



Prolegomena to the Preservation of the Site of al-Wu'ayra (Petra, Jordan) and to the Restoration of the North-East Tower

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Abstract

The authors describe the importance of the site of al-Wu'ayra, at the east border of the ancient town of Petra (Jordan) where the Archaeological Mission "Medieval Petra" (University of Florence) is working since 1986. From the archaeological point of view, the physical conformation of the site is the main condition for the formation, during nearly two thousand years, of a highly significant archaeological deposit with a continuous chronological extension from Nabataean time up to Late Islamic and a high scientific potential. On the other hand, the site itself preserves the only still standing 12th century tower of the whole area of Petra, thus being a very significant element of the historical landscape and the only monumental evidence of a short but important season of the long history of the town. During the last three decades, the addition of human disturbance to the spontaneous and natural decay of buildings makes urgent a restoration and a protection programme for the whole site.

Archaeological deposit and historical landscape: from formation to deterioration

The University of Florence archaeological mission *Mediaeval Petra: Archaeology of the Crusader-Ayyubid settlement in Transjordan* started working in 1986 aiming at studying the features of the mediaeval and post-mediaeval settlement in the area of Petra. The site of the Crusader castle of al-Wu'ayra, North-East of the town and along the road to Beidha (fig. 1, 2), was chosen as one of the most promising site for the purpose of the research, due to its wide diachronic extension of archaeological deposits, altogether with the minor installation of al-Habis, in the midst of the ancient town.

Recent campaigns provided more precise data and significantly amplified the chronology of the site of al-Wu'ayra contributing to clarify its pre-Crusader phases (Vanni Desideri, Leporatti, 2014). It is now sufficiently clear, even though the study is still in progress, that during a first phase a Nabataean necropolis/sanctuary took place at the site, as part of the network of open air religious installations around Petra (Alpass, 2013). The necropolis was accurately arranged in a very articulated topography including groups of rock cut tombs connected by a net of pathways and rock cut stairways,

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Fig. 1
NW view of the North-East tower of al-Wu'ayra (A. Vanni-Desideri 2013)

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Fig. 2
NE view of the site of al-Wu'ayra (A. Vanni-Desideri 2013)

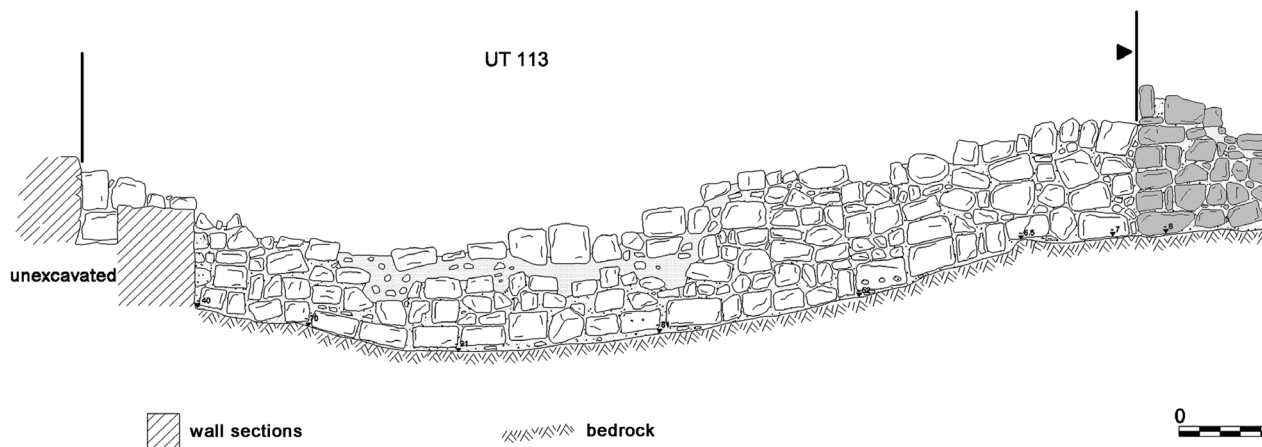




Fig. 3
The external West wall of UT 109 as the result of progressive increase, from right to left, of the number of dwelling unit starting from UT 115. Survey by E. Donato and A. Vanni Desideri (1998)

