MACHAERUS PROJECT: PRELIMINARY REPORT ON THE COLUMN ANASTYLOSES IN THE DORIC ROYAL COURTYARD AND IONIC BATHHOUSE OF THE FORTIFIED HERODIAN PALACE AT THE DEAD SEA

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Introduction

Since 2009, the Hungarian Academy of Arts in collaboration with the Jordanian Department of Antiquities has been conducting architectural surveys and archaeological excavations at Machaerus (modern Mukawir), on the hilltop citadel of the Herodian royal castle, overlooking the Dead Sea in the Hashemite Kingdom of Jordan.

The archaeological site is a pilgrimage destination for Christians and Muslims alike, as it is the site of the imprisonment and martyrdom of Prophet Yahya ibn Zakariyya (Saint John the Baptist), according to the generally accepted authority of Flavius Josephus *(Antiquitates Judaicae* XVIII 5, 2), official historian of several Roman emperors in the first century.

On the basis of our scientific submission dated September 2013, the director general of the Department of Antiquities, Professor Monther Jamhawi, agreed to clear the archaeological site of previously erected (1993), unauthentic and misleading monuments in the royal courtyard, and authorized the author to re-erect two of the original palace columns.

We carried out this task in March - April 2014; the following members of the archaeological mission were present: Dr. Győző Vörös (archaeologist; architect; director), Tamás Dobrosi (architect), Tamás Dósa Papp (architect; photographer), Ueli Bellwald (conservator), Khader Apsi (crane man) and Dylan Karges (archaeological graphic artist). The representative of the Department of Antiquities was Abdullah al-Bwareed.

Discovery of the Herodian Columns and *in Situ* Reconstruction of the Herodian Column Bases

In 2009, when the Hungarian mission started its fieldwork at Machaerus, we produced a substantial architectural catalogue of unpublished carved stones found on the unguarded site **(Figs. 1 and 2)**. Among the building elements, we identified 51 Herodian column drums and bases, as well as one Doric and six Ionic capitals. These were published in the Machaerus I monograph (Vörös 2013: 294–317), along with a plan for an architectural anastylosis project involving one Doric and one Ionic column.

Anastylosis of the two Herodian columns required sophisticated scientific preparation and detective work, both theoretical and practical. Our original intent did not change: we wanted to present the surviving ruins of the archaeological monument in an attractive, but unquestionably authentic, manner and to preserve them for future generations. Aiming at maximum authenticity, our aim was to re-erect complete columns in the very locations where two column bases had been found *in situ* by the Franciscan Mission in 1979 and 1980 respectively (Corbo 1979 and 1980).

With the valuable graphic and photographic excavation archives of the Studium Biblicum Franciscanum to hand, our first task was to identify the two column bases amongst the other Herodian architectural elements as they had been removed from their original locations by vandals. In the meantime, although the stylobate of the Doric column base remained nearly intact, the upper surface of the crepidoma for the Ionic

1. This dramatic photograph from the Jerusalem archive of the Studium Biblicum Franciscanum was taken during the second Franciscan mission (directed by Fr Michele Piccirillo) in 1992. Following complete excavation of the Herodian cistern, we can see many architectural elements in its base, waiting to be recovered. View from south-west.

2. The Hungarian mission inherited this architectural collection in the form of an undocumented, unpublished and unguarded open-air storage area on the archaeological site of Machaerus, as visible in this 2010 photograph.

column base had to be reinforced as it had degraded over the past 35 years. For earthquake-proofing, the two column bases were anchored with similar stainless steel *empolia* (plugs) to those we used as links between the column joints.

The day of the re-erection of the two column bases, 30 March 2014, was a fine celebration, as it was the first step in the complete anastylosis of the two Machaerus Herodian columns and the only phase of work that could be scheduled for a specific day. Their Royal Highnesses, Prince Hassan bin Talal and his wife Princess Sarvath al-Hassan represented the Hashemite royal family. Professor Monther Jamhawi, director general of the Department of Antiquities, and HE Dr Béla Jungbert, Hungarian Ambassador to Jordan, were also present, along with members of the Machaerus research project and the Department of Antiquities. All of us were under the protection of Jordanian security officers and royal guards. It was a memorable day in the Dead Sea sunshine that demonstrated the great support of the royal family and Jordanian government for the Archaeological Research Unit of the Hungarian Academy of Arts at Machaerus **(Fig. 3)**.

3. The re-erected Ionic column base on the reinforced crepidoma in the apodyterium hall of the former Herodian royal bathhouse at Machaerus. HRH Princess Sarvath al-Hassan stands in the center of this official photograph. On her right (in scarf) stands HRH Prince Hassan bin Talal, chairman of the Royal Scientific Society; on her left stands Professor Monther Jamhawi, director general of the Department of Antiquities of Jordan.

