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NEW SURVEYS ON UNDERGROUND STRUCTURES IN CAPPADOCIA: A DIALOGUE BETWEEN ART HISTORIANS, CONSERVATORS, ARCHAEOLOGISTS AND SPELEOLOGISTS *

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Abstract

The University of Tuscia has been working in the territory of Nevşehir (Cappadocia, Turkey) since 2006, conducting the mission "Rock painting in Cappadocia. For a project of knowledge, conservation and enhancement" by the permission and with the support of the General Direction of Monuments and Museums of the Turkish Republic and the Archeological Museum of Nevşehir. The research work concerns the phenomenon of rock-cut habitat and rock painting, in its entire lifetime and in its various aspects through the analysis of a large group of monuments in the region of Nevşehir and through the project of knowledge, conservation and enhancement of the church of Forty Martyrs in Şahinefendi (2008-2013) and of the Tokalı Kilise in the Göreme Open Air Museum (*Açık Hava Müzesi*), started in 2011. Since 2012 the survey is focusing, in particular, on the study of the settlements and rock-cut structures in the Open Air Museum in Göreme and in the valleys of Göreme and Kılıçlar (monasteries, churches, buildings for civilian use), in order to understand their relationship with the life forms that have evolved over the centuries in this area. In the same region the Centre for Underground Studies of Genoa, since 1991, carried out many explorations on the rock-cut and underground structures scattered throughout the area, surveying and documenting buildings used for worship (churches and chapels), some structures of service (dining halls, stables, cellars, dovecotes, apiaries, etc.), and a great number of structures of refuge (shelters) and water works (drainage tunnels). The University of Tuscia project is a interdisciplinary project which links humanistic knowledge with scientific and technical investigations. Since 2012, it has enriched with the experience and activities of the Centre for Underground Studies for the exploration, documentation and interpretation of the interesting underground structures focused in the area surrounding the church of the Forty Martyrs in Şahinefendi and the Tokalı Kilise in Göreme.

Keywords: artificial cavities, rock painting, Cappadocia, Göreme, Medieval Age, knowledge, interdisciplinarity, conservation, enhancement

Riassunto

L'Università della Tuscia lavora nel territorio di Nevşehir (Cappadocia, Turchia) dal 2006, conducendo la missione "Pittura rupestre in Cappadocia. Per un progetto di conoscenza, conservazione e valorizzazione" con il permesso e il sostegno della Direzione Generale dei Monumenti e Musei della Repubblica di Turchia e il Museo Archeologico di Nevşehir. Il lavoro di ricerca riguarda il fenomeno dell'habitat rupestre e della pittura rupestre, in tutto il suo insieme e nei suoi vari aspetti attraverso l'analisi di un grande gruppo di monumenti nella regione di Nevşehir e attraverso il progetto di conoscenza, conservazione e valorizzazione della Chiesa dei Quaranta Martiri di Şahinefendi (2008-2013) e della Tokalı Kilise nel Museo all'Aperto di Göreme (Açık Hava Müzesi), iniziato nel 2011. Dal 2012 l'indagine si concentra, in particolare, sullo studio degli insediamenti e delle strutture rupestri nel Museo all'Aperto di Göreme e nelle valli di Göreme e Kılıçlar (monasteri, chiese, edifici per uso civile), al fine di comprendere il loro rapporto con le forme di vita che si sono sviluppate nel corso dei secoli in questa zona. Nella stessa regione il Centro Studi Sotterranei di Genova, dal 1991, ha effettuato numerose esplorazioni sulle strutture rupestri e sotterranee sparse in tutta la zona, esplorando e documentando edifici utilizzati per il culto (chiese e cappelle), alcune strutture di servizio (refettori, stalle, cantine, piccionaie, apiari, ecc.), ma anche strutture di rifugio e opere idrauliche (tunnel di drenaggio). Il progetto dell'Università della Tuscia è un progetto interdisciplinare che collega il sapere umanistico con indagini scientifiche e tecniche. Dal 2012, si è arricchita con l'esperienza e le attività del Centro Studi Sotterranei di Genova per l'esplorazione, la documentazione e l'interpretazione delle interessanti strutture sotterranee concentrate nella zona circostante la Chiesa dei Quaranta Martiri di Şahinefendi e della Tokalı Kilise a Göreme.

Parole chiave: *cavità artificiali, pittura rupestre, Cappadocia, Göreme, Şahinefendi, Medioevo, conoscenza, interdisciplinarità, conservazione, valorizzazione.*

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* *"Rupestrian art and habitat in Cappadocia" project: an introduction* is by M. Andaloro; *The church of the Forty Martyrs and the Byzantine rock-cut settlement of Şahinefendi* is by M. Benucci and G. Romagnoli; *The vertical refuge in Orta tepe cliff* is by R. Bixio and A. De Pascale; *The underground structures around the Tokalı Kilise in Göreme* is by M. Benucci, R. Bixio and A. De Pascale.

"Rupestrian art and habitat in Cappadocia" project: an introduction

The University of Tuscia, Viterbo (Italy), has been working in Cappadocia in the territory of Nevşehir since 2006 on a survey and restoration-conservation project entitled *Rock painting in Cappadocia. For a project of knowledge, conservation and valorisation*, directed by prof. Andaloro (Andaloro, 2014). The development of Cappadocia project also includes plans for the enhancement of the Göreme Open Air Museum (*Açık Hava Müzesi*) through the creation of a Virtual Museum. This line of activity is tied to the project *Rupestrian art and habitat in Cappadocia (Turkey) and in central and southern Italy. Rock, excavated architecture, painting: between knowledge, preservation and enhancement* - Italian Program for Research of National Interest (PRIN 2010-2011), in which eight universities and CNR (National Research Council) are taking part.

The survey enjoys the support of the General Direction of the Ministry of Tourism and Culture of the Republic of Turkey and is strongly supported by the Archaeological Museum of Nevşehir.

The research has been carried out following an interdisciplinary methodology, which links humanistic knowledge with scientific and technical investigations. Researchers with very different profiles have been taking part in the project: art historians specialized in Medieval and Byzantine Art, art historians who have experience in archaeological investigations, in the study of literary texts and epigraphic heritage, in the analysis of the artistic techniques, in the realization of graphic and photographic documentation, in the new technologies applied to cultural heritage and in the processes of communication; archaeologists; speleologists; architects specialized in survey and representation. For the scientific side, geologists, biologists, chemists competent in diagnostics of cultural heritage are present, as well as experts in Virtual Heritage and in cognitive systems and new technologies (Andaloro, 2014).

Our work follows two main guidelines:

1) the project of knowledge, conservation and enhancement of the Forty Martyrs Church in Şahinefendi and of the New Tokalı kilise in Göreme;

2) the survey in the region of Nevşheir.

Project of knowledge, conservation and enhancement of the Forty Martyrs Church in Şahinefendi and of the New Tokalı kilise in Göreme

The Church of the Forty Martyrs is the pivotal monument of the entire University of Tuscia project in Cappadocia (Jolivet-Lévy, 1991, pp. 205-207). Here we have developed a methodology of knowledge, conservation and enhancement which we are now using also in Göreme area. The Şahinefendi restoration project, started in 2007 and concluded in 2013, has been conducted by a team of Italian and Turkish conservators, following a methodology agreed by the Kültür Varlıklarını Koruma Bölge Kurulu Müdürlüğü protection committee of Nevşehir, and with the support of the Nevşehir Archaeological and Ethnographic Museum, under the museum director Murat Gulyaz. The restoration concerned an extensive figurative cycle that develops on the walls of both naves and apses: cleaning, consolidation and retouching were carried out on all the surfaces in the church, whether painted and unpainted (Andaloro, Borghini, 2011).

