Rock-cut apiaries and underground shelters in Göreme (Cappadocia – Turkey): a link?

Apiari rupestri e rifugi sotterranei a Göreme (Cappadocia – Turchia): un nesso?

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Abstract

We know that in Cappadocia, in the centre of Turkey, 20,000 sq.km of tender volcanic tuffs have allowed the populations living here over the centuries to build thousands of structures carved into the rocks that concern all typologies of rock-cut works. In this article the rock-cut apiaries and underground shelters in the limited area of only 4 sq.Km of Göreme, the ancient Byzantine *Korama*, have been taken into particular consideration. The site is currently considered the heart of Cappadocia for the presence of more than 130 worship structures, including rock-cut churches and refectories, but only 4 shelters and no apiary were known before the speleological investigations of recent years. Today the apiaries identified in the same area are 14 and the shelters 18, some of which are contiguous. Based on the fact that there is a literature in which the use of bees in Asia Minor as biological weapons to defend tunnels in case of siege is attested, we have considered the suggestive hypothesis that, even in the absence of specific sources for the Cappadocia, the vertical traps of Göreme shelters could have been defended in the same way.

Key words: Cappadocia, Göreme, bees, rock-cut apiaries, *underground shelters, shaft-traps, biological weapons.*

Riassunto

Sappiamo che in Cappadocia, una regione storica nel centro della Turchia, 20.000 kmq di teneri tufi vulcanici hanno consentito alle popolazioni qui residenti nel corso dei secoli la realizzazione di migliaia di strutture scavate nelle rocce che riguardano tutte le tipologie delle opere rupestri: dalle residenze alle chiese, dalle opere agricole a quelle idriche, sino alle opere belliche. In questo lavoro vengono presi in particolare considerazione gli apiari e i rifugi sotterranei presenti nell'area circoscritta di soli 4 kmq di Göreme, l'antica *Korama* bizantina. Il sito viene considerato il cuore della Cappadocia per la straordinaria concentrazione di oltre 130 opere di culto, tra chiese, refettori rupestri e camere funerarie, documentate da numerosi specialisti, a incominciare dalle prime indagini sistematiche di Guillaume De Jerphanion di inizio Novecento e tuttora in corso. Tuttavia, solo 4 rifugi e nessun apiario erano conosciuti prima delle indagini speleologiche degli ultimi anni, che hanno portato in luce anche numerose opere idriche in precedenza non considerate. Oggi gli apiari individuati nella stessa area sono 14 e i rifugi 18, ma si ritiene che ulteriori ricerche possano incrementare tale numero.
In questo lavoro vengono descritte le caratteristiche generali di entrambe le tipologie, mettendo in evidenza, per gli apiari rupestri, la presenza di dispositivi per collocare arnie fisse e arnie mobili, queste ultime costituite da cesti tubolari, di cui ancora esistono esemplari *in situ*. Per quanto riguarda i rifugi sotterranei, oltre alle tipiche massicce porte-macine atte a blindare le camere interne, si rileva che, in diversi casi, la difesa era assicurata per mezzo di angusti pozzi comunicanti con camere soprastanti da cui i difensori potevano agevolmente colpire gli aggressori anche con un semplice lancio di pietre.
In base al fatto che esiste una letteratura in cui si attesta nell'antichità l'uso delle api in Asia Minore come armi biologiche per difendere le gallerie in caso di assedio, abbiamo considerato la suggestiva ipotesi che, pur in mancanza di fonti specifiche per la Cappadocia, anche le trappole verticali dei rifugi di Göreme potessero essere difese nello stesso modo, utilizzando le arnie mobili, del tutto adatte per forma e dimensioni ad essere gettate nei pozzi.

Parole chiave: Cappadocia, Göreme, api, apiari rupestri, rifugi sotterranei, pozzi-trappola, armi biologiche.