Prior to this, the Department of Antiquities had approved, on the basis of our carefully prepared scientific proposal, the removal of previously erected modern columns from the archaeological site. These misleading 1993 representations had altered the ancient character of the Machaerus hilltop for 21 years **(Fig. 4)**. They had partly been erected in places where no columns had stood in antiquity, thereby neglecting both the archaeological documentation of the first Franciscan excavations and current trends in monument presentation. Specifically, the 1993 reconstruction of the royal peristyle courtyard of Machaerus had a number of flaws: (1) it imitated Ionic style, instead of the archaeologically demonstrable Doric style; (2) the arrangement of columns in the peristyle of the courtyard was 10 x 8, instead of the archaeologically demonstrable 8 x 8; (3) most importantly, the presentation falsified a partial column anastylosis, in which original column bases and capitals were used with modern columns, giving the impression of an Ionic royal peristyle courtyard at Machaerus with four surviving *in situ* column bases and professional anastylosis restoration. It was misleading for visitors and failed to take the archaeological evidence into account. This presentation was actually never completed and received serious criticism internationally. Whilst it was standing, it not only eroded the authenticity of the archaeological site of Machaerus, but also gave a bad name to Jordanian archaeology.

Our proposal for a new presentation of the monument was clear: the site of Machaerus, as the historical place where John the Baptist was imprisoned and beheaded, is so precious for Christian and Muslim pilgrims and visitors that its presentation had to be absolutely reliable and authentic. We published our proposal for a new presentation of the monument in *Machaerus I* (Vörös 2013: 364–377, *The Architectural Plans of the New Monument-Presentation for the Pilgrims and Visitors*). The first step in the execution of this plan was necessarily the removal of the erroneous modern columns, followed afterwards by the re-erection of two complete, genuine Herodian columns that

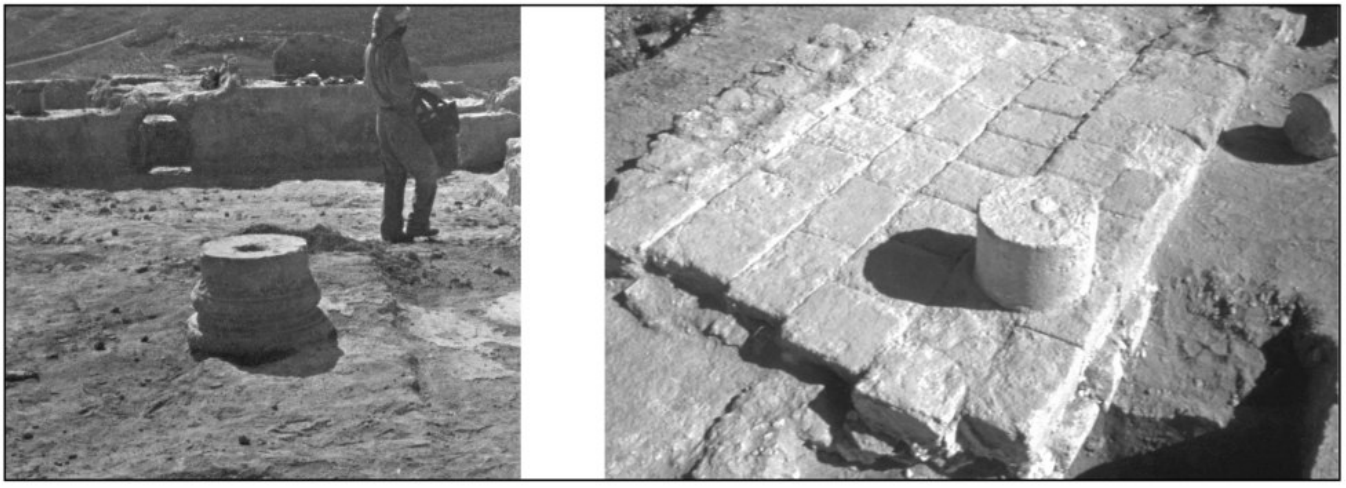
4. The problematic 1993 presentation of Machaerus, with modern columns in the background and the original Herodian architectural elements left in the foreground.

we had been able to piece together from the original architectural elements and had already published theoretically (Vörös 2013: 294–317, *The Theoretical Anastylosis of the Doric and Ionic Columns*). The decision to proceed with a new presentation of Machaerus, according to the Jordanian *Law of Antiquities*, required the authority of an appointed director general of the Department of Antiquities. However, as a result of political turmoil in the Middle East, there was - unprecedentedly - no appointed director general between June 2011 and August 2013.

One of the first decisions of Professor Monther Jamhawi, on his appointment as director general, was to approve our proposal in September 2013. With this we were able to start work on the new presentation of the monument. Since 2009, when the Hungarian mission started its work, the Department of Antiquities has provided two fundamental aspects of support free of charge: (1) it funded the entire payroll of the Mukawir workmen and (2) the project was able to use all archaeological equipment of the Madaba Archaeological Museum. In addition, the director general offered us the proven and time-tested crane of the Jarash Archaeological Park and, most importantly, its driver Khader Apsi. He started work with this crane at Jarash a good twenty years ago and has subsequently used it for the re-erection of dozens of ancient columns. The representative of the Department of Antiquities to our Machaerus project has been Abdullah al-Bwareed from the beginning. He is not simply an excellent colleague but, together with Khader, became our very good friend as well.