leading to platforms of liturgical purpose. More precise and articulated data have been collected for the late antique chronological horizon, when the site turned into a settlement, maybe of military use, through a series of complicated hydraulic achievements meant at providing energy apparently for the mechanical needs of the building yard. The foundation of Crusader al-Wu'ayra ("li-Vaux Moyses") took place certainly after the foundation of ash-Shawbak ("Mont Réal") in 1115 (Vannini-Vanni Desideri, 1995), and some authors suggest after 1127, during the rule of Baldwin II (1118-1131) (Pringle, 1998, p. 374). But taking into consideration the similar and peculiar building procedures of the two castles – among the others, the way they take advantage of late antique installations and masonry, pointed out by the Mediaeval Petra mission (Vannini, Nucciotti, 2009) – an earlier date is plausible. Besieged in 1158 by an Egyptian military unit, definitely fell into Saladin's hands between 1187 and 1189, after the defeat of Hattin (Ligato, Vannini, 2009) and its military function ceased forever. The later history of the site relies only on archaeological records.

Despite its poor preservation, the site is the result and the document of a long succession of events and, at least at a certain length, an artificial product of the peculiar behaviour of dwellers during the last seven centuries (Vannini, Vanni Desideri, 1995). In Ayyubid and Early Mamluk time inhabitants from the surrounding area simply reused the surviving structures of the most important and durable buildings. Later on, when the natural decay of such buildings started, due to the loss of maintenance (or/and to external causes, such as earthquakes) producing the first spontaneous collapses, the archaeological data show the first attempt of collecting (or disconnecting) architectural materials from the castle in order to build up small new houses with dry stones. This phenomenon is particularly clear in UT 109 where a sequence of dwelling units (fig. 3) started taking advantage of the already damaged southern wall of the church and lasted until Late Islamic time (Tonghini, Vanni Desideri, 1998) (figs. 4-5). The present poor preservation of the site is then, at least partially, induced by human disturbance interfering with the natural tendency towards the static equili-



brium between collapsed materials and still standing structures. Dwellers behaviour certainly accelerated the decay of the buildings of al-Wu'ayra. The modern landscape of the site of al-Wu'ayra - a true close universe of archaeological data due to its physical structure, efficaciously expressed by the Arabic name of the site, meaning "inaccessible place" – is the product of a number of successive events, some natural and spontaneous and some produced by dwellers. In fact the amount of human traces at the site, dating from Nabataean up to Late Islamic time, as the "Mediaeval Petra" mission already pointed out (Vannini, Vanni Desideri, 1995; Tonghini, Vanni Desideri, 1998 and Vannini et al., 20002), is the product of a number of deliberate artificial actions which brought artefacts to the site or transformed it, thus producing and increasing its archaeological archive. On the other hand, such data were only partially removed by natural subtraction (collapses, landslides et cet.) and the history of the site is then almost completely preserved *in situ* in term of amount of archaeological elements. The scientific productivity of the archaeological archive of al-Wu'ayra is very efficaciously expressed by the preliminary typological reference atlas for stone dressing techniques and types of masonry achieved during the archaeological campaign and assumed as a diagnostic instruments for the chronology of the various phases of the site and the development of the settlement (figs. 6-8).

Among the first photographic records of the landscape of al-Wu'ayra, the picture taken by Ritter and Zepharovich in 1908 (Dalman, 1908, fig. 18) is probably one of the earliest. It shows a skyline marked by the surviving part of the presbytery of the church, half of the West tower and the North-East tower. It was exactly on such basis that it was possible to Savignac (1903) and Musil (1907) recognizing the spot of the abandoned castle and drawing survey of its plan and of the major surviving buildings, altogether with a first interpretation of the topography of the keep.

Some structure, such as the apsidal portion of the church was still partially readable in the thirties (Deschamps, 1939) but since the beginning of the research by the University of Florence, the landscape of the site underwent

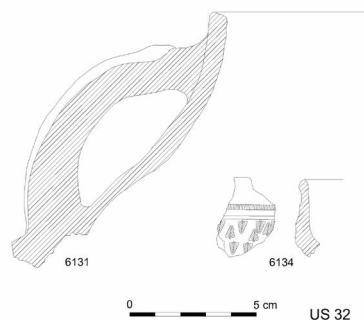


Fig. 4
UT 115, the first dwelling unit built in post-Crusader time beside the church (A. Vanni-Desideri 2000)

Fig. 5
Pottery and tobacco pipe dating the abandonment of UT 115 to Ottoman time (drawings by A. Vanni-Desideri 2000)