Rock-cut works in Cappadocia

Cappadocia (figure 1) is a region of the Central Anatolian Plateau (Turkey) known throughout the world from many points of view closely related to each other: the complex historical events, its geomorphology and, above all, the peculiar rupestrian (and underground) structures, widely distributed over most of the territory.
In summary, already inhabited in prehistoric times,

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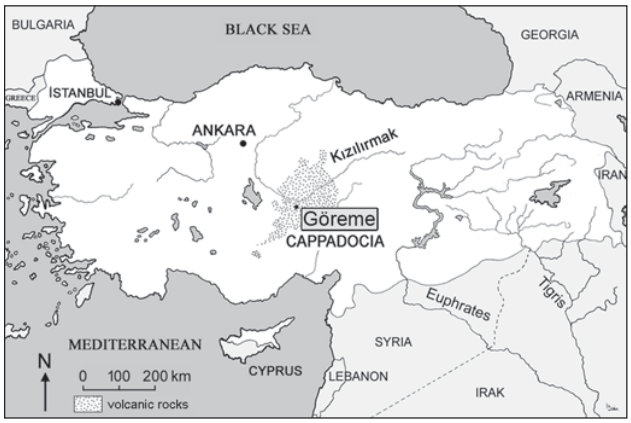


Fig. 1 – The dotted area correspond to volcanic rocks of Cappadocia (drawing R. Bixio).

Fig. 1 – Area punteggiata corrispondente alle rocce vulcaniche della Cappadocia (grafica R. Bixio).

between the 2nd and the 1st millennium BC it was the seat of the Hittite empire, then an area of opposition between Assyrian and Phrygian. It was a Persian satrapy (546-334 BC). Conquered by the Greeks and Romans, it then became an early Christian centre and an important *thema* of the Byzantine Empire, long disputed by the Arabs between the 7th and 10th centuries AD. It was conquered by the Seljuk Turks at the end of the eleventh century, and finally incorporated into the Ottoman Empire.

The landscape, crossed by the river Kızılırmak, dominated by the volcanoes Erciyes Dağı (3916 m) to the east, and Hasan Dağı (3268 m) to the west and by hundreds of smaller eruptive centres, is mainly composed of powerful deposits of soft tuff and other volcanic rocks which extend over an area of about 20,000 square kilometres, at an average altitude of 1200 m above sea level. In the region wide gently rolling plains, strewn with *buttes* and surrounded by *mesas*, alternate to valleys strongly engraved by deep *canyons*, modelled by meteoric agents in spectacular sequences of badlands and pinnacles forests.

In this environment, the populations that over the centuries have succeeded and overlapped, created an extraordinary concentration of structures carved into the rocks, favoured by the lithological features, conditioned by the climate and stimulated by historical events. These works practically cover the whole typological range of "artificial cavities" (Galeazzi, 2013): residential and utilitarian works, worship and sepulchral works, transit tunnels, water and mining works and, last but not least, defence works. In Cappadocia, there are hundreds of known underground shelters, and only the rock-cut churches are valued in more than a thousand (Ousterhout, 2017, p. 5).

Besides the numerous waterworks on which, moreover, significant discoveries have been made (see, for example, Bixio A. *et al.*, 2017/a), two of the categories on which the Centro Studi Sotterranei, from the nineties of the last century, has mostly investigated, with the help of modern speleological techniques, concern the underground shelters and the rock-cut apiaries (see, for example, Bixio R. & Castellani, 1996; Bixio R. *et al.*, 2002; Bixio R., 2012; Bixio R. & De Pascale, 2013). In this work a very limited area of just 4 sq.km will be taken into consideration, consisting of three convergent valleys corresponding to the site of Göreme, the ancient Byzantine *Korama*, which today is considered the heart of rock-cut Cappadocia (figure 2). The identification and documentation of shelters and apiaries, previously almost ignored (Bixio A. *et al.*, 2018), provide a different perspective on the organization of a site otherwise known only for the concentration and importance of works of worship (86 churches and chapels, 50 refectories and countless burial chambers and tombs from the Roman, early Christian and Byzantine ages - see, for example, Jolivet 2015; Ousterhout 2017; Andaloro *et al.* 2017).[1] Furthermore, it allows us to consider a suggestive work hypothesis on a possible, partial relationship between shelters and apiaries.

