of the spring month of Xanthicus, but he does not provide the year. Adolf Schulten, who explored Masada in 1932, thoroughly analyzed Josephus’s narrative and Roman military histories and concluded that the siege began in the late fall or winter of 72 A.D. and ended on the 16th of April 73 A.D.¹¹ Thus the siege was only about four to seven months long. Ironically, these passages have been missed by historians who assumed the building of just the ramp alone must have taken years.

Why is the conventional wisdom so wrong? How did historians come to believe that the entire spur was built by the Romans? The problems stem from misunderstanding Josephus’s admittedly rather awkward description of the construction of the ramp.

Describing the building of the assault ramp, Josephus writes, “He [the Roman general Silva] had discovered only one spot capable of supporting earthwork. For in rear of the tower [built by Herod to guard Masada’s western approach] ... was a projection of rock, of considerable breadth and jutting far out, but still 300 cubits (450 feet) below the elevation of Masada; it was called Leuce [white]. Silva, having accordingly ascended and occupied this eminence, ordered his

troops to throw up an embankment. Working with a will and a multitude of hands, they raised a solid bank to a height of 200 cubits [300 feet]."¹²

Josephus's claim that the Leuce is 300 cubits (450 feet) below the summit has misled many into believing that he was referring to the small white bank that protrudes at the far western end of the spur. This bank occupies an area of only 82 by 82 feet, is only some 23 feet above the surrounding terrain and is of little importance. It does not even merit a name. Gaining control over it would give a besieger no military advantage over the fortress, and it certainly was not capable of supporting an earthwork.

But just the opposite is true of the spur itself: It is an unusual and prominent white-colored landmark in the landscape, so it merits a name. Gaining control over it would be crucial in attacking the fortress at Masada and it could certainly have furnished a solid foundation for an assault ramp. These facts strongly suggest that the name Leuce refers to the entire spur. But what about Josephus's statement that the Leuce was 300 cubits below the summit of Masada? Undoubtedly he simply meant that the spur at its lowest point was 300 cubits below the summit.

Another pitfall in Josephus's description is his statement that Silva "raised a solid bank to the height of 200 cubits [300 feet]." Taken at face value, this statement can indeed be understood to mean that the entire spur was man-made. However, to anyone who is familiar with the geology around Masada, it is clear that Josephus here intended to describe the combined height of the natural spur and the Roman assault ramp, not just the man-made addition.

Josephus's mostly accurate descriptions of the topography and especially of the palaces and buildings on Masada, which were confirmed by archaeological excavations, were apparently based on a firsthand familiarity with the site. In his autobiography, Josephus writes that when he was 16, he spent three years with the Essene sect "in the wilderness."¹³ The Essenes' center was at Qumran, about 30 miles north of Masada, and they occupied several other remote sites in the Judean Desert. During his sojourn with the Essenes, Josephus would have had many opportunities to view Masada from a distance. During those years (50 to 53 A.D.), however, a Roman garrison occupied Masada, and it is not likely that Josephus could have visited the fortress itself.

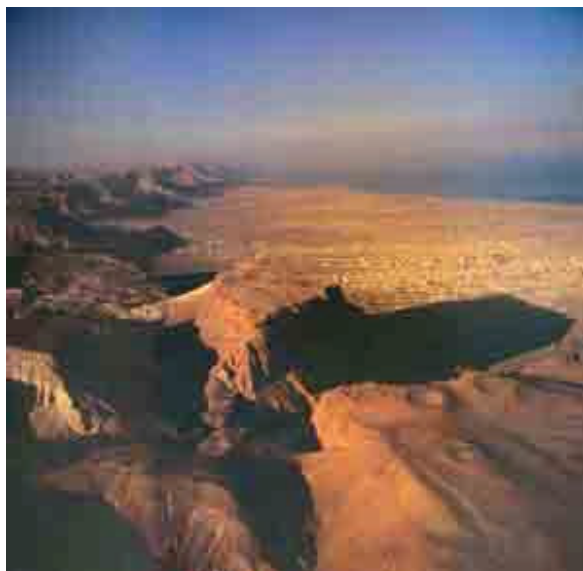
Regarding the siege and the fall of Masada, Josephus would not have had to rely solely on his own knowledge. Josephus was the commander of the Revolt in the Galilee. He surrendered to the Romans after the fall of Yodfat (Jotapata). Immediately after the fall of Jerusalem in 70 A.D., which for all practical purposes put an end to the Jewish Revolt, Josephus emigrated to Rome,

became a Roman citizen and enjoyed the patronage of the emperor, Vespasian, and of Titus, Vespasian's son and chief army commander. This gave Josephus access to Roman military reports about the war, and, in his book, *The Jewish War*, he drew on them for his description of the revolt and of the battle of Masada.¹⁴

The confusion over the size of the assault ramp can be attributed to Josephus's careless choice of words in his description of the western spur and of the construction of the ramp, and to many scholars' lack of firsthand knowledge of the terrain around Masada. A study of the geology of the area clarifies the matter: It reveals that most of the spur is a natural topographic feature and that the Roman ramp was only about 26 feet thick. The rebels at Masada were able to live free from Roman rule for about three years after the fall of Jerusalem, but once the Romans began their siege, the rebels' fate was sealed. When the end came, it came swiftly.

Masada: Arms and the Man

By Jodi Magness



Garo Nalbandian

MASADA, the mountaintop site of a palace-fortress completed by Herod the Great (37–4 B.C.E.). Still occupied by 960 Zealot resistors at the end of the First Jewish Revolt against Rome (66–73 or 74 C.E.), Masada provided a seemingly impregnable refuge. The Romans, however, methodically applied their martial skills to the problem. To prevent the Zealots' escape, they established around the mountain a circumvallation wall and a series of military camps for the men of the Tenth Roman Legion, visible as the rectangular patterns at left (camp F) and lower center (camp H). They then raised a ramp on the eastern flank, left, to permit Roman soldiers and their battering rams to approach the fortress wall. The Roman plan succeeded; Masada fell in 73 or 74 C.E. In our November/December 1991 issue, we looked at the Zealots' "Last Days and Hours at Masada," **BAR** 17:06, and in this article we investigate the Roman and Jewish Zealot armaments and tactics.

Sometimes we make discoveries not by digging in the ground, but by digging in the records of past excavations. So it is with Masada, Herod's nearly impregnable palace-fortress in the Judean wilderness, occupied and defended by Jewish Zealots during the First Jewish Revolt against Rome. Masada was excavated in the 1960s by Israel's most illustrious archaeologist, Yigael Yadin. It was a massive effort mobilizing hundreds of volunteers from all over the world. Yadin died in 1984, his final report still incomplete. Led by archaeologist Ehud Netzer, a team of scholars has taken up the task of analyzing the vast number of finds uncovered during Yadin's three full years of digging.

In the **BAR** 17:06, Netzer looked at Yadin's records and observed puzzling patterns of conflagration in the buildings on the mountain.^a With the aid of Josephus' accounts of the fall of

Masada, Netzer proposed a new understanding of how the Jewish defenders—during their desperate last days—scavenged the buildings on Masada to build a wood-and-earth reinforcement wall to withstand the war machines of the Roman army.