The Two Complete Column Anastyloses

After the publication of our theoretical column anastylosis plans (Vörös 2013: 294–317), three new and important developments occurred. The first was the discovery of a previously unknown Machaerus excavation archive in the *Studium Biblicum Franciscanum* in Jerusalem, which is referenced in the second volume of the Machaerus final reports (Vörös 2015: 264–271). Amongst these photographs were several new images of the first Italian - Franciscan mission excavations, which allowed for definitive identification of both the exact locations and actual bases of the Doric and Ionic columns found in situ in 1979 and 1980 respectively **(Figs. 5 and 6)**. The final identification of the Doric column base led to a modification in the sequence of the drums between the base and capital. The second development derived from physical analyses of the drums. Some of them were too fragile, fragmented or had cracks in the stone that rendered them unusable for an earthquake-proof anastylosis. We had to find alternate drums for these architectural elements on the basis of matching measurements. The third

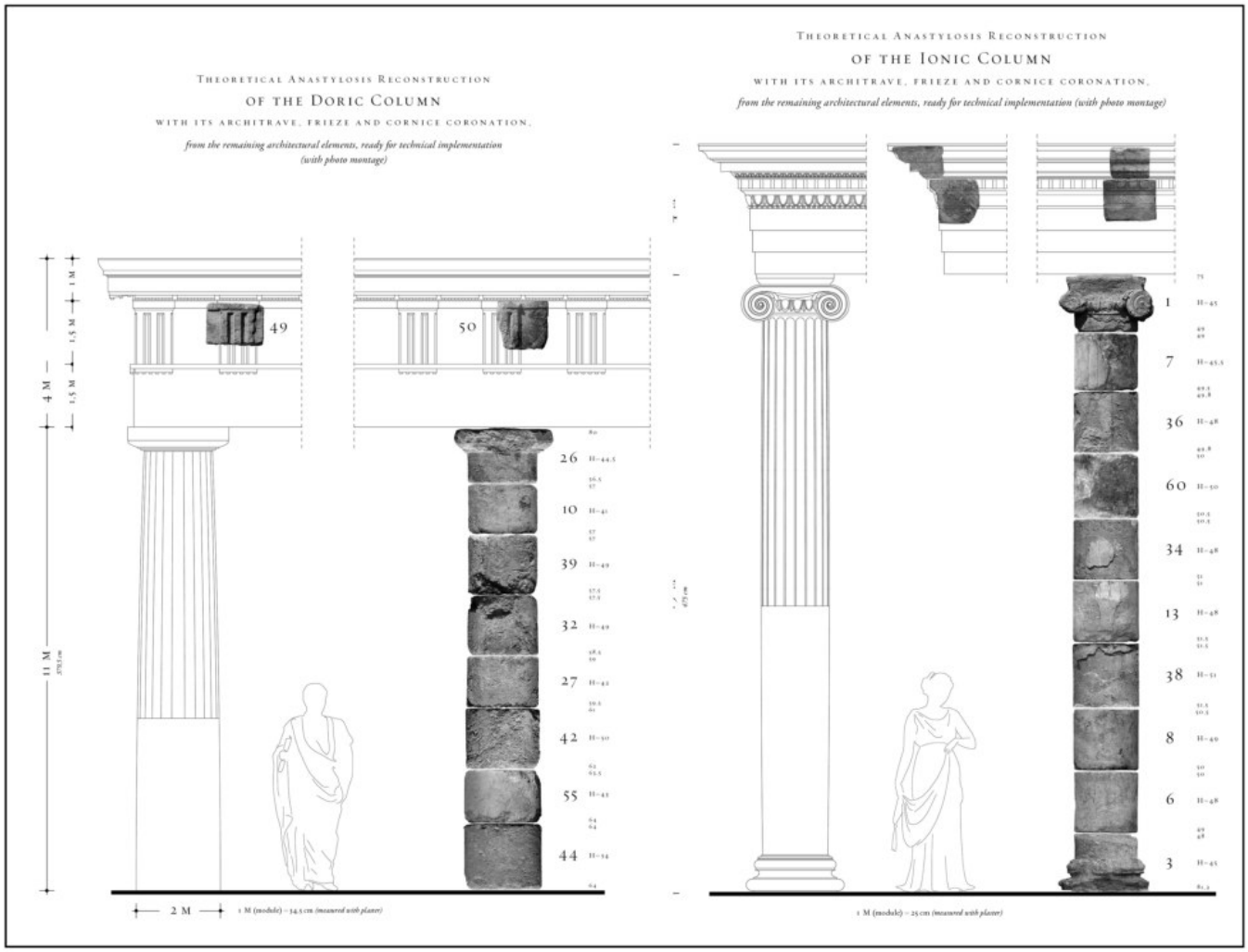


5 and 6. The original 1979 and 1980 photographs of the two in situ Herodian column bases. The photographs are from the archive of the pontifical Studium Biblicum Franciscanum in Jerusalem.