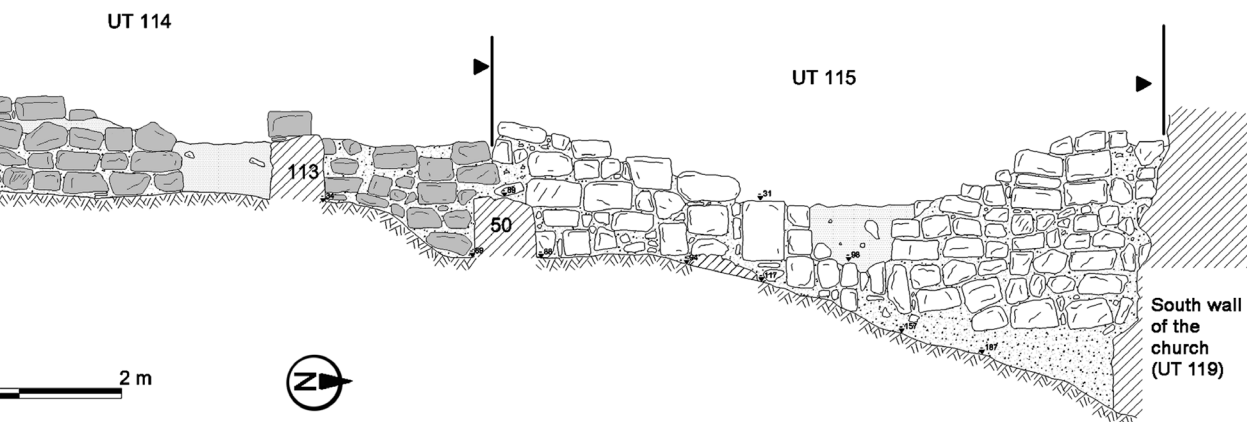


Fig. 6
Chrono-typology
of stone dressing
techniques at al-
Wu'ayra (A. Vanni-
Desideri, E. Donato
1998)

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Fig. 7
Detail of the West
wall of the West
tower showing the peculiar
application of plaster
protecting the joints
of the masonry (A.
Vanni-Desideri 2011)

Fig. 8
Chrono-typology of
masonry arrangement
techniques (A. Vanni-
Desideri, E. Donato
1998)

to substantial changes and during the next decades, the already poorly preserved mediaeval and post-mediaeval structures were affected by progressive collapses produced by the extreme and rapid climatic changes in terms of temperatures, wind and relative humidity (heavy rain and rare snow during fall-winter, followed by dry and hot weather during late springtime and summer) as well as by artificial disturbance.

In the case of the West tower, the invasive application of plaster protecting the joints of the masonry, still visible on the external face (fig. 7) was probably a countermeasure of the builders of the castle in order to protect the joints against weathering. Nevertheless, the ground plan, the volume and some architectural features of the tower, certainly one of the most important building of the whole settlement, still visible during the 1987 archaeological campaign, today are hardly recognizable as the north and west arrow slits.

A first attempt to solve some of these problems was the restoration accomplished, at the end of the last century, with a strictly conservative procedure in the area of the South churchyard (fig. 12). But later on increasing robber activity and vandalism caused even more painful damages to the site (fig. 11). A number of illegal trenches aiming at discovering archaeological 'treasures' are now scattered in the west, and more hidden part, of the site, produced by well equipped and technologically updated groups, like the one occasionally met by the author during the 2013 campaign. This fact involves directly the efficacy of official controls along the eastern boundary of the Petra Archaeological Park, only active during the morning. But also vandalism is now affecting the site damaging the few and already poorly preserved structures. During the same 2013 campaign the author noticed people climbing the North-East tower producing the disconnection of stones from the walls, exposing the nucleus (the weakest part of the masonry) and accelerating its collapse.