The restoration allowed us to study the paintings with great accuracy: we produced a detailed documentation of preservation status; analysed materials and techniques, iconography and style and individuated four different phases of pictorial decoration, which had not been noticed before. The last one must be referred to the dedicatory inscription, dating back to 1216-1217 (Andaloro, 2012). Besides the paintings, we investigated the original excavation techniques and development phases of the rupestrian environments into which the church is inserted, and of the rock cones (pinnacles) surrounding the church, aiming at a better understanding of the entire settlement. The present paper presents some results of the joint study conducted by our team and by Centre for Underground Studies of Genoa, which is collaborating with us since 2012. To develop a clearer understanding of the topographic system and the various environments, the entire settlement was recorded using 3D laser scanning and panoramic photography. This work was conducted by a group of architects from University of Rome 'La Sapienza'.

Thanks to the competence we have gained conducting the restoration of the wall paintings of the church of the Forty Martyrs at Şahinefendi, in 2011 we have been invited to work in Tokalı Kilise. Excavated and decorated in two phases in the course of the tenth century, this extraordinary complex consists of two churches, the old and the new (Wharton Epstein, 1986). The pictorial decoration of New Tokalı undoubtedly exemplifies the highest level attained by painting in Byzantine Cappadocia (Andaloro, 2011). During the first campaign, we conducted a very careful study of the preservation state of the paintings, an emergency intervention to stop the most advanced deterioration phenomena, and also individuated methodologies and materials for the upcoming restoration. Since 2012 we are carrying out the restoration of wall paintings. Operations on the north wall have been finished in 2014 campaign. The work we have conducted in Şahinefendi and in New Tokalı Kilise is strictly tied to the second main line of our project, which is the survey in the region of Nevşehir.

The survey in the region of Nevşheir

Through the analysis of a large group of 70 churches in the region of Nevşheir, we aim at the implementation of a database on constituent materials and techniques of execution of mural painting, which we have formed since 1997 during our work in Turkey. Since 2011, in parallel to Tokalı restoration, the survey is focusing on the area of Göreme Open Air Museum (Andaloro, 2013, 2014). The area is characterised by an extraordinarily

Fig. 1: Şahinefendi, general view from the S of the rock-cut settlement (photo G. Alfano).
Fig. 1: Şahinefendi, veduta generale da S dell'insediamento rupestre (foto G. Alfano).

dense population of painted churches in a striking scenic context, some of which can be visited freely, whilst others that have been turned into museums. The extensive studies we carried out on this area, analysing and documenting thirty-three painted churches, allowed us to see how the settlement of Göreme developed through the centuries (from the 7th to the 11th). The area where the village of Göreme stands today hosts the church with the most ancient pictorial decoration (4b) (Restle, 1967, vol. I, p. 107; Jolivet-Lévy, 1991, pp. 90-91, pl. 62); most of the churches dating back to the 10th century are along the side of the Kılıçlar Vadisi (Cave, 1984; Jolivet-Lévy, 1991, pp. 137-141) and the Tokalı Kilise (Wharton Epstein, 1986) and in the area of the Open Air Museum which contains churches with paintings dating back to the 11th century (De Jerphanion, 1925-1942, vol. I, pp. 377-483; Restle, 1967, vol. I, pp. 58-64, 124-130, vol. II, pl. 160-150; Jolivet-Lévy, 1991, pp. 122-125, 128-131, 132-135, pl. 80-84).
In the same area, between the valley of Göreme and the valley of Kılıçlar, we began, together with the Centre for Underground Studies, the organic study of the types of settlements and rupestrian structures, including monasteries, churches and buildings for residential use, in order to understand the civil and religious functions of rock-cut buildings. Some results of this investigation are presented in this present paper.
An important tool used in order to gain a general understanding of this area in terms of the relationship between the land and the rupestrian settlements was a series of 3D surveys carried out by the group from the University of Florence and the Sapienza University of Rome with the high-speed CAM/2 Faro Focus Laser Scanner of the University of Viterbo. This was accompanied by a series of 360° panoramic shots illustrating the landscape and the architecture (Andaloro, 2013, 2014).
Regarding the context in which the rupestrian churches of Cappadocia are located, we are increasingly aware of the permanent union between the landscape and the heritage of its painted churches, hidden deep in its womb, as it is extremely representative of the relationship between rock and painting. The rocky landscape we have glimpsed appears strong and powerful, but is very fragile, at the same time.
For this reason, in 2011, in collaboration with the University of Calabria, we began to establish a branch of research that developed our methodologies, consolidating and preserving the rocks with the aid of our traditional systems, but also by developing new, well-thought out alternative procedures, such as testing the materials used for consolidation, and the use of less invasive anchoring systems (Rovella et al., 2012; Andaloro, 2013, in press).

The church of the Forty Martyrs and the Byzantine rock-cut settlement of Şahinefendi

The Turkish village of Şahinefendi is located 18 km S of Ürgüp, at the opening of the Damsa Çay valley. This river, tributary of the Kızılırmak, flows along a wide alluvial plain, still intensely cultivated. The landscape is dominated by two buttes isolated from the surrounding tuff plateau: Orta tepe (1581 m a.s.l.) and Kale tepe (1585 m a.s.l.).
The Damsa valley has long been a natural communication corridor between the Kızılırmak and Güzelöz-Soğanlı valleys. In Roman times (and afterwards in the Byzantine period) a route passed through it connecting *Venasa* with *Nazianzos* and *Tyana* (Hild 1977, p. 70). For a long stretch it corresponds to the present day road connecting Ürgüp to Yeşilhisar. The layout of the ancient road between Cemil and Şahinefendi is marked by the presence of some roman rock-cut tombs (Thierry, 2012, no. 3). The remains of a late Roman and early Byzantine settlement, including a bath, a