reason for coming up with a different sequence of drums in the technical implementation was linked to the nature of the cone-shaped Doric and 'pregnant'-shaped Ionic entases and the requirements of their canonic heights based on both column-base module radii and style. The Doric column was given its original *in situ* base (No 44, with the result that we had to leave out No 45), with No 39 being inserted into the original sequence as the last-but-one drum before the capital. This gave a slightly greater height (379.5 cm instead of 368.5 cm) and module (34.5 cm instead of 33.5 cm). According to the early Roman architectural canon, Doric columns had to have a height equivalent to 11 modules.

This new module did not however fit the two-module base (the actual diameter was only 64 cm rather than the 'requisite' 69 cm), leading us to the theoretical conclusion that the ancient Herodian architects at Machaerus measured the bases of the columns together with their plaster coating, as was normal at Pompeii or Herculaneum. This supposition led us to the dramatic discovery of the diastyle and systyle intercolumniation of the peristyle courtyard. All the other architectural measurements of the royal courtyard conformed to multiplications of 34.5 cm, the so-called *pygme*-module, which will be discussed later **(Fig. 7)**.

Even though we based our theoretical reconstruction of the Ionic column on the original *in situ* base, when it came to the Ionic entasis of the shaft we faced a new challenge. After thorough cleaning of the column base we realised that its diameter was not 51.5 cm, but only 48 cm. A yet greater surprise came when the



7 and 8. Final computer reconstructions of the Ionic and Doric columns of the Herodian royal palace of Machaerus, before their re-erection on the archaeological site.

capital was separated from the modern shaft; its diameter was not 44 cm, but 49 cm. At the same time, most of the drums had larger diameters than the base and the capital. We quickly realised that we were dealing with a vertically cigar-shaped entasis of the Ionic columns, in which the ancient builders used plaster to give the appearance of monolithic white marble columns that were usually wider in the middle for strength and stability. Although in practice we were able to use the originally selected base and capital of the Ionic column, as a result of the different measurements and physical states of the various architectural elements, of the eight column drums we were only able to use Nos 7 and 8, and those at different places in the sequence. This resulted in a lower height for the Ionic column of 475 cm (instead of the anticipated 513 cm), but this fitted perfectly with the new module (25 cm instead of 27 cm) measured in antiquity with the plaster, as in the Doric column. According to the early Roman architectural canon, Asia Minor-type Ionic columns were supposed to have a height equivalent to 19 modules **(Fig. 8)**.

Detailed examination of the ancient square holes for *empolia* in the column drums chosen for the anastylosis revealed that although they were positioned in the center of the bed joint, their dimensions did not match. This was because the drums chosen for the anastylosis originally came from different columns. The *empolium* holes were therefore positioned to centre the drums in different vertical successions. The only solution was to widen and deepen the indentations in some of the drums by a few millimeters. This was done with traditional tools, *viz*. mallet and claw chisel. As noted above, our modern *empolia* and their movable rods were manufactured from high quality stainless steel.

In conjunction with the widening of the *empolium* holes, conservation work was carried out on the stucco decoration of the Ionic capital and the surviving Roman-style fluted plaster decoration on the drums. Once the empolium holes on the bedding surfaces of the Doric and Ionic column drums had – where necessary – been widened, the individual elements were ready for reassembly, with any missing sections being restored in limestone mortar. The base and drums of the Ionic column did not need any restoration, although the capital did. However, in the case of the Doric column, the capital and five drums had to be restored in order to ensure safe set-up (excluding the all important base and lowest drum, which were complete) **(Fig. 9)**.

In order to guarantee perfect alignment of the drum perimeters and sufficient stability whilst waiting for the limestone mortar to set, it was necessary to manufacture moulds from 3 mm steel sheet. For easy handling during restoration

9. Final sequence of the bases, drums and capitals of the two Herodian columns before anastylosis.

and to ensure a tight seal between the moulds and drums, clamps were welded to the edges of the cylindrical steel sheets to allow them to be fastened together using brackets. To prevent sticking of the limestone mortar, the surfaces of the steel sheets were treated with talcum powder before being attached to the drums. To restore the drums, stone mortar was mixed with aggregate and epoxy resin as a bonding agent. The mix was as follows: epoxy resin 10 %; special minerals to ensure epoxy resin penetration of the aggregate 20%; limestone sand 70 %. For a better aesthetic appearance, the restored surfaces of the Doric column drums were treated with a bush hammer.