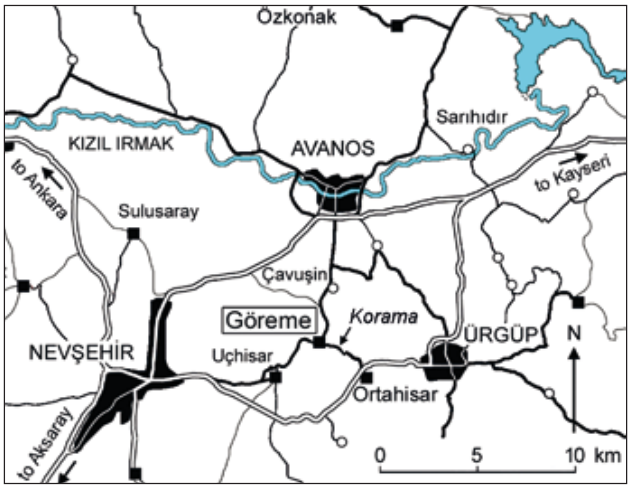


Fig. 2 – The location of Göreme, in the territory of the Nevşehir province (drawing R. Bixio).

Fig. 2 – La posizione di Göreme, nel territorio della provincia di Nevşehir (grafica R. Bixio).

The Göreme apiaries

The origin of beekeeping may be very old, as suggested by a late Neolithic painting found at Çatal Hüyük, near Konya, therefore not far from Cappadocia, which seems to indicate the transition from a harvesting phase to the first forms of domestication (Bortolin, 2008, pp. 60-61).

The important role of beekeeping in Asia Minor, in general, and in some localities of *Pontus Euxinus*, is attested at least since the Hellenistic age, by authors

[1] In the early twentieth century Guillaume De Jerphanion (1925-1942) had begun the first systematic study of *Gueurémé*, identifying 32 rock-cut worship works. The numbers shown in the cartouches of figure 5 refer to some of the churches included in its repertoire, whose fulcrum is no. [7] Tokalı Kilise.

Fig. 4 – Above. Cylindrical basket beehive in the apiary of Nicetas in Kızılçukur/Meskendir valley (photo G. Bologna).

Fig. 4 – Sopra. Arnia a cesto cilindrico nell'apiario di Nicetas in Kızılçukur/ valle di Meskendir (foto G. Bologna).

Fig. 3 – Left. Representation of horizontal cylindrical hives (after *Homilies* of Gregory of Nazianzos, cod. Taphou 14).

Fig. 3 – A sinistra. Rappresentazione di arnie cilindriche orizzontali (da Homilies di Gregorio di Nazianzos, cod. Taphou 14).

such as Zeno, Aristotle and Pliny (Bortolin, 2008, pp. 44-45). Certainly it was flourishing even in the Byzantine era as it appears from the *Geoponika* (anonymous of the tenth century), which also describes the pigeon houses, however it talks in general, not specifically for Asia Minor (Germanidou, 2015, pp. 34/37). References about beekeeping in monastic foundations are found in two Lives of Saints: the Life of Lazaros, 11th century, and in Paphlagonia in the Life of Saint Philaretos, 8th century. Already in the *Homilies* of Gregory bishop of Nazianzos, one of the Fathers of the Church of Cappadocia (born in 329 AD), the images of horizontal hives are reproduced (figure 3) (Germanidou, 2016, pp. 64 / 226-227) which we still find today, although no longer used (figures 4, 15).