I was asked to undertake a study of a different aspect of the military situation at Masada—the arms and armor discovered at the site.¹ This large and diverse group of arms and armor includes arrowheads and arrow shafts, armor scales, shields, swords, spears, javelins, iron points and a scabbard chape (the tip of a sword sheath). All of these weapons have a story to tell. Sometimes they solve puzzles. Sometimes they create them. They almost always raise more questions than they answer.

Take, for example, the arrowheads. Hundreds and hundreds of them were found all over the site. We can't really tell how many there were because so many of them, badly corroded, have disintegrated into small fragments.



Gaby Mazor

THE DEBRIS OF WAR. Excavators have found hundreds of arrowheads like these all over Masada. The largest concentrations, including a group of more than 200, came from two rooms in the western palace (rooms 442 and 456), identified by the author as a Zealot smithy. The arrowheads range from .5 to 2 inches long and from .5 to .75 inch wide at the tips of the barbs. Their light weight indicates that they were fired from manually powered bows rather than from catapults.

A metallurgical test on one arrowhead showed that it was not hardened by quenching in water during the manufacturing process, reflecting a low-quality level of smithing during the Roman period.

More than 200 largely intact arrowheads along with the remains of some arrow shafts were found in two rooms in the western palace, designated as 442 and 456. Both rooms are located in

the “royal wing” of the palace, which contains the “throne room” and an adjacent bathhouse. Many readers may be familiar with room 456, for its southern half is paved with an elaborate (now partially destroyed) mosaic floor that visitors to Masada are often shown. I first became interested in these rooms because they contained the largest concentrations of arrowheads at Masada.

What were all these arrowheads doing here?

To try to find out, I combed through the records from the excavation. As at most excavations, locus cards were kept at Masada. A locus is a room, a pit, a part of a room or almost any other kind of archaeological feature. Most of the loci at Masada were rooms, like 442 and 456. Locus cards are usually filled out by the area supervisor after the excavation of the locus has been completed. They tend to be synthetic, leaving out details. So I tried to get behind the locus cards—to dig deeper, as it were.

I tracked down the daily records for rooms 442 and 456, the description of the work while it was in progress, and came across an unexpected source of information. During the excavation, Yadin convened his area supervisors at the end of each work day to discuss their daily progress and strategy. Many of these area supervisors are now well-known archaeologists, some of whom were my professors when I was an undergraduate at Hebrew University. Unlike any other excavation I am familiar with, however, Yadin tape recorded these daily meetings. The recordings have since been transcribed, and they are preserved among the notes and records from the excavation.

By reading the transcriptions from the time of the excavation of rooms 442 and 456, I could understand Yadin's thoughts, for it was he who was speaking. It is clear from these records that Yadin's interpretation of the arrowheads and associated remains was influenced by Josephus' history of the Roman siege of Masada. Josephus tells us that the Zealots set fire to everything but their stores of food before committing suicide, in order to prevent the supplies from falling into Roman hands and to demonstrate that they did not starve but chose to die as free people.² To Yadin the remains in rooms 442 and 456 represented piles of arrows that the Zealots had set on fire just before committing suicide. This is the “official” interpretation that was adopted in Yadin's lifetime.³ But this interpretation didn't square with the context in which these particular arrowheads were found.

My review of the excavation records revealed that the arrowheads in rooms 442 and 456 had been discovered together with a large quantity of charcoal, iron fragments, iron slag and arrow shafts. These remains lay in the center of hearths—clearly associated with the Zealot occupation

level—that were each about 18 inches in diameter. The hearth in room 456 was located in the northern half of the room, opposite the mosaic floor.⁴ The intensity of the heat from the hearths had whitened the areas surrounding them; an ordinary destruction fire would not be sufficient to create this effect. Moreover, Yadin's interpretation did not account for the hearths, the charcoal, the iron fragments and the pieces of slag found together with the arrowheads.

At this point, I returned to the locus cards for rooms 442 and 456. Amnon Ben-Tor, now the Yigael Yadin Professor of Archaeology at the Hebrew University, had been the area supervisor in the western palace at the time of the excavation. On his locus cards, he had suggested that these two rooms were actually workshops or smithies (*fabricae*) for the forging of iron arrowheads. Ben Tor was right; here was where Masada's defenders actually manufactured the arrowheads to shoot at their Roman attackers.

My further study of the technology of ancient iron smithing has since confirmed Ben Tor's interpretation of the archaeological evidence made nearly 30 years ago. The manufacture of iron objects is a two-stage process.⁵ First, the iron ore must be extracted from its source through the process of smelting, which extracts the metal from its ore by heating beyond the melting point in the presence of oxidizing or reducing agents. This yields a lump of iron mixed with slag and charcoal called a bloom. It is the bloom that is worked by the smith. The second stage of the ironworking process, smithing, is much simpler than smelting. The smith only needs to have a bellows, a tuyere (a conical clay object to hold the tip of the bellows and to focus the blast of air) and a pile of charcoal. The smithing furnace, unlike the smelting furnace, does not have to be dug into the ground or covered. Once the pile of charcoal is ignited and fanned with air from the bellows, the bloom is placed among the charcoal near the tuyere. A heat of up to 1,200° centigrade (2,192° Fahrenheit) can be reached in this type of forge. During the process of working the bloom, the iron is extracted, leaving the slag as a by-product or refuse.

The hearths, the charcoal, the arrowheads and arrow shafts, the pieces of slag and the scraps of iron in rooms 442 and 456 provide clear evidence for iron smithing. In addition, an iron tool with one flat face and one pointed end, which may be a smith's hammer, was found in locus 448, the room located between 442 and 456.

Why did the Zealots choose these two rooms as the site of their iron workshops, especially 456 with its mosaic floor? I believe that it was because of their proximity to the bathhouse and its water supply in this part of the palace.

These arrowheads can almost certainly be identified as Zealot supplies—manufactured, but never used. But we could not tell this from the arrowheads themselves, only from the context in which they were found. All the arrowheads—with one exception to be discussed—were of the same design: three-winged (trilobate) in section, with barbed wingtips and a tang that fit into a hole in a wooden shaft. They range in length from about .5 inch to about 2 inches, and in width from about .5 to .75 inch at the tip of the barbs. They vary so much in size because arrowheads were individually forged, not manufactured in molds. And we may be sure from the literature on Roman armies that they had their own smithy at the base of the mountain-fortress making arrowheads for them, as well as repairing their other weapons.

All of these arrowheads are rather light (between .05 and .35 ounces). This suggests that they were all probably fired from manually powered bows instead of from catapults with torsion (machine-powered) bows.