al-Wu'ayra stone dressing techniques

Romano - Nabatean	?	Late Roman - Byzantine?	Crusader
   		  	    



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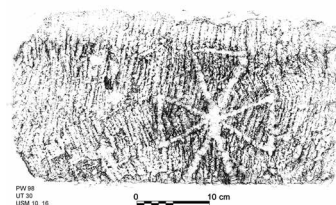
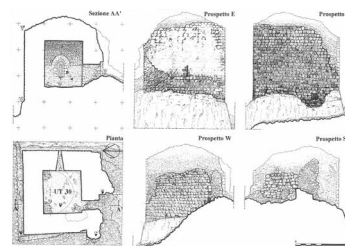
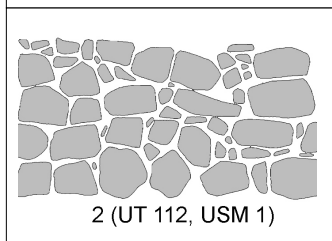
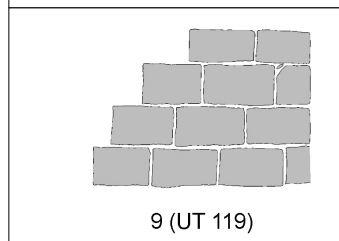
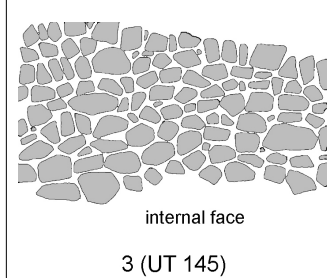
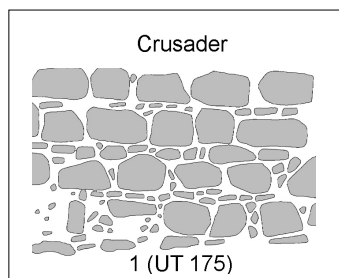
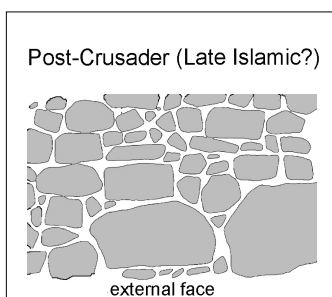
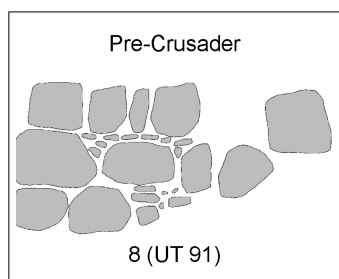


Fig. 9
Survey of the NE tower
of al-Wu'ayra

Fig. 10
Stone block from
the arrow slit of
the NE tower with
an engraved cross.
Frottage by A. Vanni-
Desideri 1998

Notes for a restoration and protection programme

The site of al-Wu'ayra is located inside the boundary of the Petra Archaeological Park, owned by the Hashemite Kingdom of Jordan, and was acknowledged in 1985 by UNESCO as a World Heritage Site with identification number 326 (<http://whc.unesco.org/en/list/326>) explicitly quoting also the castle of al-Wu'ayra, along the road connecting the town of Wadi Musa to Beidha. The archaeological area of Petra, including the site of al-Wu'ayra, has been protected since the first Antiquities Law of 1924, more recently by the Jordanian Law of Antiquities no 21 (1988) and specifically by Law Number 15, issued in 2009 by the Jordanian Government, establishing the Petra Development and Tourism Regional Authority and the Petra Archaeological Park. Being al-Wu'ayra exposed to progressive spontaneous collapse and recently also affected by illegal human behaviour, a restoration project of the tower should also aim at improving and extending the protection to the whole site which contains a nearly exhaustive and complete anthology of archaeological data covering most part of the history of Petra, from Nabatean up to Late Islamic time, as the research of the "Medieval Petra" mission has recently pointed out in a more clear way.

The site is accessible to the public, but despite its position inside the boundary of the Petra Archaeological Park the control of the admission ticket (the same of the Petra area) is insufficient. In fact illegal excavations and robbing activities, also aided by sophisticated equipment (metal detectors et cetera), as well as vandalism recently started affecting al-Wu'ayra, exposing the site to increasing danger. Thus a more strict, efficacious and continuous control of the access to the site is strongly needed to prevent the damaging of such an extraordinary but fragile site, even through physical measures (for instance the installation of a gate).

Today the North-East tower of al-Wu'ayra is the only surviving building of the castle and the only 12th century still standing tower in Petra. It also preserves its volumetric features and a completely preserved ground floor (fig. 9-10). Moreover its strategic position, along the road leading to Beidha from Wadi Musa, makes the monument a real and evident landmark, part of an historical landscape formed in the 12th century and in imminent danger: delaying its restoration would reduce drastically the possibility of success of any preservation programme (fig. 2).