In the last decades in Cappadocia has been recorded

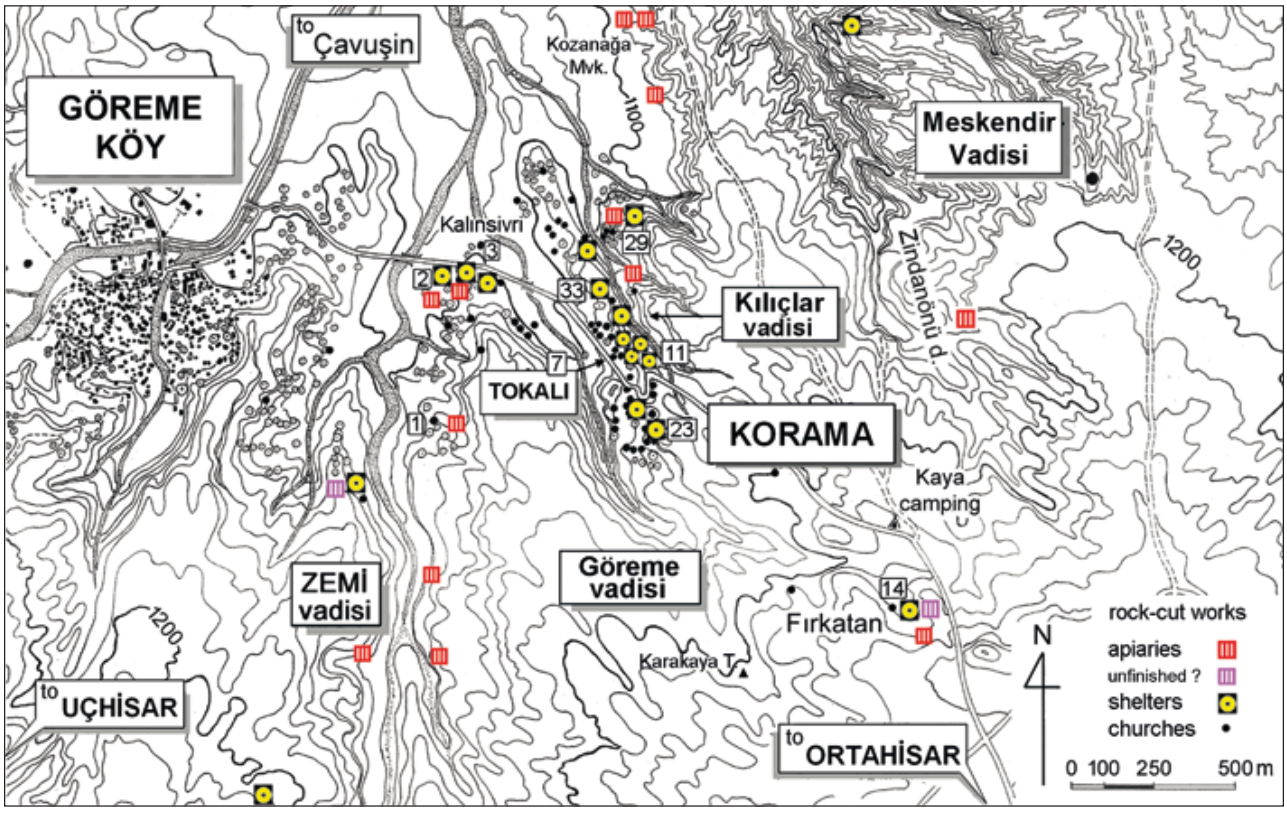
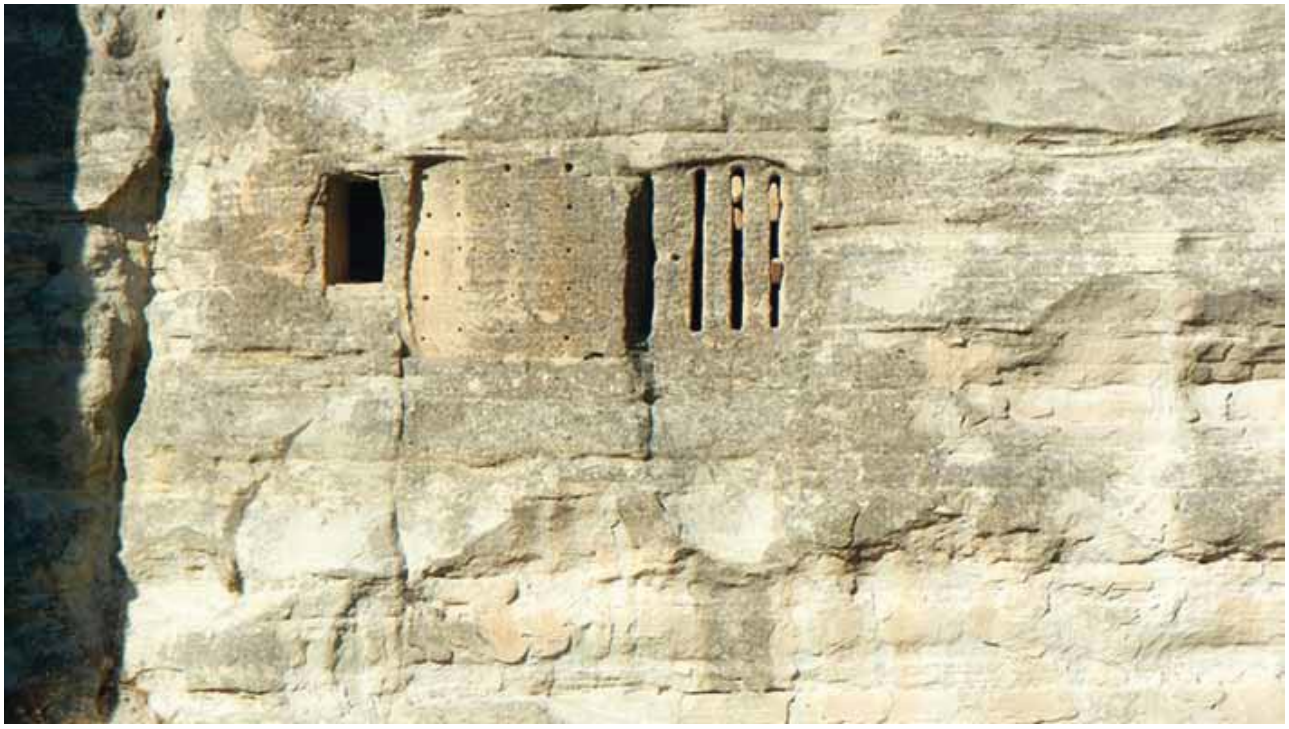