Several years ago, one of the arrowheads from Masada, found in a group of 80 on the lowest terrace of the northern palace, was subjected to laboratory analysis. The result was unexpected.⁶ It turned out that this arrowhead had not been hardened by quenching^b or by tempering.^c The arrowhead is therefore fairly soft. Unfortunately, this was the only arrowhead tested in this way, so we don't know whether or not it is representative. My suspicion is that it is. Many of the arrowheads do not seem to be of very high quality. The fact is that the technical level of smithing in the Roman period was low and quench-hardening of arrowheads was not widely practiced.

But how effective would a soft arrowhead like this be? It could certainly kill an animal or a human protected only by leather. In this connection, we did find the remains of at least two leather-and-wood shields—a rare find because of the perishable nature of the material. But we also found hundreds of bronze scales from scale armor (Latin, *lorica squamata*). The bronze scales were attached to a fabric backing to form a corselet or waistcoat that extended down to about the hips. The scales were cut from cast sheet metal and came in four basic sizes and designs. Most of the scales have four holes in a square and are strengthened by a raised medial rib and border. As with the arrowheads, however, it is impossible to tell which of the various scale designs and sizes belonged to the Romans and which belonged to the Jews. It is most likely that both sides protected themselves with scale armor. Over 650 scales were found in one cistern; 430 were found on the lowest terrace of the northern palace.

These scales tell us something about the likely composition of the Roman forces. The Roman army consisted of two kinds of troops: the legions and the auxiliary troops. The legions were composed of soldiers recruited mainly from among Roman citizens in Italy, although by the end of

the first century C.E. an increasing number of legionaries came from the provinces as well. These provincial recruits were non-Roman citizens by birth, but they were given Roman citizenship and Latin names upon their enlistment. (The enlistment period was 25 years.) Each legion consisted of between 5,000 and 6,000 men, divided into ten smaller units called cohorts.

The auxiliary troops were conscripted, non-Roman forces; they were much more lightly armed, and included skilled archers (*sagittarii*). The term *auxilia* reflects the origin of these troops as aids to the citizen legionaries. They acted as the legions' light cavalry and infantry.

Legionaries and auxiliary troops were equipped quite differently. The typical legion infantry soldier at the time of the fall of Masada would be equipped with heavy military boots or sandals (*caligae*), metal or leather body armor (*lorica*), a bronze helmet with an iron skull-plate (*cassis*) and a large, rectangular shield (*scutum*) that was curved to fit the body. His offensive equipment would consist of a type of spear called a *pilum*, a *gladius* or "Spanish sword" and a dagger (*pugio*). He would carry his shield in his left hand and a *pilum* in his right. The *pilum* was a pointed spear with a long tang set into a wooden shaft. At the beginning of a military engagement, the legionaries would hurl their *pila* at the enemy, and then use their swords in hand-to-hand combat. The sword, which was over 2 feet long, was carried in a sheath or scabbard worn high up on the right-hand side of the body, so as to be clear of the legs and the shield arm. It was withdrawn from the sheath in an upward movement and thrust forward like a bayonet. The dagger was attached to a belt on the left-hand side of the body.



Hebrew University Museum/Moshe Cohen

JAVELIN POINT. This 4-inch-long point came from a javelin (*pilum*). The javelins used by the Roman legionary infantrymen consisted of a long, four-sided, pyramidal iron head with a four-sided shank that was set into a wooden shaft. The javelin was generally a little more than 6.5 feet in length. At the beginning of a battle, the legionary infantrymen hurled their javelins at the enemy before they closed in for combat with their swords.



Hebrew University Museum/Moshe Cohen

THE BEST-PRESERVED SWORD, of four found at Masada, came from a burnt layer in the corridor separating the storehouses from an administrative building in the northern palace. It measures 2 feet, 2 inches long and 2.5 inches wide. Both of its sides are flat. The length identifies it as a *spatha* (long sword), used by the Roman auxiliaries (conscripted non-Roman troops) rather than the shorter, broader *gladius* (Spanish sword), used by the legionaries.

The legionaries were obviously quite weighted down. Not so the auxiliary—the light mobile troops. Since they were from the provinces, their equipment was much less standardized. Characteristic types of auxiliary weapons included a broad thrusting-spear (*hasta*), a long, narrow-bladed lance (*lancea*) and a sword (*spatha*) that was longer and narrower than the legionary's *gladius*. At least some of the auxiliaries wore shirts of scale armor and helmets. Their oval shields were smaller and lighter than those of the legionaries. They also wore the heavy military boots or sandals, and carried daggers. Some of the mounted auxiliaries carried a light *lancea* that could be thrown from a distance.

Archers were auxiliaries. Most of them came from the eastern provinces, where the native nomadic peoples had a long tradition of mounted warfare and archery.

The soft arrowheads from Masada indicate that there was a major contingent of auxiliary troops at Masada and/or that the Zealots had armed themselves in the manner of auxiliaries, with bows and arrows. The hundreds of metal scales found at the site suggest that the auxiliaries were protected by armor of this kind. Scale armor is more typical of auxiliaries than legionaries, who often wore segmented cuirasses (chest armor) and chain mail. In Roman reliefs from the mid-first century C.E. onward, scale armor is usually associated with auxiliaries.

The plethora of arrowheads and armor scales may be contrasted with the surprising paucity of the kind of weapons that would have been used by the legionaries, who apparently confined themselves principally to working the large siege machines⁷ that eventually climbed the ramp and set the fortress afire, as described in Ehud Netzer's article.

No chain-mail armor was found. No segmented armor was found. At least three iron swords were found, but in such a poor state of preservation that we can't even determine their original

form. A fourth, better-preserved sword, about 2 feet long, is flat with no medial rib. It is probably a *spatha* (long sword), a weapon used mainly by auxiliaries.

Strangely, the excavators seem to have found no projectile points of the kind that would have been shot by legionaries from torsion bows. Projectile points are much larger and heavier than the iron arrowheads that were found in abundance. The absence of projectile points at Masada is in contrast to the situation at Gamla, another site attacked and destroyed earlier in the First Jewish Revolt,^d where numerous projectile points were uncovered. The few metal objects that could possibly be identified as projectile points at Masada were not found on the Roman ramp side of the site, but on the other side. Moreover, they were found in a context with other weapons belonging to the Zealots. In my opinion, these metal objects were not projectile points at all, but points that fit onto the wooden end of spears so they could be stood upright in the ground. The mystery of the absence of projectile points at Masada remains.

One piece of fancy equipment that we did find was a chape, the metal tip of a leather sword sheath. This probably belonged to a legionary officer. The sword sheath may have been booty taken by the Zealots after a skirmish with Roman troops.



Hebrew University Museum/Moshe Cohen

HIGH-FASHION EQUIPMENT. A delicate cutout design and incised lines decorate the front of this scabbard chape, the ornamental bronze tip of a leather sheath for a sword. Originally the bronze was covered with silver, and the details were incised through the silver and then gilded. The hole in the upper edge allowed for the chape's attachment to the rest of the sheath. Found in a southeastern casemate room at Masada, the 3-inch-long chape probably belonged to a legionary officer and may have been taken by the Zealots as booty.