As the limestone blocks along the inner edge of the south-eastern angle of the crepidoma had almost completely eroded away, they had to be replaced with two well-preserved blocks of the same dimensions. In the meantime, holes were drilled into the column bases, drums and capitals to allow rods to be inserted into the *empolia* for increased stability and earthquake-proofing. This was done in stages using drills of increasing diameter, starting with 8 mm, then 15 mm, 25 mm and finally 30 mm. *Empolium* holes were also chiseled into the stylobate of the Doric column and the reinforced crepidoma of the Ionic column, followed by the drilling of holes for the rods. Next, the *empolia* and rods were fixed into the holes using the same lime mortar used in the consolidation of the crepidoma masonry. Before the bases were anchored in their final locations, the surfaces of the stylobate (for the Doric column) and the crepidoma (for the Ionic column) were leveled with a thin layer of lime mortar in order to assure stable positioning of the bases on the eroded surface, without any possibility of wobbling.

Wide crane belts were used to lift, position and place the column drums in order to avoid damage to the restored elements. Furthermore, these belts allowed for the precise control of each movement during set-up of the drums, minimising the chance of injury to staff **(Fig. 10)**. One of the main concerns during the set-up of the upper half of the Ionic column was

10. Ueli Bellwald and Tamás Dobrosi position the Doric capital, while the author (right) discusses the lifting with Khader Apsi.

11. The complete Ionic column after its re-erection.

the positioning of the individual drums so as to respect the alignment of the Roman-style flutes in the stucco decoration **(Fig. 11)**.

After the two Herodian columns had been re-erected, an entire day was devoted to filling the joints between the column drums with lime mortar. The joints were filled almost to the surface of the drums in order to avoid any unsightly gaps. After the lime had carbonized and the mortar hardened, the joints were meticulously cleaned with water and all visible shrinkage cracks were filled **(Fig. 12)**.

Architectural and Historical Interpretations

The royal courtyard at Machaerus, with an apsidal throne-niche on its axis, was undoubtedly the most important architectural space within this Herodian fortress on the east shore of the Dead Sea. The tragic birthday party of the newly remarried Tetrarch Herod Antipas was celebrated with royal princesses Herodias and Salome in this courtyard. Many people were invited, even from Galilee, the northern part of the tetrarchy: "An opportunity came on Herod's birthday when he gave a banquet for the nobles of his court, for his army officers and for the leading figures in Galilee" (*Mark* 6, 21). It is not simply the largest architectural space in the fortified palace of Machaerus, but the only space in which the Tetrarch was able to receive a large gathering of official guests. The royal courtyard of Machaerus was likely the very place where, according to Josephus, Antipas sentenced John the Baptist to death. Machaerus was the Golgotha of the Baptist; Jesus compared his future death with that of John the Baptist in the following statement: "they did not recognise him but treated him as they pleased: and the Son of man will suffer similarly at their hands. The disciples understood that he was speaking of John the Baptist" (*Matthew* 17, 12-13).

The archaeological remains of the Jerusalem *praetorium*, where Jesus was condemned to death by Pontius Pilate, are probably lost. However, at Machaerus we have one of the closest architectural and archaeological parallels to its courtyard in the former palace of King Herod. On the *gabbatha* ('elevation') of the Machaerus palace, even the Herodian *lithostrotos* ('stone pavement') survived *in situ* in the royal courtyard. After detailed architectural and archaeological studies in the field, we were able to reconstruct the original Doric architectural space that was designed in the classical early Roman canon with the Greek module of 34.5 cm.

The architects of King Herod the Great established his fortified palace at Machaerus in ca 30 BC, on the ruins of the Hasmonean fortress of the Jerusalem high-priest king