Fig. 5 – Location of the apiaries (red) and shelters (yellow) identified in the *Korama*/Göreme area (drawing R. Bixio).

Fig. 5 – Posizionamento degli apiari (rossi) e dei rifugi (gialli) individuati nell'area di Korama/Göreme (grafica R. Bixio).



Figs. 6, 7 – Locatity of Kalınsivri: the large hanging apiary (photo A. Bixio).
Figg. 6, 7 – *Località Kalınsivri: il grande apiario pensile (foto A. Bixio).*

Figs. 8, 9 – Locality of Kozanağa: apiary at ground level (photo A. Bixio).
Figg. 8, 9 – Località Kozanağa: apiario a livello suolo (foto A. Bixio).

Fig. 10 – At the Kayadibi apiary only the front remains with a slit parallel to 5 flight holes in the column (photo A. Bixio).
Fig. 10 – Dell'apiario di Kayadibi rimane solo la facciata con una fessura parallela a 5 fori di volo in colonna (foto A. Bixio).

the presence of apiaries that have the peculiarity of being rupestrian, that is entirely excavated in the rocks (Bixio R. *et al.*, 2002; Bixio R. *et al.*, 2004; Bixio R. & De Pascale, 2013). Until now we did not find any bibliographic sources that can attest to their origin. However, we noted that most are in abandonment; some of them, in view of the very advanced erosion, seem very ancient (figures 8, 9, 10), while the few still in operation (figures 12, 15) give the impression of coming from a very long reuse.