Another elegant find—among the scale armor from the northern palace—was the remains of what must have been parade scale armor. The deluxe metal scales were of different colors—silvery, red and gold—obtained by deliberately mixing different proportions of alloys to make the

bronze. One is tempted to attribute this parade armor to an officer of the Roman legion. But the context in which it was found makes it clear that this was part of the equipment of the Jewish defenders: It was found with other items that were used by the Zealots, including arrows, arrowheads, an ostrakon with Hebrew letters and a prayer shawl (*tallith*).

Of all the hundreds of arrowheads found at Masada, one was different: a bronze trilobate arrowhead with a socket into which a wooden shaft was inserted. Sometimes called a Scythian arrowhead, this type generally dates to an earlier time than the barbed iron trilobate arrowheads with tangs. Bronze trilobate arrowheads with sockets have been found in Israel at the northern coastal site of 'Atlit and in the Citadel in Jerusalem in contexts dating to the Persian and Hellenistic periods (sixth to first centuries B.C.E.). Perhaps the one found at Masada also comes from an earlier period, although it was uncovered in a clearly Zealot context. It may have been brought to Masada by the Hasmoneans (who originally fortified the site in the second century B.C.E.), or by Herod. In any event, it saw its last use at the time of the revolt against the Romans.

Around the mountain's base, the Romans had constructed a circumvallation wall. The steep and winding Snake Path on the eastern side of the mountain, the main route to the top, was unsuitable for an assault with heavy artillery. The Roman commander, Flavius Silva, ordered his forces to construct a huge ramp with a more gradual slope on the western side of the mountain. Artillery machines stationed on top of the small hill (called the "white promontory" by Josephus) at the foot of the western side of Masada provided covering fire for the soldiers engaged in the ramp's construction. When the ramp was completed, the full assault got underway.

The different kinds of artillery machines used by the Romans are referred to as catapults and ballistas by ancient writers, though the distinction between them is not always clear. One type was a huge, stone throwing engine, used to make holes in the walls and towers surrounding a fortress and to drive the defenders from the walls. The other type was a smaller machine that operated a torsion bow. These bows fired large, iron-headed projectiles, sometimes called darts, that provided covering fire for the advancing forces. As we have seen, none of these projectiles was found in the excavation. However, a large number of stones of various sizes thrown by these machines were discovered on top of Masada. Perhaps Josephus' mention of darts was simply formulaic.

Under covering artillery fire, the Roman forces dragged the battering ram up the ramp and broke through the wall that Herod had constructed around the top of the mountain. The Roman auxiliary archers added covering fire to that of the machines as the forces ascended the ramp. The Zealots certainly returned the fire with everything at their command, including bows and

arrows manufactured during the last days of the siege of Masada. After the Romans set fire to the reinforcement wall of wooden beams and earth hastily constructed by the Zealots opposite the top of the ramp, it became apparent that the fall of the site was imminent. Once the wall was breached, the Zealots could not withstand the Roman onslaught and all their defensive preparations came to nought—except for the memory of their bravery.

Where Masada's Defenders Fell

A garbled passage in Josephus has obscured the location of the mass suicide

By Nachman Ben-Yehuda

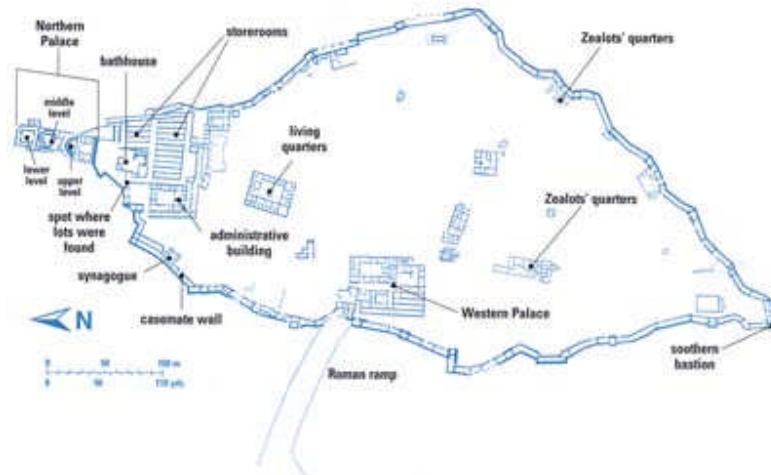


Duby Tal/Albatross

Prior to Yigael Yadin's excavations in the 1960s, most of what we knew about Herod the Great's mountain fortress of Masada came from the first-century C.E. Jewish historian Flavius Josephus. The story is well known: After the Romans destroyed Jerusalem and burned the Temple in 70 C.E., the First Jewish Revolt against Rome was, for all practical purposes, suppressed. However, three fortresses in the Judean wilderness remained outside Roman control: Herodium, Machaerus and Masada. It took the Roman military machine a number of years to attend to these remnants of the revolt. Masada, occupied by 967 Jewish rebels, was the last fortress the Romans attacked. They built numerous camps around the site, amassed thousands of troops, besieged it for three to four years, and, finally, built a ramp and stormed the fortress proper. Yet when the Romans, led by Silva, breached Masada's walls, they encountered only silence: 960 of the Jews had committed suicide rather than surrender to their enemies.

Yadin's excavations confirmed this account in its broad outlines, but many today question the details given in Josephus's account and seemingly corroborated by Yadin's interpretation of the finds. Did the Jews really commit mass suicide? Did the Jewish commander Eleazar Ben Yair actually make the stirring speeches Josephus attributes to him (see "Let Us Leave This World As

Free Men")? Did Yadin really find the lots the Jewish defenders used to select the ten men who would slay everyone else and the one among the ten who would slay the other nine and then himself? Were there really 960 rebels? What happened to the bodies? Did Yadin find some of them, as he claimed?



Plan of Masada.

I studied Josephus's account for many years while preparing a book on the episode and its use in modern Israel.¹ One sentence of it has always puzzled me. It has led me to think more deeply about what might have happened to the corpses of the Jews. Whether the Jews committed mass suicide or were killed by the Romans, their bodies, I reasoned, had to have been disposed of in some way. This realization led me, in turn, to consider precisely where the mass suicide of the Jews may have occurred. But I am getting ahead of the story.

The sentence from Josephus that has given me so much trouble concerns a palace Herod built at Masada: "He [Herod] built a palace therein at the western ascent; it was within and beneath the walls of the citadel, but inclined to its north side."²

A problem arises here because there are two palaces at Masada, a western palace and a northern palace.

The western palace is the largest structure on the site. It occupies an area of about 36,000 square feet near the point where the western ascent to Masada—the geological formation on which the Romans built their siege ramp—meets the top of the mountain.

The northern palace is the most dramatic and elegant structure on the site. With three levels, it is more a villa than a palace. Its lowest level was supported by huge external walls and columns

chiseled into the rock. It had frescoes and a small bath house. The middle level had a small circular structure whose purpose is not entirely clear. The top level contained living quarters and a semicircular veranda that still provides a spectacular view.