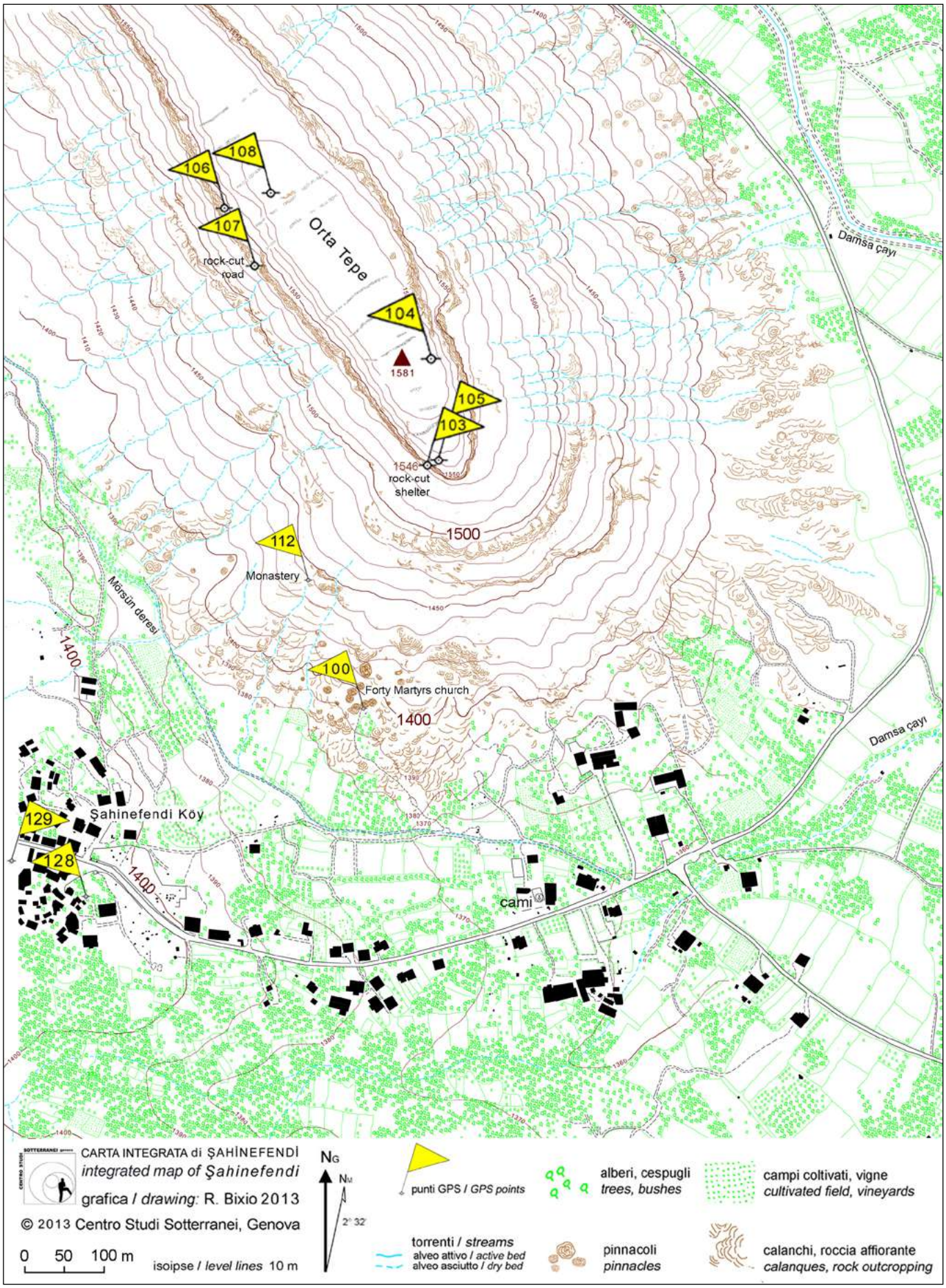

Fig. 2: Şahinefendi, map with location of the underground structures (archive Centro Studi Sotterranei).
Fig. 2: Şahinefendi, mappa con localizzazione delle strutture sotterranee (archivio Centro Studi Sotterranei).

Fig. 3: Şahinefendi, courtyard complex (so called "Şahinefendi Monastery") (photo G. Romagnoli).
Fig. 3: Şahinefendi, complesso a corte (cosiddetto "Monastero di Şahinefendi") (foto G. Romagnoli).

meeting hall and a later dated church, were recently uncovered at the foot of Orta tepe about 1,5 km SE of the church of the Forty Martyrs (Yenipinar, 2003; Cassia, 2004, pp. 324-326; Thierry, 2012, p. 9). This site, only partially investigated, is usually identified as *Sobesos*, a Byzantine centre documented as a diocesan seat in a *Notitia* from the Leo VI period: the old name of the village of Şahinefendi, known as *Söviş* or *Suveş* since the beginning of the 20th century, could be in fact a corruption of *Sobesos* (De Jerphanion, 1925-1942, I.2, p. 156; Hild, Restle, 1981, p. 116).

The upper Damsa valley retained a strategic importance at least up to the end of Middle Ages. In the Seljuk period played an important role the centre of Taşkınpaşa (formerly *Tamisos*, *Tamsa* or *Damsa*), that still preserves some Karamanid monuments (a *medrese,* a mosque and two *türbe*) dating back to the middle of the 14th century (Hild, Restle, 1981, p. 290; Çiftçioğlu, 2001; Uzar, 2007). The butte which dominates the village and entire valley (Kale tepe) preserves the remains of a fortress which was built in this period, probably on a pre-existing Byzantine site.

The survey on the church of Forty Martyrs of Şahinefendi, completed in 2013, offered an ideal opportunity to investigate the relationships between this monument and his archaeological and topographical context (Figs. 1 and 2). Our work was focused on measuring, drawing and photographing all the caves located on the southern slope of Orta tepe – about a hundred rooms cut in tens tuff pinnacles scattered in a one-kilometre square area NW of the village of Şahinefendi – in order to point out, through stratigraphic and typological analysis, the structure and the development of the rock-cut settlement surrounding the church.

The caves are carved into a layer of Cemilköy ignimbrite, a member of the Ürgüp volcanic formation, that may be classified as having poor or very poor durability (Rovella et al., 2012). For this reason, chimneys and pinnacles have been heavily subject to erosional and weathering phenomena. Moreover, continuous reuse in the Ottoman period by local inhabitants as stables, dwellings, cellars, shelters, food storage and dovecots has damaged most of the caves. Several of these more recently were destroyed by the extraction of blocks of tuff, used to build the surrounding terrace walls and perhaps the houses of the modern village.

The church of Forty Martyrs is the core of the settlement. Operating a schematisation, in the development of this complex it is possible to identify three main excavation phases. Each of these can be linked to different layers of painting, the oldest of which dates back to sometime before 11th-12th century (Andaloro, 2008, 2009, 2010, 2011).

The original structure of the church consisted of a single nave (the southern one, measuring 6,40 x 2,90 m), with an apse on the E side, preceded by a poorly preserved vestibule. Along the W and N sides were two quadrangular funerary chambers with *arcosolium* tombs cut out in the walls and some graves in the floor. A few *arcosolia*, in a very bad condition, were also placed along the external sides of the tuff cones and in the vestibule.

In the second phase, dated between the 11th and 12th centuries, a second nave (m 6,30 x 2,10) was obtained N of the previous one by extending and modifying one of the pre-existing funerary chambers. Communication between the two naves was provided by three arches on pillars or columns, completely removed by excavations and demolitions carried out in the Ottoman era, certainly before Father Jerphanion's visit.

The last important transformation of the church consists in a small enlargement, with the carving out of a quadrangular space (m 3,40 x 1,90) on the western side. In this area there is the inscription commemorating the restoration of the decorations sponsored by the ieromonk Macario in 1216/1217. This renovation of the church took place shortly after the peace treaty between the Byzantines and Seljuks following the battle of Antioch on the Meander (1211), won by the army of Theodor I Lascaris, whose name appears in the inscription of Şahinefendi, like in that one at the nearby monastic church of Cemil (Uyar, 2008; Kiourtzian, 2008). It is not easy to ascertain for how long the church of Şahinefendi remained in use after this date. In the Ottoman and Turkish period its various spaces were reused as shelters, stables, storage areas and dovecots, right up until the recent aforementioned demolitions.

In the cone immediately SW of the church a homogeneous block of rooms, consisting of two kitchens, a hall and some storage areas is located. Their belonging to the ecclesiastical complex is confirmed by the topographic closeness, the presence of a few *arcosolium* tombs outside the cone and, on the upper level, of a funerary chapel.

The storerooms are two quadrangular spaces underneath the church which were afterwards reused as stables. Each one was originally protected by a locking system using millstone doors, that were later removed. This locking device appears to be typical of many storage areas in the rural villages of Byzantine Cappadocia (Cooper, Decker, 2012, pp. 34-36). The use of these rooms as a shelter or redoubt is to be considered at least in this case as secondary or sporadic. The kitchens are composed of two adjoining rooms