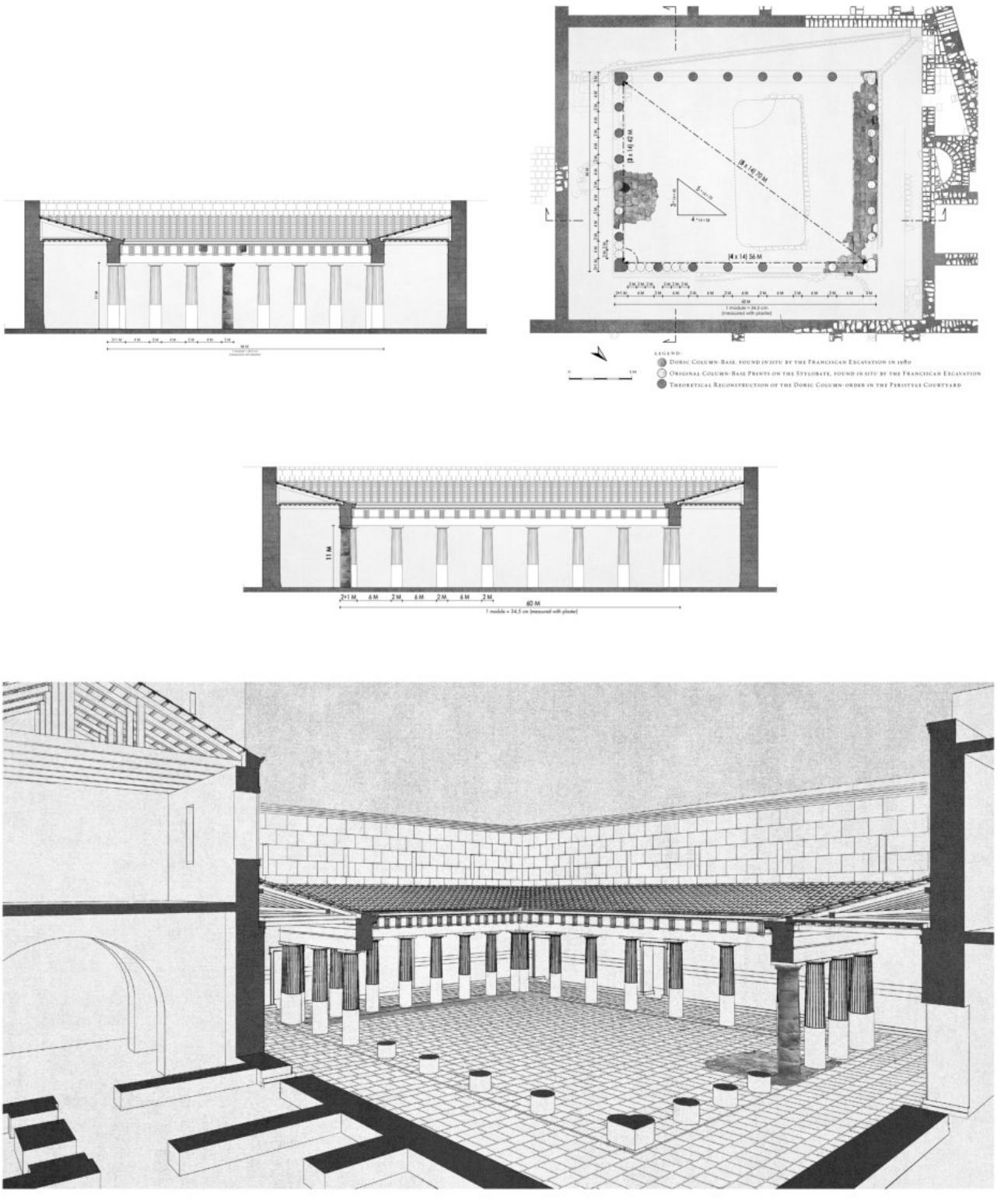
12. The two re-erected Herodian columns of Machaerus with the Dead Sea in the background.

Alexander Jannaeus. The heart and center of the hilltop castle became the royal courtyard. Its alignment was completed on the mountain-top summit using the Pythagorean ratio of a 3 : 4 : 5 triangle. Using the same so-called *pygme*-unit, that is the Greek forearm module (34.5 cm or 13.6 in [called pygmaioi, from *pygmê* or the length of the forearm; this is much smaller than a cubit, being only the length from the elbow to the wrist-joint]), they designed not only the courtyard, but also the colonnade of the Doric tetrastyle portico (one column-base radius = one module). The intercolumniation on the short side was two (systyle) column diameters, and on the long side three (diastyle) column diameters. The contemporary Vitruvius, chief architect of Emperor Augustus, warned that when columns are placed three column-diameters apart or more, stone architraves break (Vitruvius, *De architectura* III 3.4). As no architrave stones survived on the archaeological site of Machaerus, most probably the Herodian builders used Lebanese cedar instead. The surviving Doric column drums came from from a number of similar columns, not just from one column. In the Doric peristyle courtyard, there were originally 24 similar columns (plus four heart-shaped ones at the corners), of which the imprint of eleven columns survived on the stylobate **(Fig. 13a-d)**.