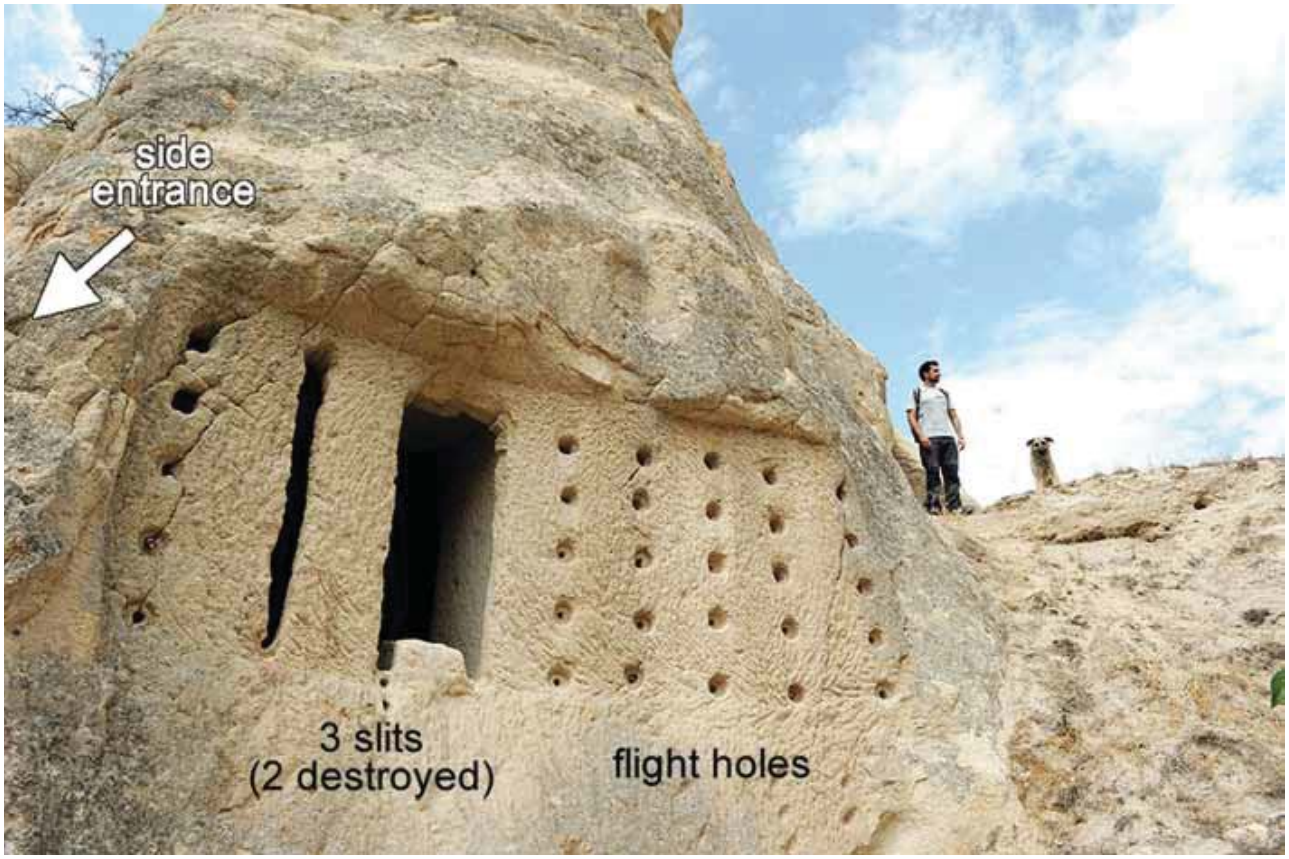


Fig. 11 – Kozanağa apiary with side entrance. On the front: 30 flight holes and 3 slits, 2 of which destroyed (photo A. Bixio).
Fig. 11 – Apiario di Kozanağa con ingresso laterale. In facciata: 30 fori di volo e 3 fessure, di cui 2 distrutte (foto A. Bixio).