To which of these palaces was Josephus referring? For many years, scholars thought Josephus meant the western palace since it is located near the western ascent on which the Romans built their ramp. However, this conclusion does not fit the rest of Josephus's description. The western palace, as Yadin found it, is not "beneath the walls of the citadel" and is certainly not "inclined to its [the site's] north side."

For these reasons, Yadin and others concluded that Josephus must have been referring to the northern palace in this passage. The northern palace lay "beneath the walls of the citadel" and was "inclined to its north side." Moreover, Josephus mentioned "a road dug from the palace, and leading to the very top of the mountain." This too seems to indicate the northern palace. There is a problem, however: No western ascent leads to the northern palace. If Josephus's description is accurate, it cannot refer to this palace either.

From all this, we can draw only one conclusion: Josephus's sentence simply does not make sense as it stands.

Nor does it make sense that Josephus never seems to mention the western palace at all. Josephus, who is well known for his accurate descriptions, appears to have been quite familiar with Masada. Are we to believe that he simply failed to make any reference to the largest building on the site? This would be especially surprising since the Roman breach of Masada's wall occurred near this structure.

I believe this sentence from Josephus has been corrupted. Something has been changed or omitted. The words that give this away are "a palace ... at the western ascent." This can only be the western palace. Yet the rest of the sentence can only refer to the northern palace. Some text must have been lost in the middle.

I believe that the text stating "He built a palace therein at the western ascent" was originally followed by a description of the western palace and, after that, a description of the northern palace. At some point, the description of the western palace was deleted and the two unrelated sentences were combined, creating an ambiguous text that cannot be parsed.

The various versions of Josephus that survive in manuscript form provide little help in reconstructing this sentence. The standard Greek version with commentary uses the word for “palace,” *basileion* (literally “place of the king”), in the first part of the sentence, and the word *akra*, which might indicate a kind of citadel, in the second part of the sentence.³ This use of two different words seems to confirm that the two parts of the sentence refer to two different palaces.

The Greek version of Josephus is based on two principal manuscript groups dating from the 10th to the 12th century. Both textual groups existed as early as the third century. Early translations from the Greek into Latin (fourth and fifth centuries) and Syriac (sixth century) also exist. The omission in this sentence, however, occurs in those texts as well. In short, none of the surviving manuscripts offers a significant alternative reading for this passage.

In 1923 and 1993, Josephus was published in Hebrew translations. Both of these editions incorrectly translate “ascent” (the Greek *anabasis*) as “descent.” If Josephus had said that Herod built himself a palace “in the western descent,” then, with a little imagination, we might take this as a reference to the northern palace—as if there were a “western descent” leading to it. This is clearly wrong. Apparently, the translators were attempting to make some sense of this critical sentence.

Omissions such as the one in this sentence occur accidentally all the time. Sometimes, however, they are intentional. In this case, someone may have wanted readers (contemporary and future) to be unaware of something. But of what? What about the western palace would be worthy of omission? That it was where the Jewish commander Eleazar addressed his people, where the mass suicide occurred and where the Roman soldiers buried the bodies? That is the proposition I would like to explore.

When the final male survivor “perceived that they all were slain,” Josephus tells us, “he set fire to the palace, and with the great force of his hand ran his sword entirely through himself, and fell down dead near to his own relations.” (According to Josephus, a few children and two old women hid themselves and lived to tell the tale.) The implication of this passage is that the collective suicide took place at “the palace.”

Which palace is Josephus referring to? It seems clear that he means the western palace. The lower and middle levels of the northern palace would not have held 960 people. It also would have been hard to assemble everyone on one of the palace levels because the path down to them is difficult to traverse. The western palace, on the other hand, was easily accessible and could have accommodated everyone; it would have been a natural place for the collective

suicide. Indeed, even Yadin noted that the western palace was probably the central locale for Masada's ceremonies and its administration. Also, when Yadin excavated the western palace, he found it had been terribly burnt, which would be in keeping with Josephus's account.^a Furthermore, the word Josephus uses in this sentence for palace is *basileion*, the same word he used earlier for the palace "at the western ascent," not *akra*, the word he used for the palace "beneath the walls." His very terminology points to the western palace as the place of the suicide and fire.

When the Roman soldiers, probably in full armor, finally broke open the gateway to Masada at the top of the ramp, they entered carefully, expecting to meet resistance. Instead they were greeted only by the sounds, sights and smell of fire. The rebels were dead. The Roman soldiers "attempted to put the fire out, and quickly cutting ... a way through it ... came within the palace, and so met with the multitude of the slain, but could take no pleasure in the fact, though it were done to their enemies." In Josephus's narrative, the Romans do not take long to go through the fire, debris and rubble of the *basileion*. This also implies that the bodies were discovered in the western palace. Heading north and searching the northern palace would have taken longer; the western palace was near the Romans' point of entry.

Josephus's failure to mention the western palace, so central to the entire action, is mysterious. Could someone have tampered with the text to omit whatever description Josephus gave of it? And if so, why?

One plausible answer has to do with the missing bodies. Yadin thought that he had found the skeletons of a few of the slain defenders in a cave on Masada's southeastern face, but this is open to serious question (see *Whose Bones?*). In any event, he found fewer than 30 skeletons. So what happened to the rest?

The Romans occupied Masada for nearly 40 years after conquering it; they could not have simply left the dead to rot where they had fallen. They could have thrown the bodies of the slain over the side of the cliff, but I doubt it. I don't believe the Romans would have wanted to see those bodies at the bottom of the cliff, rotting in the sun and being eaten by animals. Not only would it have been unpleasant and unhealthy, but the Romans apparently had a grudging but understandable respect for their erstwhile enemies. According to Josephus, "Nor could they [the Roman soldiers] do other than wonder at the courage of their [the Jewish rebels'] resolution, and at the immovable contempt of death which so great a number of them had shown, when they went through with such an action."⁴

The Romans could have set fire to the bodies, but burning 960 would have been a major undertaking requiring materials hardly available in the desert. They could have buried the bodies in a mass grave, especially if, as indicated above, the Romans had some respect for the dead. But where would they have dug this grave? At the foot of the Roman ramp? Somewhere on Masada's top? The latter seems more logical. It would have got the bodies out of the way quickly and respectfully. My guess—and it is just a guess—is that the bodies were buried in or close to the western palace, where the Romans had found them.

In the Byzantine period, between the fifth and seventh centuries, monks lived on Masada and built a church northeast of the western palace. Monks usually built their churches and monasteries on sites that had some historical and transcendental significance. Did they come to Masada to build a church where they knew, or guessed, the death scene of Masada had occurred—and perhaps where the bodies were buried?

Finally, did the early Christians delete the information provided in Josephus's original passage because they did not want later generations of Jews (and others) to make the site a place for Jewish pilgrimage or veneration?

Speculative? Yes. Impossible? No.

I am grateful to Shmuel Gertel for his crucial and significant help in translating original writings and locating sources.