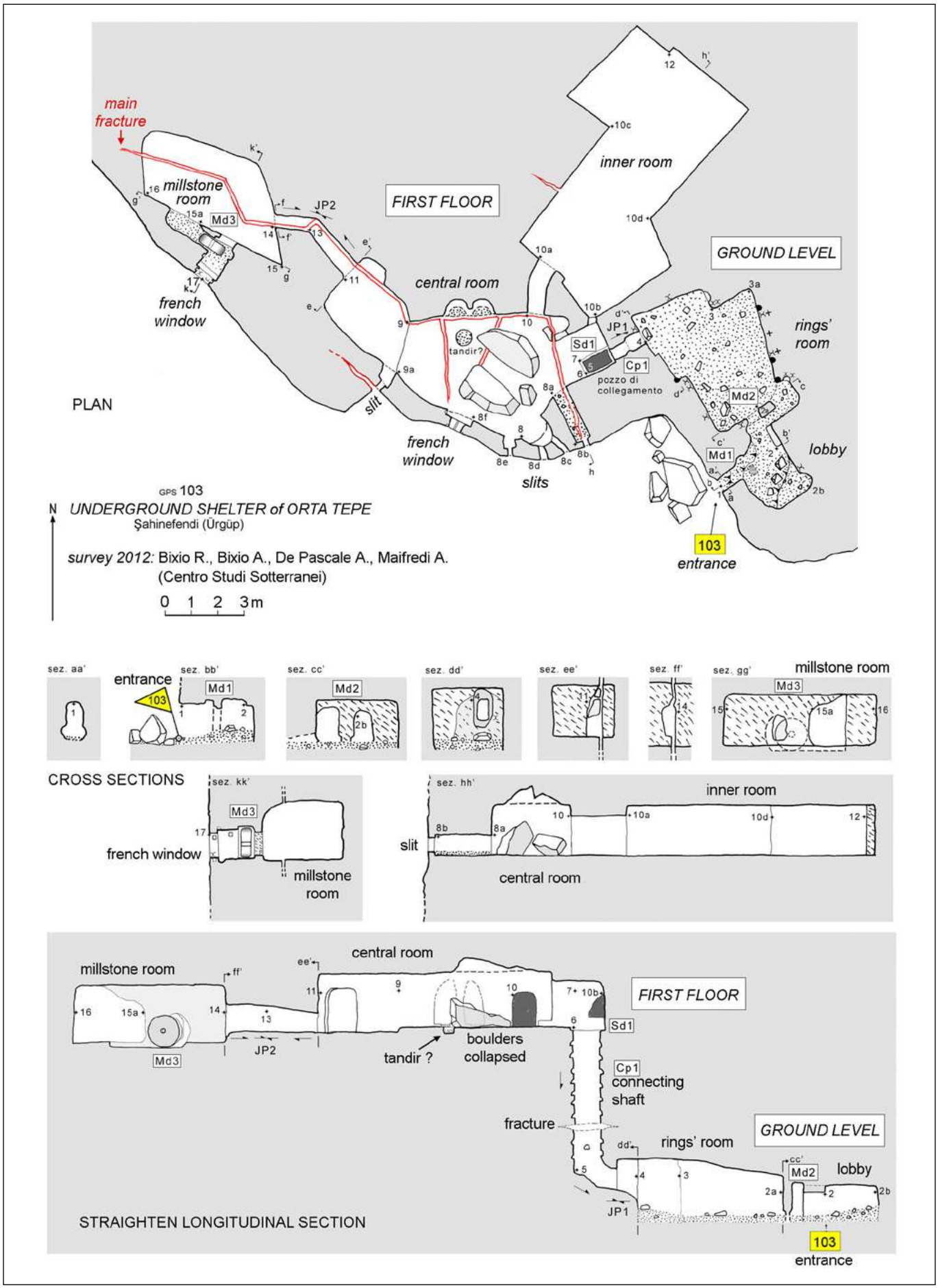

Fig. 4: Şahinefendi, plan and sections of the vertical refuge in Orta tepe cliff (archive Centro Studi Sotterranei).
Fig. 4: Şahinefendi, pianta e sezioni del rifugio verticale nella falesia dell'Orta tepe (archivio Centro Studi Sotterranei).

(3,15x3,15 m and 4,30x3,40 m). The first of these, seriously damaged by erosion, is characterised by the presence of a large conical chimney, known in this typical form in other monastic and secular settlements in the region, such as Çanlı kilise (Ousterhout, 2005), Acık Saray and Selime-Yaprakhisar (Kalas, 2009a, 2009b). The second room has an oven, a chimney and various niches for wooden shelves.

In the same cone, a long rectangular barrel-vaulted hall (7,70 x 3,50 m), carefully excavated, could be identified as refectory or a meeting room. Unfortunately, this room is partly buried by debris and damaged by erosion and recent quarrying, so that it is impossible to recognize at present time the presence of some feature as a *trapeza* or an apse.

Above the aforementioned rooms there is a small undecorated funerary chapel with apse on the E wall and a small room with a central fireplace, used as *kellion* or dwelling. The presence of the kitchens and the hall (ceremonial space or refectory?) suggests that the church of the Forty Martyrs could have been part of a monastic complex. It is important to note that at the beginning of the 13th century a ieromonk was the promoter of the last and most important restoration campaign of the church.

The cones surrounding the church contain a quite articulated series of rooms reserved for activities of work and production, including a stable, a wine press and several storage areas. The stable, located in a cone SE of the church, is a rectangular space measuring m 5,60 x 3,40 with four horse or mule mangers. A tuff cone just a few meters NW of the church houses the wine press. The main room of this complex features two communicating plastered basins for grape pressing and juice collecting. On the upper part of one of these basins there is a red painted cross with the invocation to Christ the victorious (IC XC NHKA) that assumes an apotropaic as well as a sacral character in the middle Byzantine period (Walter, 1997). Also above the doorway of this room various shapes of crosses can be seen, some simply engraved in the wall and others painted in red on a plastered surface, underlining the important role winemaking played for the local economy, as well as for the Divine Liturgy. An adjoining irregular shaped room, with the remains of some compartments probably for various containers, could have been used for wine storage. Another room used for storage with at least three oval pits plastered inside can be found in a cone SW of the church, seriously damaged by its later use as a stable.

The nucleus of a modest rural settlement develops SE of the church, inside a dozen tuff cones. Many small rooms with flat ceilings do not show any particular feature or furnishing to demonstrate their original function; they could have been multi-purpose storage or living areas. In this area there is also another wine press, smaller than the previous one, and also here, on the main collection basin, one can find a cross painted in red on a thin plastered surface. The SE boundary of the settlement is defined by the presence of two small funerary chapels, devoid of any painting or carved decorations. In one of these three graves are in the centre of the nave, with at least four *arcosolia* along the outside walls of the cone.

Fig. 5: Şahinefendi, the shaft connecting the two levels of the vertical refuge in Orta tepe (photo A. Bixio).
Fig. 5: Şahinefendi, il pozzo di collegamento tra i due livelli del rifugio verticale nella falesia dell'Orta tepe (foto A. Bixio).

The Byzantine settlement surrounding the church of the Forty Martyrs appears to be closely related to an important rock-cut complex known as "Şahinefendi Monastery" (Rodley, 1985, pp. 38-39). This complex, situated about 150 m NW of the church in an isolated outcrop of volcanic rock (Fig. 3) overlooking the valley, belongs to the courtyard type, fairly widespread in Byzantine Cappadocia. The main façade of the quadrangular courtyard, poorly preserved due to erosion, presents a simple carved decoration: a series of blind niches with horseshoe arches, separated by heavy pillars with slab capitals. A few traces of red painting on a plastered surface can be seen on a capital. Around the courtyard and the vestibule, ceremonial and residential rooms are situated, according to a layout that seems to be quite recurrent in examples discovered so far in Cappadocia. The main hall opens up along the centre of the vestibule and is rectangular in shape (6,70 x 4,30 m) with two pairs of columns and pillars on each of the long sides and a deep arched recess in the wall opposite the entrance. Along the shorter sides of the vestibule there are two rectangular rooms with flat ceiling, perhaps for residential use and utilitarian spaces, like a kitchen (4,50 x 3,70 m) with the usual cone-shaped chimney. On the opposite side, in a more hidden position, is a small cross-in-square church (m 5,40 x 4,50), with three apses and five domes (Rodley, 1985, pp. 33-39), decorated with simple geometric motives painted in red and white. The church is preceded by a narthex which includes two funerary chamber, partially buried by debris and eaten away by erosion. The horse and mule stables and other rooms for various kind of household activities are to be found SE of the complex.