The al-Wu'ayra masonry structures are characterized by sequences of almost regular stone bricks and layers of small pushed fragments, to improve the regularity of the texture (fig. 1). The internal part of the walls are chaotic. The edges of the main tower are made of regular stones with joints closed by mortar mixture. The vulnerability of the monument is given by the absence of any water protection at the top of the masonry panels. The basement of the towers consists of the natural bed rock modified to create a sub-horizontal support: risks of shear settlements due to progressive cracks on the bed rock should be considered. The collapse of an edge of the main tower represents a relevant source of vulnerability for the entire construction: its absence does not permit the containment of the internal

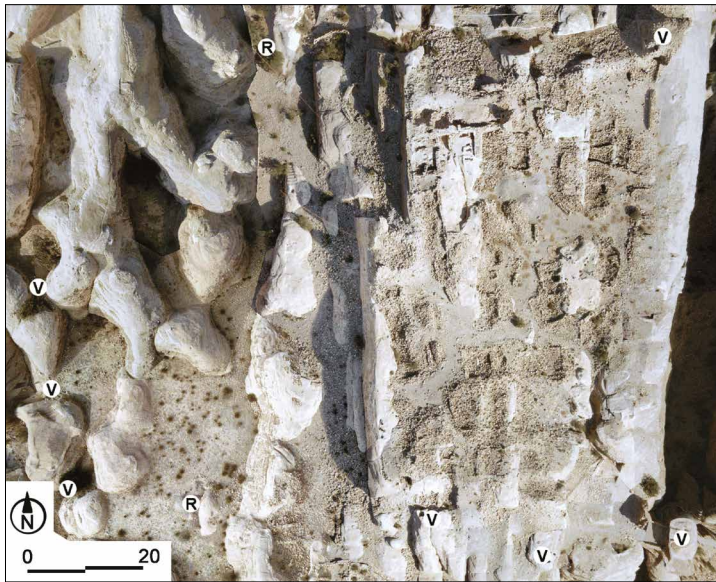


Fig. 11
Robber trenches (R)
and vandalism (V) at
al-Wu'ayra. Survey by
A. Vanni Desideri and
S. Leporatti (2013)

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Fig. 12
The South churchyard
(UT 109) and the
cemetery after the
Medieval Petra
mission restoration (A.
Vanni-Desideri 2002)

chaotic part of the wall, inducing probable further collapses in short time, due to repeated rain penetrations or the actions of wind.

Penetrometric PNT-G tests should be performed to determine the compressive strength of the existing mortar joint on the edge of the tower, together with spectrographic analysis to evaluate the chemical composition of the mortar, in view to reply the joints during the phases of re-construction.

Following the already proposed general programme of intervention (Ruschi, Vannini, 2001), for a proper restoration of the monument, the main constructive phases could be the following (fig. 13):

1. Scaffoldings around the crusader tower and surrounding walls.
2. Removal of collapsed materials (earth, clays, crumbled stones, etc.) around the sliding surface or unstable areas;
3. Displaying of geotextile layer on the basement of the zones to rebuild, to separate the original walls from the rebuilt features;
4. Selection of the bricks to be reuse (color, shape and dimensions);
5. Rebuilding of the missing parts of dry masonry using the same texture;
6. Stabilization of the blocks in place with small stones forced into the joints, replying the traditional technique to refinish the texture in the Tower;
7. Introduction in the texture a series of transverse stones to connect the external façades of masonry panel with the backside drainages to place the gravity centre behind the wall axis;
8. Filling of the empty zones behind the wall with dry gravel by selection of small stones on site, to ensure a correct washout of the rain penetrating and to reduce the hydraulic transverse pressure on the wall;
9. Beautification of the top of the walls with the same soil available in the adjacency, to create a roof protection from rain penetrations.





As a really urgent rescue intervention, a possible restoration project aims at preserving and restoring the tower as the most visible architectural remains of a short but important chapter of the long history of Petra, also taking into consideration the indications of the *Risk Management at Heritage Sites. A Case Study of the Petra World Heritage Site*, issued by the UNESCO Amman Office in 2012.

In such a perspective the intervention, beside its preservation purposes, is also intended as a first step towards a more strict protection and the development of a possible touristic exploitation of the site, aided by panels to be installed on the site (Vanni Desideri 2012) and information on the web (for instance through QRC system). At the same time the restoration could be the first step for the development of a more efficacious protection of the site, even through more strict controls of the visits.

Fig. 13
Examples of some
of the procedures
proposed for the
restoration of the
North-East tower of
al-Wu'ayra (Sassu, et
al., 2012)





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