“Let Us Leave This World as Free Men”

Sidebar to: Where Masada's Defenders Fell
Ben Yair's Last Speech According to Josephus



David Harris

When the besieged Jewish defenders of Masada saw that the Romans had completed a ramp up to their walls and were preparing to attack in the morning, they realized that their long struggle would soon be over. They knew no one could rescue them; they were the last holdout of the Jewish resistance that had fought Rome in the First Jewish Revolt (66–70 A.D.). Jerusalem had fallen in 70 A.D., and the Temple had been destroyed. All other pockets of resistance had been crushed one by one and the captured rebels tortured and killed, enslaved or sent to Rome to die as gladiators.

Masada's defenders assembled for the last time. According to the first-century A.D. Jewish historian Flavius Josephus, their leader, Eleazar Ben Yair, addressed them with so moving a speech that 960 of the 967 Masada defenders were convinced to commit suicide and die as free persons rather than face torment, slaughter, rape and enslavement at the hands of the Romans. The defenders cast lots, Josephus writes: Ten men would kill the others and then draw lots again to determine which one would kill the other nine before killing himself. Yigael Yadin, Masada's excavator, believed the inscribed lots he had found (photo at center) were the ones described by Josephus.

Josephus claimed that seven people slipped out of Masada just before its fall, avoiding both suicide and capture by the Romans. Josephus, who was not an eyewitness, claims that one of those survivors told him of Ben Yair's speech. However, some scholars question Josephus's account, claiming that Ben Yair never made the speech, that no mass suicide occurred and that

Masada's excavator, Yigael Yadin, claimed too quickly that the archaeological evidence fit Josephus's account. Though archaeological evidence at other sites has been found to verify Josephus's accounts in great detail, scholars point out that the most important evidence of all is missing from Masada—the remains of the 960. Whatever its veracity, Ben Yair's speech undoubtedly still has the power to stir emotions nearly 2,000 years later:

“My loyal followers, long ago we resolved to serve neither the Romans nor anyone else but only God, who alone is the true and righteous Lord of men: now the time has come that bids us prove our determination by our deeds. At such a time we must not disgrace ourselves: hitherto we have never submitted to slavery, even when it brought no danger with it. We must not choose slavery now, and with it penalties that will mean the end of everything if we fall alive into the hands of the Romans. For we were the first of all to revolt, and shall be the last to break off the struggle. And I think it is God who has given us this privilege, that we can die nobly and as free men, unlike others who were unexpectedly defeated. In our case it is evident that daybreak will end our resistance, but we are free to choose an honorable death with our loved ones. This our enemies cannot prevent, however earnestly they may pray to take us alive; nor can we defeat them in battle ...

“Let our wives die unabused, our children without knowledge of slavery: after that, let us do each other an ungrudging kindness, preserving our freedom as a glorious winding-sheet. But first let our possessions and the whole fortress go up in flames: it will be a bitter blow to the Romans, that I know, to find our persons beyond their reach and nothing left for them to loot. One thing let us spare—our store of food: it will bear witness when we are dead to the fact that we perished, not through want but because, as we resolved at the beginning, we chose death rather than slavery ...

“If only we had all died before seeing the Sacred City utterly destroyed by enemy hands, the Holy Sanctuary so impiously uprooted! But since an honorable ambition deluded us into thinking that perhaps we should succeed in avenging her of her enemies, and now all hope has fled, abandoning us to our fate, let us at once choose death with honor and do the kindest thing we can for ourselves, our wives and children, while it is still possible to show ourselves any kindness. After all, we were born to die, we and those we brought into the world: this even the luckiest must face. But outrage, slavery, and the sight of our wives led away to shame with our children—these are not evils to which man is subject by the laws of nature: men undergo them through their own cowardice if they have a chance to forestall them by death and will not take it. We are very proud of our courage, so we revolted from Rome: now in the final stages they have offered to spare our lives and we have turned the offer down. Is anyone too blind to see how furious they will be if they

take us alive? Pity the young whose bodies are strong enough to survive prolonged torture; pity the not-so-young whose old frames would break under such ill-usage. A man will see his wife violently carried off; he will hear the voice of his child crying 'Daddy!' when his own hands are fettered. Come! while our hands are free and can hold a sword, let them do a noble service! Let us die unenslaved by our enemies, and leave this world in company with our wives and children."

Flavius Josephus, Jewish War 7.8.6–7

Authors

Biographies are published as they originally appeared with their respective authors' articles.

Ehud Netzer graduated from the Technion University in Haifa as an architect, a vocation he has pursued along with archaeology since the late 1950s. He worked as a surveyor at Yigael Yadin's Hazor excavation and as an architect at Yadin's Masada excavation, where he was also in charge of the preservation and reconstruction of the site. As an archaeologist, he has directed or co-directed excavations at numerous sites, including Herodium, the Third Wall of Jerusalem and Caesarea. A professor of archaeology at Hebrew University, Netzer serves on **BAR**'s Editorial Advisory Board. The most recent of his many **BAR** articles was "Jewish Rebels Dig Strategic Tunnel System," **BAR** 14:04.

Sidnie White Crawford is the chair of the classics and religious studies department at the University of Nebraska, Lincoln. She is also president of the Albright Institute of Archaeological Research in Jerusalem. As a member of the scroll publication team, she has written extensively on both the scrolls and the sectarian community of Qumran that she believes produced them.

Dan Gill is a senior geologist with the Geological Survey of Israel. A member of many scientific committees and societies, including the American Association of Petroleum Geologists, Gill holds the rank of Research Scientist Grade A+, the equivalent of a full professor at a university. His article on Hezekiah's Tunnel, "How They Met," **BAR** 20:04, was named the best article in **BAR** for 1994 and 1995.

Jodi Magness is assistant professor of classical archaeology at Tufts University in Medford, Massachusetts. For a comparatively young scholar, she has excavation experience at an unusually large number of sites, including, as area supervisor, Khirbet 'Uza, Kfar Hananiya and Emek Rephaim, in Israel, and Corinth, in Greece. She currently serves as the late Roman and Byzantine ceramics specialist for the dig at Caesarea. The technical version of Magness' study of the arms and armor from Masada, on which she based her **BAR** article, will appear in volume five of *Masada: The Yigael Yadin Excavations, 1963–1965, Final Reports*, forthcoming from the Israel Exploration Society. Her first book, *Jerusalem Ceramic Chronology: ca. 200–800 C.E.*, will be published next year by Sheffield Academic Press.

Nachman Ben-Yehuda is the author of *The Masada Myth: Collective Memory and Mythmaking in Israel* (Univ. of Wisconsin, 1995). But the sociology professor at Hebrew University in Jerusalem has also served as a government advisor on drug abuse policy and as a member of national committees on police violence, cults and corruption in public service.

Notes

The Last Days and Hours at Masada

Originally published in the November/December 1991 issue of Biblical Archaeology Review.