The courtyard or "inverted-T" plan type complexes (Mathews, Daskalakis Mathews, 1997), initially identified as monasteries, have recently been interpreted as aristocratic residences, owned by local elite families who settled in Cappadocia in the 10th century, when Byzantine empire regained the eastern territories. Dating of the Şahinefendi structure could

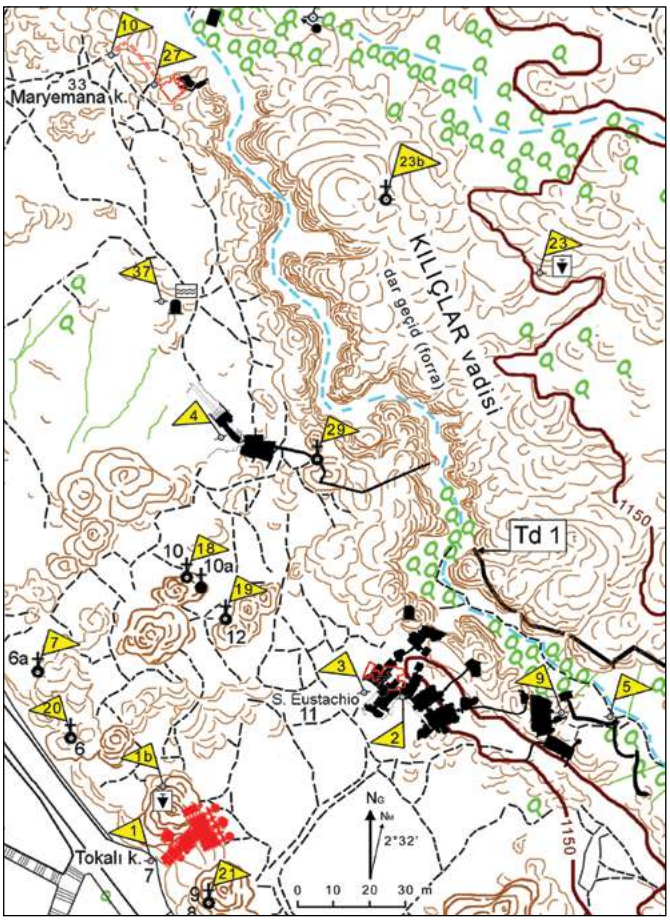

Fig. 6: Göreme, map with location of the principal underground structures (drawing R. Bixio).
Fig. 6: Göreme, mappa con localizzazione delle principali strutture sotterranee (grafica R. Bixio).

be placed in the 11th century according to formal and stylistic analogies with similar complexes identified in the region between Soğanlı and Göreme (Ousterhout, 2005; Kalas, 2006; Kalas, 2007; Öztürk, 2013; Cooper, Decker, 2012, pp. 194-199). Also the church cross-in-square plan became the dominant type in Cappadocia not before the 10th-11th centuries.

The vertical refuge in Orta tepe cliff

In the S summit of the *butte* cliff known as Orta tepe, which overlooks the complex of cones of the church of the Forty Martyrs and the nearby rock-cut monastery, develops an unusual rock-cut shelter on two different levels (Fig. 4).

The entrance to the lower floor was excavated on the break line of the slope, at the base of the vertical wall of the cliff, at an altitude of 1546 m a.s.l.. A short corridor perpendicular to the cliff enters to a small rectangular room, which leads to a wider trapezoidal irregular room (Hall of the Rings), between 170 and 190 cm high, with a flat ceiling. Along the perimeter were carved 12 rings of rock, perhaps useful for tying animals, although only four of them are in correspondence with two niches presumably used as feeders.

In the access to the structure were placed two closing devices with "pillar and groove" (Md1 and Md2) where millstone-doors, now disappeared, could be moved. The orthogonal position of the two devices was probably intended to prevent the use of a ram, in the case that the attackers had passed the first defense.

The ground floor is connected to an upper storey with a shaft, with footholds to climb in contrast (Fig. 5), preceded by a short tunnel. The location and size of the passage, very cramped, make the movement uncomfortable, forcing to continue creeping up to the point where it engages the vertical pipe that, with a drop of 5 m, reaches the floor of the level above (point 6). This system was evidently a true "vertical trap", where the assailants, if they could overcome the millstone-doors, were fully exposed to the attacks of the defenders (Bixio, De Pascale, in press).

It is interesting to note that at the narrowest point of the tunnel (JP1) the digging signs change direction, revealing that the passage was dug with the technique of opposing fronts, the tunnel from below and the shaft from above, showing that the upper storey had a separate entrance. In fact, it's difficult to think that the vertical shaft, so uncomfortable, could be used daily as a passageway to reach the residential area.

The upper end of the shaft comes out flush with the floor at the E end of the Central Hall on the first level. The mouth is surrounded by the track of a frame lowered, perhaps made to position horizontally a door-shield (wooden door or stone slab), as an additional block for enemies, or to reduce the effect of air draft that, in winter, would have overcooled the rooms or, more simply, to prevent the fall of persons.

The first storey consists of three rooms: two are parallel and overlooked to the outer contour of the cliff, and the third dug at right angles into the rocky body. They are connected by short horizontal tunnels.

The main room has very irregular trapezoid plan with flat ceiling, high in average 180/200 cm, interrupted in the middle by large collapsed boulders. The room is well lit by daylight from 7 openings, overlooking the valley, carved in the thin wall of rock in the SW wall, deep 60 cm to 1 m, which separates the room from the outside. They are all set in vertical fractures that cross the cliff taking advantage, probably not coincidentally, of these discontinuities as the starting point of the excavation of the niches in which the openings are located. Particular attention deserves the central one (point 8f), made with care, with a frame and some joints intended to accommodate a wooden closing system: as we shall see, although it has the size of a window, this opening was used as a passage for an independent access to the room.

A niche (9a) retains three grooves dug horizontally on both sides that could possibly support shelves for storing items. For some features it is similar to the grooves for hives that are frequently found in rock-cut apiaries between Urgup and Göreme area (Bixio, De Pascale, 2013, p. 62) where, however, the slots, if not changed by erosion, are narrower or associated with rows of flight holes here not encountered.

The entire structure is crossed by extensive fractures enlarged by release of the rock mass as a result of the progressive detachment of portions of the outer wall of the cliff, probably in part already present at the time of the creation of the settlement. In fact, just on the axis of

the main fracture the tunnel which connects the W end of the Central Hall (point 11) to the Hall of millstone, the last on the face of the cliff, was excavated.
The tunnel (120 to 70 cm high), very uncomfortable to go, crawling or on all fours, is a second horizontal "trap". The point at which the fracture has a sharp double change of direction corresponds to a bend of the tunnel where they meet the excavation directions signs (JP2) conducted by opposing halls, probably using the discontinuity of the rock as a guide [1].

On the side facing the outside of the Hall a room has been carved, "pillar and groove" type, with a runner on the floor, to maneuver a millstone-door, still *in situ*, positioned to defend a short orthogonal passage that faces directly on the outer wall of the cliff. Currently a narrow opening allows to overcome the millstone-door and enter the small passage (82x65x120 cm), which opens in the cliff with a door-window similar to that of the Central Hall. In fact, the rectangular section of the mouth is surrounded by a frame, with a raised threshold, adapted to house a wooden door even if it is not entirely clear the function of some notch placed in the thickness of the jambs and the sill on the floor, likely to facilitate a suitable system of access.
That the window served as access is evident not only by the fact that it was protected from the inside outwards by the double device, but also by the opposite direction of the signs of excavation in the connecting tunnel,

1) The opposing sides excavation technique applied in the two sections described here (connecting shaft between the ground floor and first floor, and the corridor between Central Hall and the Hall of millstone) assumes that the three rooms mentioned were not carved in progression, such as, first glance, it would seem logical, that is, starting from the entrance on the ground floor and going from bottom to top and from east to west, but were carved separately and then put in communication. We do not have elements to deduce whether the excavation was conducted at the same time, by three different teams, or from one group of miners, at successive times and with which sequence. In any case, from anywhere the digging has started, so that the opposing sides technique described above could be implemented, each room must necessarily be originally equipped with a separate access from the outside, identified in the entrance in point 1 for the ground floor, in the door-window 8f for the Central Hall and in the door-window 17 for the Hall of millstone. The inference is supported by the fact that all the millstone-doors are positioned to defend the inside of the shelter from an external attack; therefore, there is no doubt that the door-window 17, which now faces the overhanging wall, was once easily accessible. They could, in fact, exist outside structures consisting of scaffolds, balconies and / or wooden stairs, somehow anchored to the surface of the cliff, of which traces remain in the testimony of the joints below the door-window (8f) in the Central Hall. A second possibility, not surprisingly, could be in the original existence of structures excavated in the thickness of the rock, such as shafts, stairways or, more likely, ledges, disappeared with the collapse of large sections of the cliff.