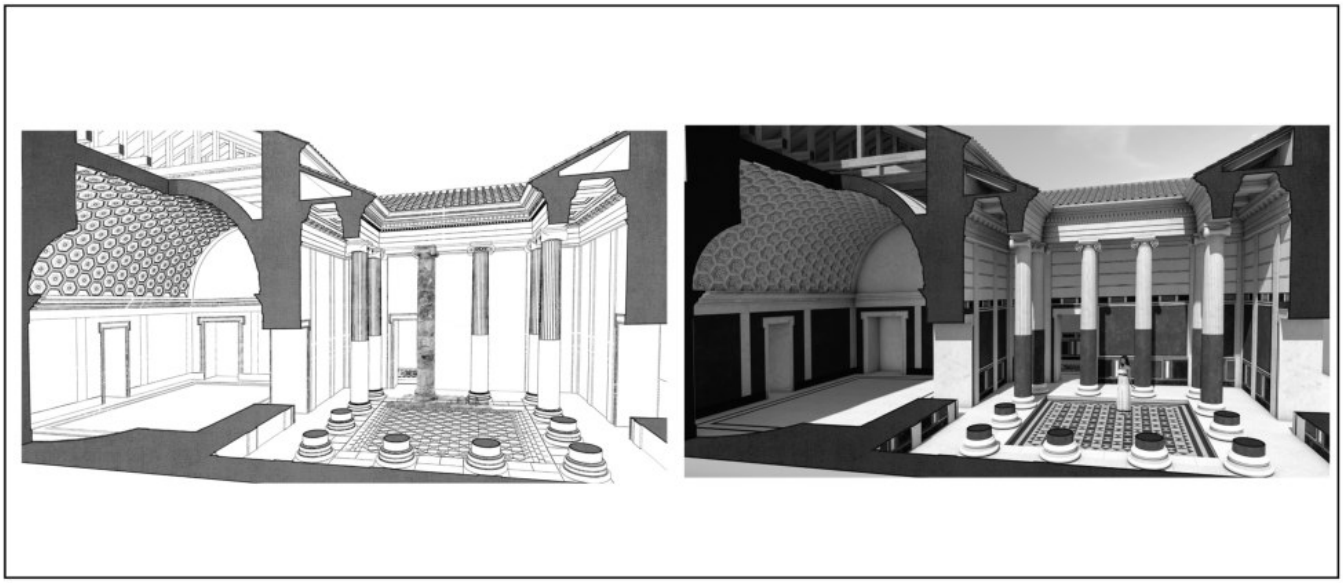
Although the Herodian royal bathhouse was Ionic in style, the courtyard was Doric. This was confirmed not only by the presence of in *situ* column bases, but also by archaeological artifacts that came to light during the excavation of these two locations in the royal castle. Inside the original *apodyterium* hall of the bathhouse there were probably 12 similar Ionic columns on the crepidoma (with much smaller diameters than the Doric drums) **(Fig. 14a-b)**. Nevertheless, we were only able to reconstruct one complete Ionic and one complete Doric column from the surviving architectural elements.

The completed re-erection of the two columns conforms to international conventions of monument anastylosis and presentation, as we used (1) exclusively original architectural elements, (2) re-erected the columns in their original places and (3) ensured that reconstructed columns retained their original appearance. Their heights fit the classical early Roman architectural canons, *viz*. the Doric column is 11 modules or 380 cm, while the Ionic column is 19 modules or 475 cm. The Doric column is even a perfect fit with the classical 11-module standard of the Greek pygme unit of the courtyard, using the same module both horizontally and vertically. Both re-erected columns were originally decorated with plaster, giving them the appearance of white marble monoliths, as in Alexandria or Rome.

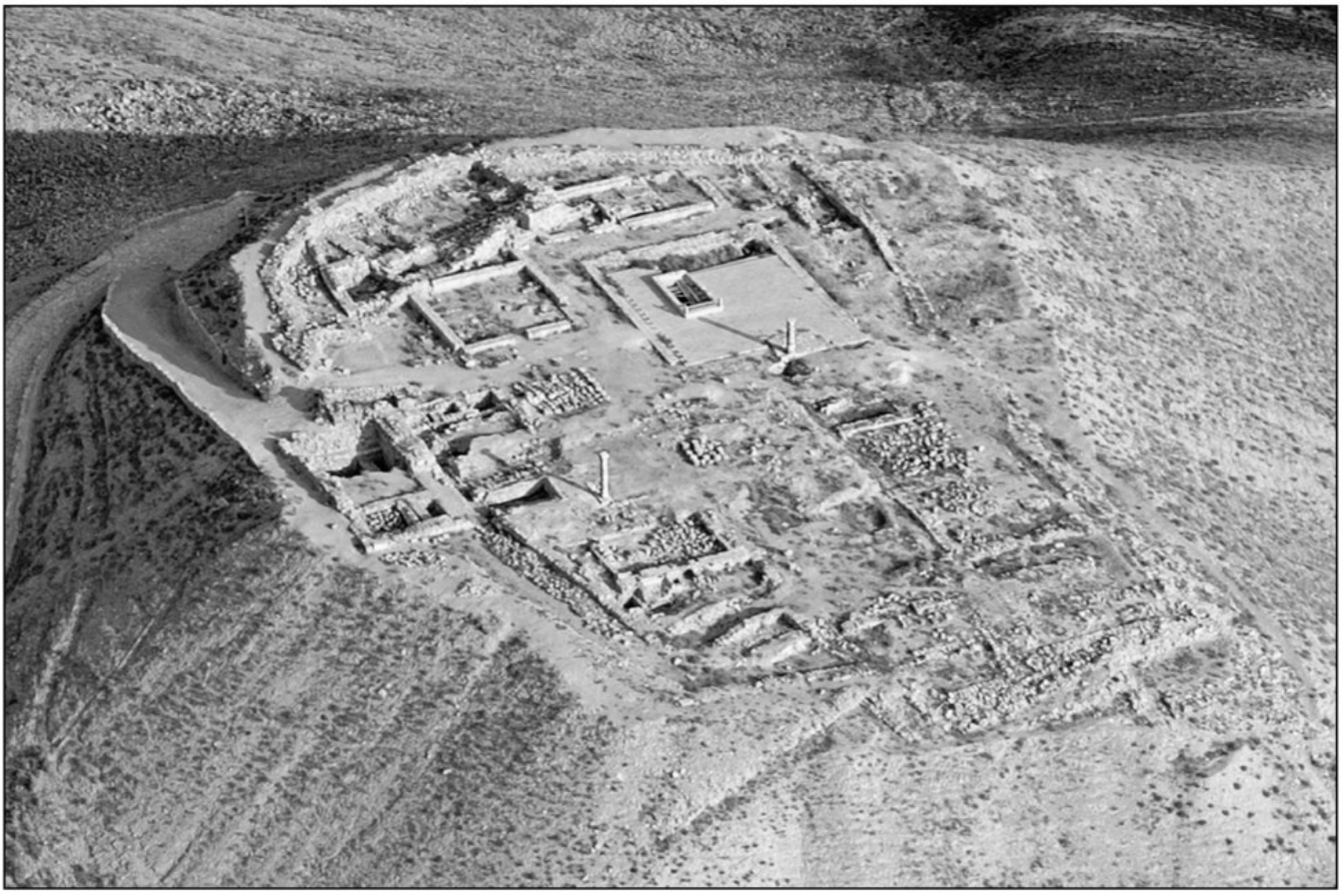
Machaerus, always an important location in the Gospels, has long inspired the imaginations of Bible, Gospel and religious / history book illustrators. In 2014, when opera fans celebrated the 150th anniversary of the birth of Richard Strauss, we were able to propose historically accurate sets designs instead of the imaginary *Salome* set designs used in the opera houses of the world. The latter were based on the text of Oscar Wilde, who described Machaerus from his artistic imagination. As a result of our archaeological excavations and architectural reconstructions, the historical place and its architectural spaces have been revealed, thereby elucidating hitherto blurred scenes from the Gospels. Within the walls of this castle, four figures from the Gospels once lived: King Herod the Great, his son Tetrarch Herod Antipas with his second wife Princess Herodias, and their daughter Princess Salome from the previous marriage of her mother. Today, we do not simply visit the archaeological monument **(Fig. 15)**, but also - in virtual terms - the architectural space of the Calvary of Saint John the Baptist **(Figs. 16 and 17)**.