- a. The scholars involved in this project, and their areas of responsibility, are Gideon Foerster and Ehud Netzer, coordinators, Ehud Netzer, description of the site and architecture; Gideon Foerster architectural elements and background; Joseph Naveh, Hebrew and Aramaic ostraca; Ya'akov Meshorer, coins; Hanna M. Cotton and Joseph Geiger, Latin and Greek documents; Rachel Bar Natan, ceramics; Dan Barag and Malka Hershkoviz, lamps; Avigdal Sheffer, textiles; Shemaryahu Talmon, scrolls.
- b. B.C.E. (Before the Common Era) and C.E. (Common Era), used by this author, are the alternate designations corresponding to B.C. and A.D. often used in scholarly literature.
- c. Although, theoretically, Josephus may have joined the Roman army during the siege, there is no data. However, I believe that there is a basis for his testimony that "an old woman and another, a relative of Eleazar, superior in sagacity and training to most of her sex, with five children, escaped by concealing themselves in the subterranean aqueducts, while the rest were absorbed in the slaughter" (The Jewish War 7.399), which could describe what happened.

Scribe Links Qumran and Masada

Originally published in the November/December 2012 issue of Biblical Archaeology Review.

- a. See Stephen Goranson "Qumran—A Hub of Scribal Activity," **BAR**, September/October 1994. See also Stephen Goranson, "Qumran—The Evidence of the Inkwells," **BAR** 19:06.
- b. Sidnie White Crawford, "A View from the Caves," **BAR** 37:05.

Endnotes:

1. Ada Yardeni, "A Note on a Qumran Scribe," in M. Lubetski, ed., *New Seals and Inscriptions: Hebrew Idumean, and Cuneiform* (Sheffield: Sheffield Phoenix Press, 2007), pp. 287–298.
2. John Strugnell, "Notes en marge du volume V des 'Discoveries in the Judean Desert of Jordan,'" *Review de Qumran* 7 (1970), pp. 163–276. See Emanuel Tov, *Scribal Practices and Approaches Reflected in the Texts Found in the Judean Desert* (Leiden/Boston: Brill, 2004), pp. 23–24, who also includes a full bibliography. See also Eibert Tigchelaar, "In Search of the Scribe of 1QS," in Shalom Paul et al., eds., *Emanuel: Studies in Hebrew Bible, Septuagint, and Dead Sea Scrolls in Honor of Emanuel Tov* (Leiden: Brill, 2003), pp. 439–452.
3. Eugene Ulrich, "Identification of a Scribe Active at Qumran: 1QPs^b-4QIsa^c-11QM," in M. Bar-Asher and E. Tov, eds., *Meghillot: Studies in the Dead Sea Scrolls V-VI. A Festschrift for Devorah Dimant* (Jerusalem: Bialik Institute and Haifa University Press, 2007) pp. 201–210. Ulrich has informed me (private communication) that this same scribe also penned 4QDan^b.
4. G. Bonani, I. Carmi, S. Ivy, J. Strugnell and W. Wölfli, "Radiocarbon Dating of the Dead Sea Scrolls," *Atiqot* 20 (1991), pp. 27–32. A.J.T. Jull, D.J. Donahue, M. Broshi and E. Tov, "Radiocarbon Dating of Scrolls and Linen Fragments from the Judean Desert," *Atiqot* 28 (1996), pp. 1–7.
5. Frank Moore Cross, "Paleography," in L.H. Schiffman and J.C. VanderKam, eds., *The Encyclopedia of the Dead Sea Scrolls*, vol. 2 (New York: Oxford, 2000), p. 631.
6. B.A. Levine, P.J. King, J. Naveh and E. Stern, eds., *Eretz Israel 26: Frank Moore Cross Volume* (Jerusalem: Israel Exploration Society, 1999), p. xi.
7. Yardeni, "A Note on a Qumran Scribe," p. 288. For a discussion on chronology at Qumran, see Jodi Magness, *The Archaeology of Qumran and the Dead Sea Scrolls* (Grand Rapids: Eerdmans, 2002).
8. Brian Webster, "Chronological Index of the Texts from the Judean Desert," in Emanuel Tov, *Texts from the Judean Desert, Discoveries in the Judean Desert Series 04XIX* (Oxford: Clarendon Press, 2002), p. 375.

9. Shemaryahu Talmon, "Qumran Corner: Fragments of a Joshua Apocryphon—Masada 1039–211," *Journal of Jewish Studies* 47 (1996), pp. 128–139.
10. Carol Newsom, "Songs of the Sabbath Sacrifice," in L.H. Schiffman and J.C. VanderKam, eds., *The Encyclopedia of the Dead Sea Scrolls*, vol. 2 (New York: Oxford Univ. Press, 2000), pp. 887–889.

It's a Natural: Masada Ramp Was Not a Roman Engineering Miracle

Originally published in the September/October 2001 issue of Biblical Archaeology Review.

a. See Nachman Ben-Yehuda, "Where Masada's Defenders Fell," Joe Zias, "Whose Bones?" and Ze'ev Meshel, "Governments-in-Exile," **BAR** 24:06.

Endnotes:

1. The idea that the entire spur was built by the Romans is either explicitly stated or implied in numerous publications. See, for example, Christopher Hawkes, "The Roman siege of Masada," *Antiquity* 3 (1929), pp. 195–213; Michael Avi-Yonah, Nachman Avigad, Yochanan Aharoni, Imanuel Dunayevsky and Shmaria Gutman, "The archaeological survey of Masada, 1955–1956," *Israel Exploration Journal* 7:1 (1957), pp. 1–60, esp. p. 7; Yigael Yadin, *Masada, Herod's fortress and the Zealots' last stand* (London: Weidenfeld and Nicolson, 1966), p. 226; Avi-Yonah, *Carta's atlas of the period of the Second Temple, the Mishnah and the Talmud*, 2nd rev. ed. (Jerusalem: Carta, 1974; in Hebrew); Y.L. Levin, *The History of Eretz Ysrael*, vol. 4, *The Roman and Byzantine Period* (Jerusalem: Ketter and Yad Ben-Zvi, 1984; in Hebrew); Israel Shatzman, "The Roman Siege of Masada," in Gila Hurvitz, ed., *The Story of Masada: Discoveries From the Excavations* (Provo, Utah: BYU Studies, 1997), pp. 109–130. It is particularly significant that this understanding is evidently still prevalent among archaeologists such as Meir Ben-Dov and Ehud Netzer. See Ben-Dov, "In contradiction to the claim made by geologist Dan Gill, archaeologists claim the Masada siege ramp is man-made," *Ha'aretz* (August 13, 1993), p. 6 (in Hebrew); and Netzer, "Masada ramp thesis is as firm as bedrock," *Jerusalem Post* (December 7, 1994), p. 7.
2. Nachman Ben-Yehuda cites 14 history books and 16 guidebooks in which this statement is made (Ben-Yehuda, *The Masada Myth: Collective Memory and Mythmaking in Israel* [Madison: Univ. of Wisconsin Press, 1995], tables 8.1, 9.1).
3. Sources that advocate that the besieging forces numbered 16,000 to 25,000 men (6,000 to 10,000 legionnaires and 10,000 to 15,000 slave workers) include Moshe Pearlman, *The Zealots of Masada* (Herzlia: Palphot; repr. London: Hamilton, 1969; New York: Scribner, 1967), p. 13; and Louis H. Feldman, *Josephus and Modern Scholarship* (1937–1980) (Berlin: de Gruyter, 1984), p. 776.
4. Dan Gill, "A Natural Spur at Masada," *Nature* 364 (1993), pp. 569–570. I should note that my conclusions confirmed and refined the findings of the earlier investigation by Adolf Lammerer, the German general who surveyed the ramp for Adolf Schulten's expedition in 1932 (Lammerer, "Der Angriffsdamme," in Schulten, "Masada: Die Burg des Herodes und romoschen Lager," *Zeitschrift des Deutschen Palastina-Vereins* 56 [1933], pp. 167–171); Lammerer and Schulten's observations were highlighted by Yoseph Braslavi (Braslavi, *Masada* [Tel Aviv: Hakibutz Hame'ukhad, 1944; in Hebrew]); see also Braslavi, "The Dead Sea around and around," in *Did you know the land?* (Tel Aviv: Hakibutz Hame'uchad, 1955; in Hebrew), pp. 297–448. A correct geological analysis of the spur was published by Shmaria Gutman in *With Masada: Excursion and research notes* (Tel Aviv: Hakibutz Hame'uchad, 1965; in Hebrew). Gutman's findings, which were published earlier in several articles in the journal *Mibefnim*, were also adopted by Ian Archibald Richmond (Richmond, "The Roman siege-works at Masada, Israel," *Journal of Roman Studies* 52 [1962], pp. 142–155). I arrived at my findings independently of these earlier studies, and became familiar with them only after I completed my own investigation.
5. The Bina Formation is a geological rock unit name that is used in central and northern Israel. In the Judean Desert the Bina Formation is subdivided into the Derorim, Shivta and Nezer formations. I chose to combine these units and employ the name Bina in order to simplify the drawings and the discussion.
6. The word Nimmer means tiger in Arabic. This stream is also known as Wadi Kibrita (sulfur in Arabic), and Nahal, or Gay, Ha'armon, the Palace Stream, or Gully, in Hebrew.
7. Lammerer, "Der Angriffsdamme," p. 169.