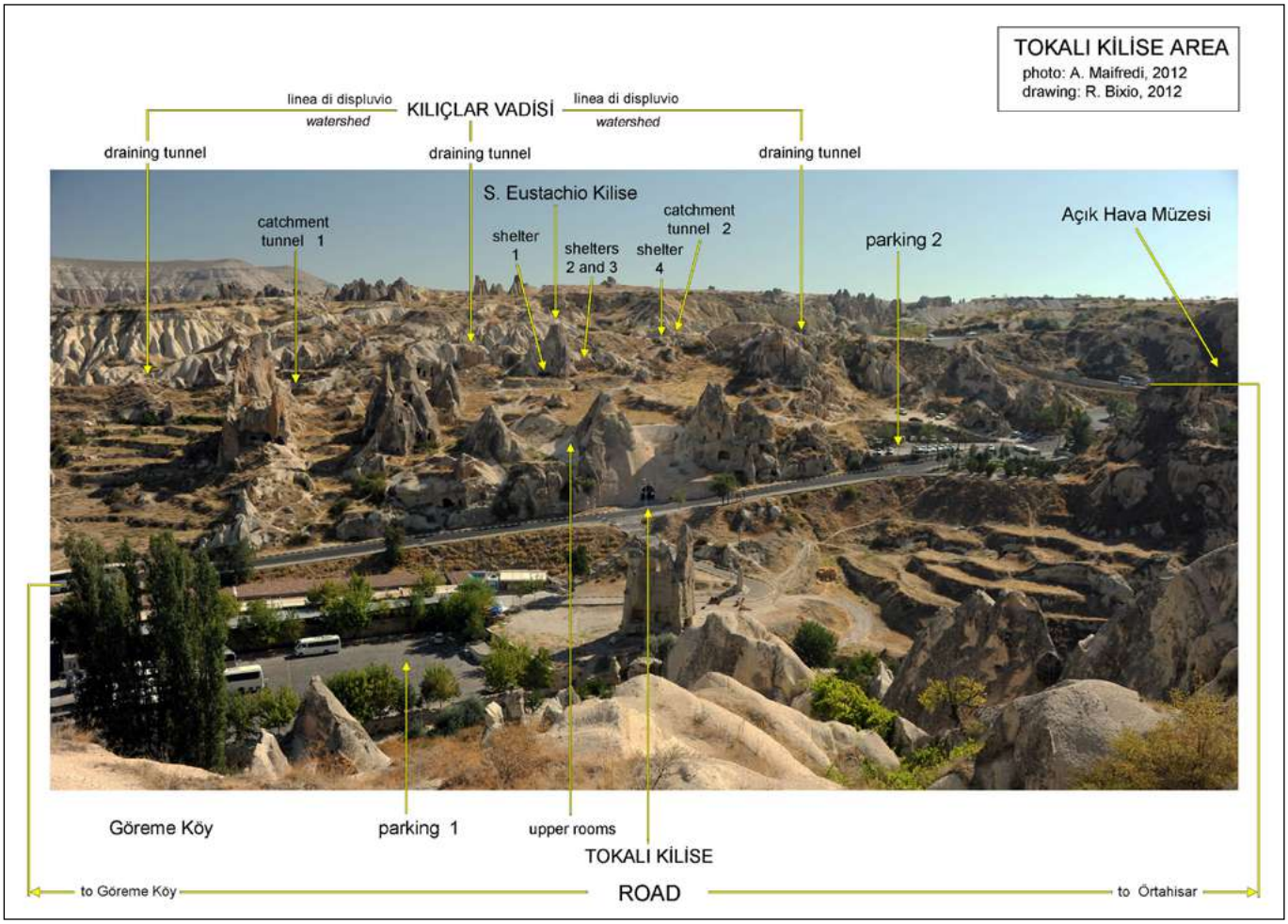

Fig. 7: Göreme, location of the principal underground structures (photo A. Maifredi, drawing R. Bixio).
Fig. 7: Göreme, localizzazione delle principali strutture sotterranee (foto A. Maifredi, grafica R. Bixio).

Fig. 8: Göreme, the first millstone-door in the refuge 1 (photo A. De Pascale).
Fig. 8: Göreme, la prima porta-macina nel rifugio 1 (foto A. De Pascale).

justifiable only if each of the halls had an entrance. The largest hall of the complex (Inner room) has a substantially rectangular plan, which penetrates in the core of the rock mass, oriented orthogonally to the Central Hall to which it is connected by a short vaulted tunnel. The hall has a flat ceiling; the walls are straight, free of niches, except some of small size for the lamps.
It is evident that all the described rooms had a decidedly defensive connotation, with a division between the first storey, intended for residential use, and the ground level, probably used as temporary shelter for animals to escape by occasional raids.
In the general framework of knowledge about the Cappadocian underground shelters, the location of this defensive structure placed in a steep site and away from the settlement is anomalous, since it can be reach with difficulty, in more than thirty minutes from the church (less from monastery), climbing the steep slope without trails at present. As seen, the church of the Forty Martyrs had its own shelter carved in the same pinnacle in the hall below the ecclesial structure, protected by a vertical trap and two large millstone-doors. The Monastery, however, is apparently devoid of defensive structures, but it is possible that they were in some point of the rocky cliff, now collapsed. For these reasons, we are inclined to consider the hypothesis that the refuge of Orta tepe was used by a small group concentrated at the top of the *butte*, in rooms carved into the bedrock, such as that identified by the flag 110, or in very simple structures made in high, now missing, the foundations of which may be confused between the low vegetation and the remains of the more ancient necropolis spread on this area. The surface of the plateau steppe could offer land for grazing and subsistence agriculture, while the rocky road (flag 106), now truncated, and perhaps other more direct steps, now disappeared, would allow to quickly reach the underground shelter. In fact, on the plateau we can see different linear tracks, more or less parallel to each other and perpendicular to the longitudinal axis, corresponding to drywall, which could correspond to ancient divisions of land into plots. Based on general knowledge of a large number of underground settlements in Cappadocia (Bixio et al., 2012), although not exhaustive, and with reference to documentation obtained on the four underground refuges of Saint Eustathios, in the area of Tokalı Kilise described in this same work, we highlight some differences in the characteristics of the shelter of Orta tepe.
The most obvious discrepancy concerns the arrangement of the rooms. In the case of Orta tepe refuge the structure is spread over two stories, with a trend of the rooms almost parallel to the cliff, carved into the strip closest to the outer contour of the rock mass (first band). The most protected room by defensive devices is located on high and in a central position, with an independent access, and with various other windows that give light to the hall. This provision seems to repeat itself in shelters placed on opposite sides of the same valley, in the cliff of Yarlağan tepe and that one in Düğen tepe [2]. The structure, within the classification of the cliff's settlements, is a "wall-dwelling" (Bixio et al., 2012, pp. 11-12), and, in particular, we can name it "wall vertical refuge".
On the contrary, the shelters documented in Göreme, and generally in other areas of the province of Nevşehir, are developed mainly on one level, with a succession of horizontal rooms from an entrance on the level of campaign, and in the perpendicular direction to the slope, in order to go deep into the rock mass ("underground horizontal refuges"). The more defended room is the innermost one (redoubt), necessarily without windows (collapses excepted) and, therefore, devoid of natural light. Special cases are the great shelters of Derinkuyu and Kaymaklı which develop on many overlapping stories, but all below ground level ("underground vertical refuges"). Some analogy may be found at the site of Maziköy ("wall horizontal refuge"), located halfway between Kaymaklı and Şahinefendi. It is worth adding that in the refuge of Orta tepe we were able to detect the application of the technique of excavation with opposing sides, already identified in Göreme, especially for water works, but found in structures built in times and places very far from each other, such as in tunnels of Ani, the medieval capital of the kingdom of Armenia (Bixio et al., 2009), today on the eastern border of Turkey, or those of Ahlat on Lake Van (Bixio, De Pascale, 2011; Bixio et al., 2013), or in the settlement of Troy, on the Aegean coast of Turkey, attributed to the 3rd millennium BC (Korfmann, 2004, pp. 38-39). Also excavated by opposing sides were the Persians *karez* of the 7th century BC (Castellani, 2001, p. 27) and the Eupalino's aqueduct in Samos, dating from the 6th century BC (Castellani, 1997, p. 181) as well as the underground emissary of Lake Nemi, near Rome, dug around the 5th century BC (Castellani, 1997, pp. 28-29). Evidently, this technique was so

2) These rock-cut complexes will be the subject of future communications.