13a-b. Architectural (a) cross section and (c) longitudinal section drawings, together with (b) plan of the reconstructed Herodian royal courtyard at Machaerus. The architectural reconstruction (d) is not an imaginary illustration of the royal courtyard. As can be seen through photomontage of the original architectural elements in the illustrations, the details are all based on archaeological evidence. During the excavations of the lower city of Machaerus, several additional architectural fragments and column elements came to light that will be incorporated into the next phase of monument presentation.

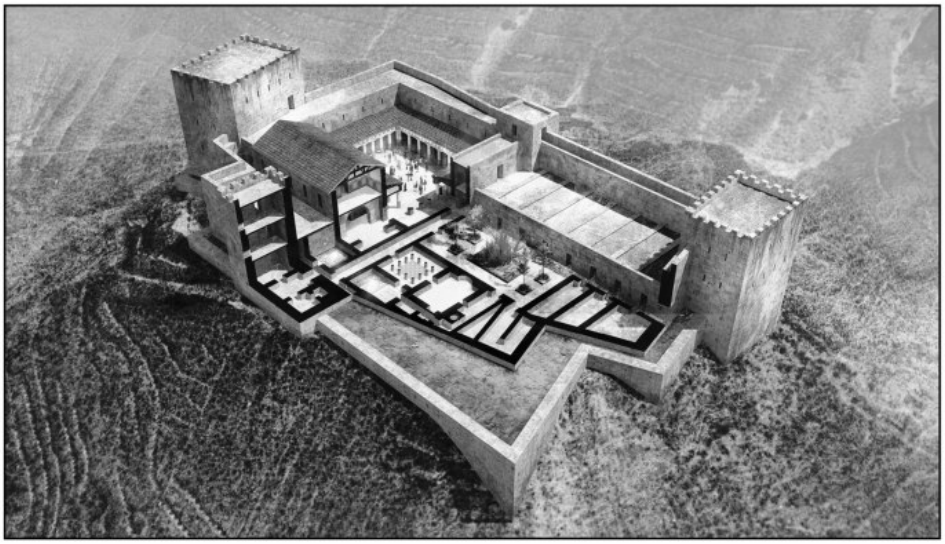


14a-b. Completed Ionic column anastylosis with tentative architectural visualization; the colors are based on archaeological evidence. An artistic vision of the Machaerus bathhouse can be seen in a cutaway architectural reconstruction, viewed from the north-east.



15. Ruins of the hilltop castle from the south (APAAME_20141013_RHB-0073), together with the re-erected original Herodian columns.

16. 3D architectural model incorporating the preserved colors of the royal Herodian courtyard and an authentic reconstruction of the actual lithostrotos pavement.



17. Cutaway birds-eye view of the Machaerus royal palace of King Herod and Tetrarch Herod from the south, visualized with implied ancient colors.

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