8. Nili Lipshchitz, Simcha Lev-Yadun and Yoav Waisel, "Dendroarchaeological Investigations in Israel (Masada)," *Israel Exploration Journal* 31 (1981), pp. 230–234. The authors analyzed 186 branches from the ramp and report that 92 percent are of *Tamarix jordanis* trees and the remaining 8 percent are of a few other species that still grow in the area.
9. Dan Yakir, Arie Issar, Yoel Gat, Eilon Adar, Peter Trimborn and Joseph Lipp, "¹³C and ¹⁸O of wood from the Roman siege rampart in Masada, Israel (A.D. 70–73): Evidence for a less arid climate for the region," *Geochemica et Cosmochemica Acta* 58:16 (1994), pp. 3,535–3,539.
10. Jonathan Roth, "The length of the siege of Masada," *Scripta Classica Israelica* 14 (1995), pp. 87–110.
11. Schulten, *Masada*, pp. 17–18. Most scholars concur with these dates, but some push the events forward to 73–74 A.D. See Hannah M. Cotton, "The Date of the Fall of Masada—The Evidence of the Masada Papyri," *Zeitschrift für Papyrologie und Epigraphik* 78 (1989), pp. 157–162; see also Feldman, *Josephus and Modern Scholarship*, p. 789.
12. Henry St. John Thackeray, *Josephus with an English translation*, v. 3, *The Jewish War*, Books IV–VII (London: W. Heinemann, 1928), 7.8.5, p. 591.
13. Tessa Rajak, *Josephus: The historian and his society* (London: Duckworth, 1983), p. 34.
14. This has opened Josephus up to criticism. Several historians over the years have suggested that Josephus's description of the battle of Masada may have been deliberately slanted to make Flavius Silva, the commander of the 10th Roman Legion, look good and that Josephus inflated the Roman accomplishment to please his patrons. Feldman, *Josephus and Modern Scholarship*, pp. 772–777.

Masada: Arms and the Man

Originally published in the July/August 1992 issue of Biblical Archaeology Review.

- a. Ehud Netzer, "The Last Days and Hours at Masada," **BAR** 17:06.
- b. Quenching: rapid cooling of steel in water or some other liquid, which greatly increases the strength but induces brittleness.
- c. Tempering: moderate reheating of quenched steel (to temperatures below 727° C.) to reduce the brittleness caused by quenching.
- d. See Danny Syon, "Gamla: Portrait of a Rebellion," **BAR** 18:01.

Endnotes:

1. I am grateful to Dr. Ehud Netzer and Professor Gideon Foerster of the Hebrew University of Jerusalem, and Joseph Aviram of the Israel Exploration Society, for their permission and encouragement to publish this article. My report on the arms and armor from Masada will appear in *Masada, The Yigael Yadin Excavations 1963–1965, Final Reports*, Vol 5, ed. J. Aviram, G. Foerster and E. Netzer (Jerusalem: Israel Exploration Society, forthcoming). The ballista stones will be published in the same volume by Andrew E. Holley.
2. Josephus, *The Jewish War* 7.8.
3. Yigael Yadin, *Masada* (New York: Random House, 1966), p. 97: "The weapons of the Zealots, who used mainly bows and arrows were discovered by us in many locations on Masada. We found hundreds of arrows in such places as the middle terrace of the palace-villa, the western palace and elsewhere, literally in heaps where they had been piled and intentionally set on fire." However, in his preliminary excavation report ("The Excavation of Masada 1963/64, Preliminary Report," *Israel Exploration Journal [IEJ]* 15 [1965]), pp. 61–64, Yadin alludes to Zealot workshops in the western palace.
4. See Yadin, "Excavation of Masada," where he incorrectly states that the arrowheads were found "in the eastern part of the mosaic" (p. 62).
5. The main reference for this section is R.F. Tylecote, "Furnaces, Crucibles, and Slags," in *The Coming of the Age of Iron*, ed. T.A. Wertime and James D. Muhly (New Haven, CT: Yale Univ. Press, 1980), pp. 183–228.
6. See R. Knox et al., "Iron Objects from Masada: Metallurgical Studies," *IEJ* 33 (1983), pp. 97–107.
7. The larger weapons, which would have been much more valuable, would have been taken by the Romans when they left Masada.

Where Masada's Defenders Fell

Originally published in the November/December 1998 issue of Biblical Archaeology Review.

a. See Ehud Netzer, "The Last Days and Hours of Masada," **BAR** 17:06.

Endnotes:

1. Nachman Ben-Yehuda, *The Masada Myth* (Madison, WI: Univ. of Wisconsin Press, 1995).
2. Josephus, *The Jewish Wars* 7.8.3.
3. Benedikt Niese was the German scholar who edited the works of Flavius Josephus in the Teubner series, *Flavii Iosephi opera recognovit Benedictus Niese*, 7 vols. (Berlin: Weidmannos, 1888–1895). It is considered the authoritative scientific edition of the Greek text of Josephus.
4. Josephus, *The Jewish Wars* 7.9.2.