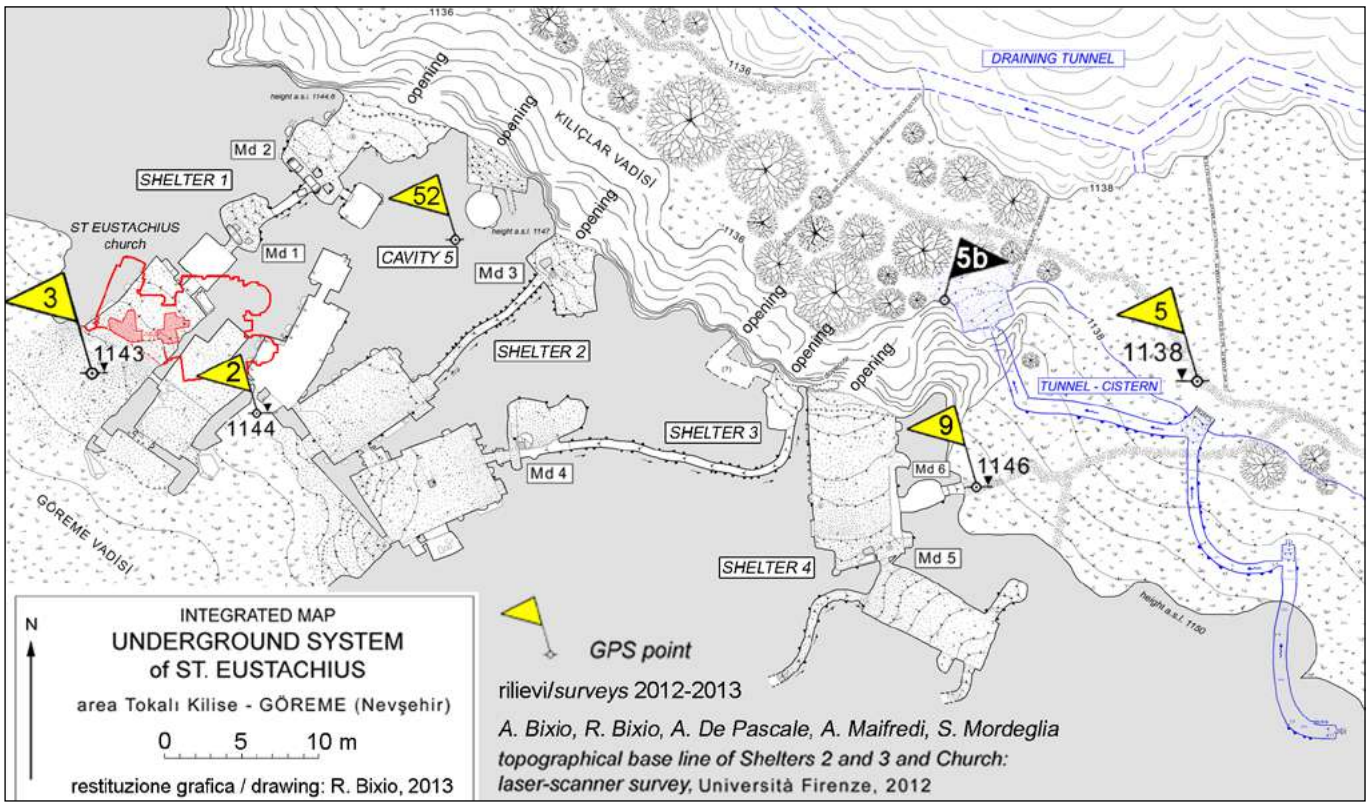

Fig. 9 - Göreme, plans of the refuges and of the hydric systems around Tokalı church (archive Centro Studi Sotterranei).
Fig. 9 - Göreme, piante dei rifugi e dei sistemi idrici intorno alla chiesa Tokalı (archivio Centro Studi Sotterranei).

obvious and profitable to be widely applied everywhere and can not be considered as representative of a limited period or a particular cultural area.

The underground structures around the Tokalı Kilise in Göreme

The Centre for Underground Studies of Genoa, since 1991, carried out many explorations on the rock-cut and underground structures scattered throughout the Nevsehir district, surveying and documenting buildings used for worship (churches and chapels), some structures of service (dining halls, stables, cellars, dovecotes, apiaries, etc.), and a great number of structures of refuge (shelters) and water works (drainage tunnels) [3].

The research has focused in particular behind the Tokalı church (Wharton Epstein, 1986), in the area around the church of Saint Eustathios - dated back to the 10th century - which is partly collapsed, remaining suspended on the wall of the pinnacle (Figs. 6 and 7).

The rooms located under the church advance into the heart of the rock mass through a series of small doors and corridors defended by large millstone-doors. These underground works have particular characteristics. Near the actual entrance, after a little room carved in the rock, there is a first millstone defending the refuge. The defenders could roll the stone to close and open the passage locking it against the two pillars carved by saving of rock inside the second chamber (Fig. 8). The defence was then doubled by a second monolith that closed, in case of danger, the redoubt, that is the inner part where the inhabitants could take refuge for the entire period in which the raid lasted. The second millstone in the redoubt is at present broken. We do not yet know if it was because the shelter was taken over by attackers or, more likely, for natural causes due to freezing phenomena.

As it is possible to see from the plan (Fig. 9) the shelter had its own distinctive character, which we find repeated in all of Cappadocia, consisting of a sequence of narrow corridors and closing devices to provide maximum protection to the redoubt. We do not know the exact shape and size of the redoubt because the last room is now ripped open.

Making a further reconnaissance outside, we find that the structure crosses the tuff relief and comes out in a deep canyon - the Kılıçlar vadisi - remaining virtually hidden from the ancient attackers.

We think highly plausible that in the disappeared rock mass there was a passage, probably a shaft with footholds, which allowed the refugees to descend into the valley, thus allowing people to supply of water and food, or to escape, or to attack the raiders from behind. It is also possible that the valley, at that time, was less deep and that the underground structures were carved below the bottom of the valley.

Along the cliff there are other openings that correspond to other structures similar to the one just described.

During the 2012-2014 research campaigns we have explored all the underground structures, tunnels and shafts although in rather difficult conditions because often occluded by slumping or earth fills. This work permitted to identify and document further shelters, parallel to the first and quite similar in construction

3) The hydric systems around the Tokalı Kilise will be the subject of future communications.

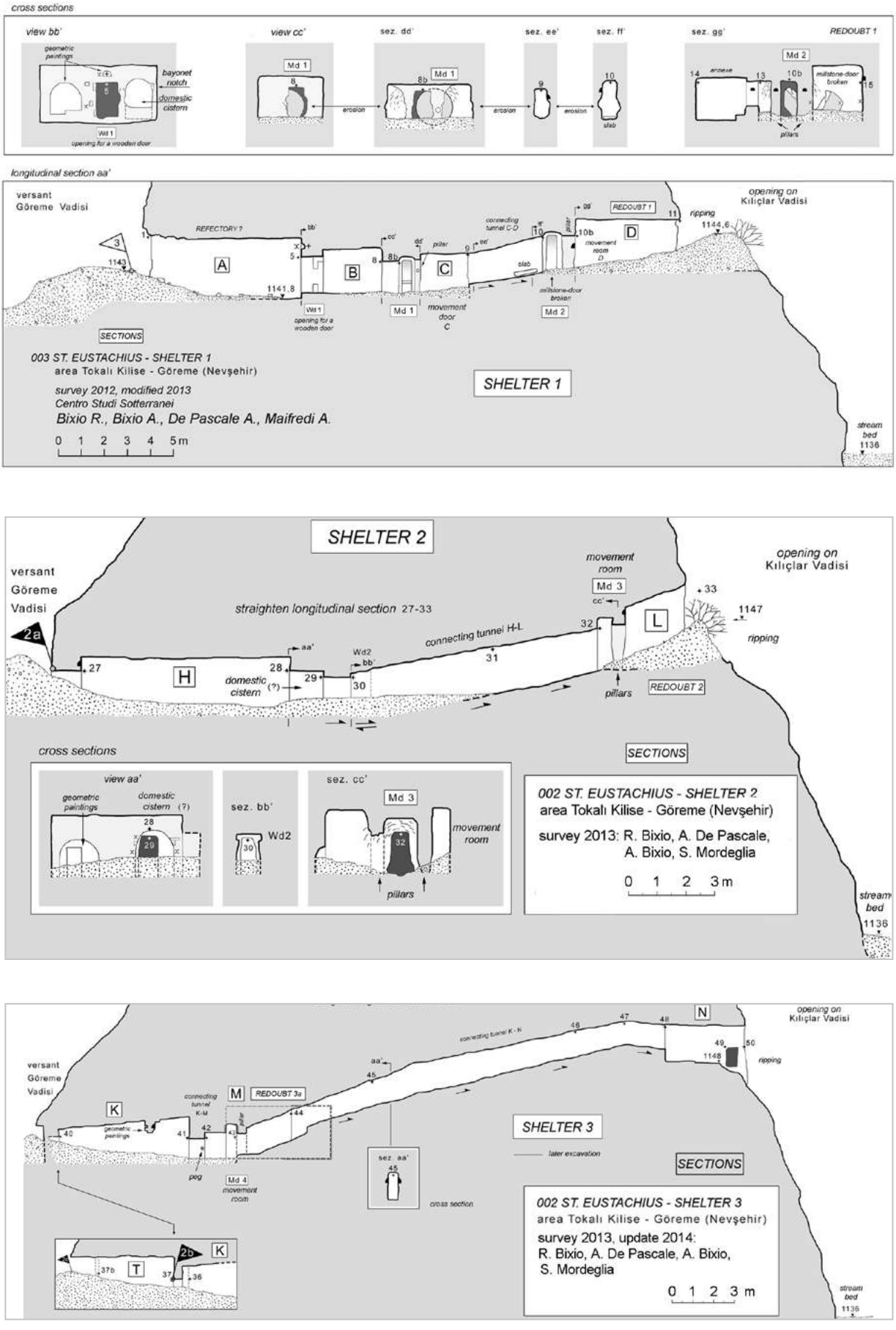

Fig. 10a-c: Göreme, sections of the refuges around Tokalı church (archive Centro Studi Sotterranei).
Fig. 10a-c: Göreme, sezioni dei rifugi intorno alla chiesa Tokalı (archivio Centro Studi Sotterranei).

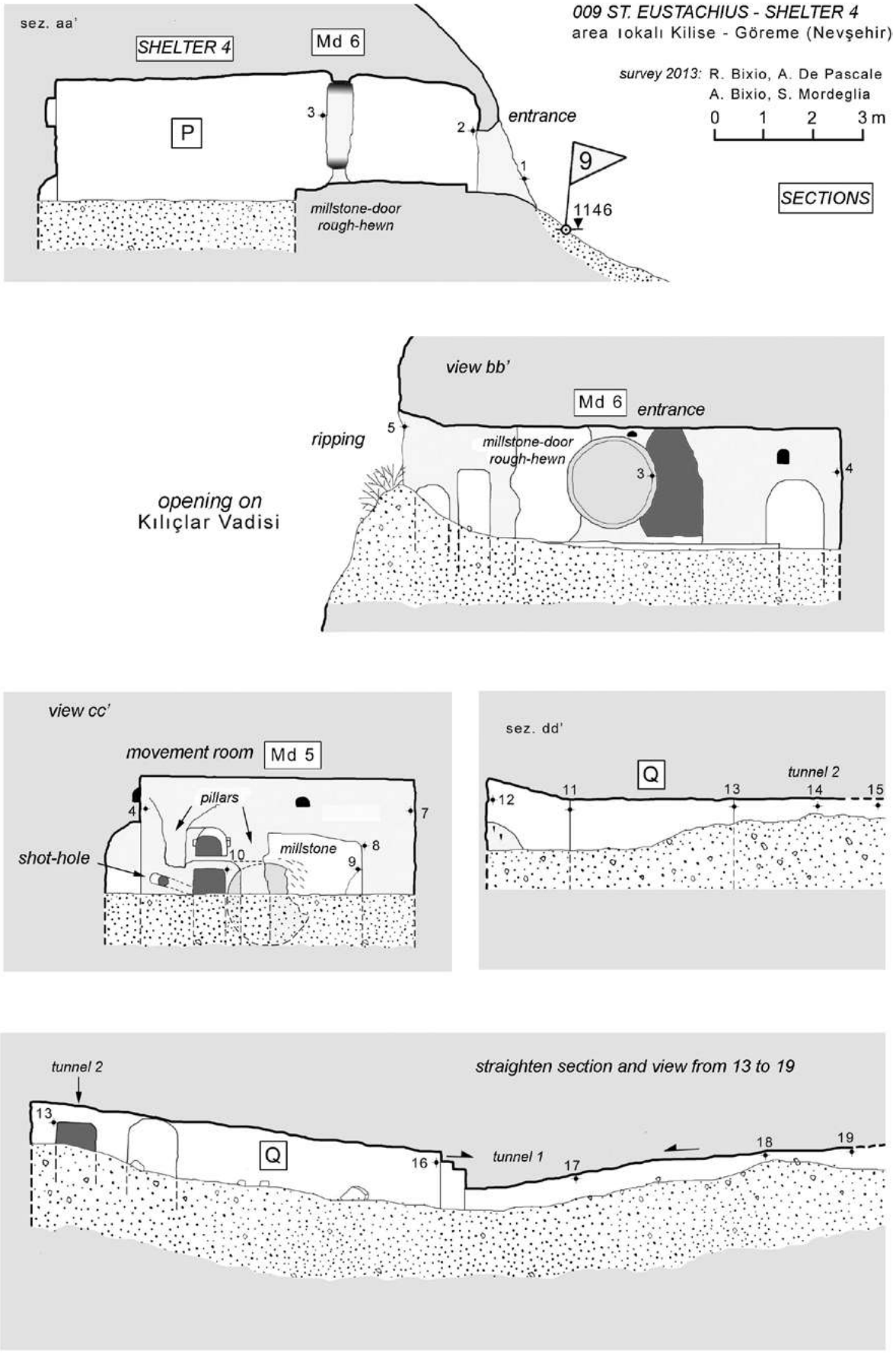

Fig. 10 d: Göreme, sections of the refuges around Tokalı church (archive Centro Studi Sotterranei).
Fig. 10 d: Göreme, sezioni dei rifugi intorno alla chiesa Tokalı (archivio Centro Studi Sotterranei).

scheme, also fitted out with wide rooms (Figs. 9 and 10a-d).

In one of these shelters, the fourth one (GPS 9), there is a large millstone-door carved vertically into the rock wall, but never finished and still united with the rock mass. It is obvious that the shelter was abandoned before completing the work, perhaps because conquered by the attackers or because the outer part of the room collapsed, making the structure unusable. However, the presence of the monolith confirms that in some cases the millstones were produced on site.

These shelters, however, were in need of water supply that invariably we found in the deep canyon that develops behind the settlement, in Kılıçlar Vadisi.

The underground shelters situated in the area around Tokalı Kilise in Göreme, albeit on a more limited extension, have many similarities with some other structures documented in the rest of Cappadocia, such as those documented in the wide plain extending SW of Gülşehir, in Göstesin, Filiktepe, Sivasa and Tatlarin (Castellani, 1995, 2002a, b). These have been excavated inside low flat hills (butte) with, at the foot of the cliff, the entrances to large rooms showing signs of use as storehouses and shelters for domestic animals, but also as churches. These structures show a modulating organization and the presence in any underground structure of rooms connected by narrow tunnels with always articulated defensive systems, consisting of one or more millstone-doors, and redoubts that we also found in the case of the shelters around Tokalı Kilise, with the only difference that the structures were carved in pinnacles and in the hillslope, but the characteristic and the organization of the underground works are very comparable.

So, although still at a preliminary level which requires further investigations and assessments, we can assume that the area of the rock churches and monasteries of Göreme has not always been a place of quiet asceticism, as it appears today but the inhabitants had to organize themselves in a rather complex and ingenious way, to face continuous and repeated attacks.

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