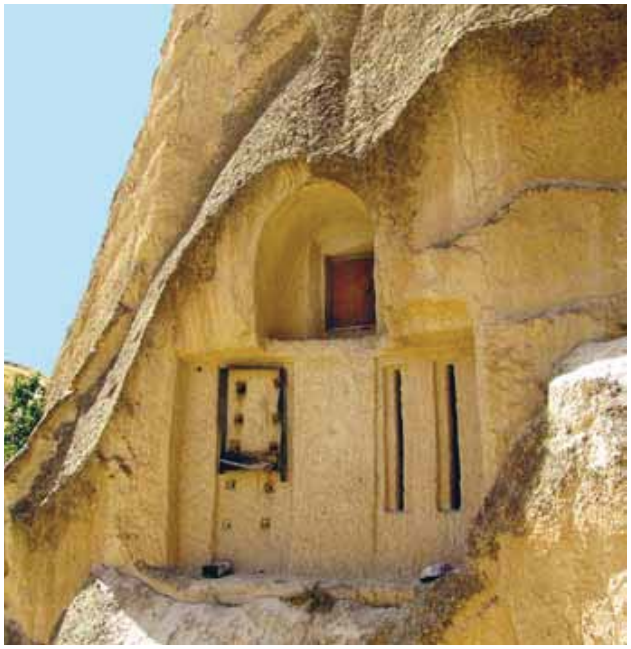


Fig. 12 – Locality of Fırkatan. Rock-cut apiary still in use, with upper wooden wicket (photo A. De Pascale).
Fig. 12 – Località Fırkatan. Apiario rupestre ancora in uso, con porticina di legno in alto (foto A. De Pascale).

The apiaries so far identified in Cappadocia, of which we are informed, are located in the area between Ürgüp, Uçhisar, Ortahisar and Çavuşin (Nevşehir province), in the valley of Ihlara (Aksaray province) and in the valley of Soğanlı (province of Kayseri). Currently more than 50 rock-cut apiaries are known, catalogued by Gaby Roussel (2006; 2008), an expert in the field, but we believe that they can be many more. Substantial evidence on our assumption is that in the only restricted area of Göreme considered in the present work, Roussel does not even mention any apiary, while recently, following investigations by the Centro Studi Sotterranei and other researchers (Bobrovskyy, Grek, Lucas), at least 12 rock-cut apiaries have been located (red icons in figure 5), plus another three in the valley of Meskendir (Bixio R. *et al*., 2004).
All the rock apiaries, even if each with its own peculiarities, have a similar basic conformation, consisting of chambers wholly excavated in the rock in which they were, or are still housed the hives (figures 14, 15). Like the numerous rock-cut pigeon houses in the same areas, the apiaries are generally excavated at higher position, in the rock faces (figures 6, 7, 11, 16), but in some cases they are placed at ground level (figures 8, 10, 12). From the external view they are identified by the presence of ordered groups (rows and columns) of small round

Fig. 13 – Internal compartment of an apiary with flight holes, grooves and remains of a mobile slab (photo M. Traverso).

Fig. 13 – Compartimento interno di un apiario con fori di volo, scanalature e resti di una lastra mobile (foto M. Traverso).

holes (flight holes), often combined with parallel series of vertical slits, sometimes irregular, sometimes very precise, from which the bees enter (figures 7, 9, 10, 11, 12). The beekeeper can access from a small front or side entrance, originally closed by a wooden door. In the inner chamber, the flight holes, as a rule, correspond to housings for fixed hives consisting of vertical compartments subdivided into cells by horizontal slabs inserted in grooves (figures 13, 14), each with a movable closure on the back (figure 15): they are evidently functional to a sedentary beekeeping. At the vertical slits were placed mobile, tubular hives, corresponding to oblong baskets covered with dried dung (figures 4, 15), laying one on top of each other. It is likely that the tubular beehives were used to practice the so-called nomadic beekeeping, according to the Code of Solon already attested in Greece from 600 BC (Kristensen, 2007). As we will see, their characteristics (shape, size, mobility) fit well with the hypothesis of a different use at the service of the underground shelters equipped with vertical traps.

The Göreme shelters

Among the most representative rock-cut structures of Cappadocia, besides churches and their paintings (on which the interest of most Byzantinists was almost exclusively concentrated, neglecting the "secular context" constituted by a far more complex and diversified underground urban organization, of which the works

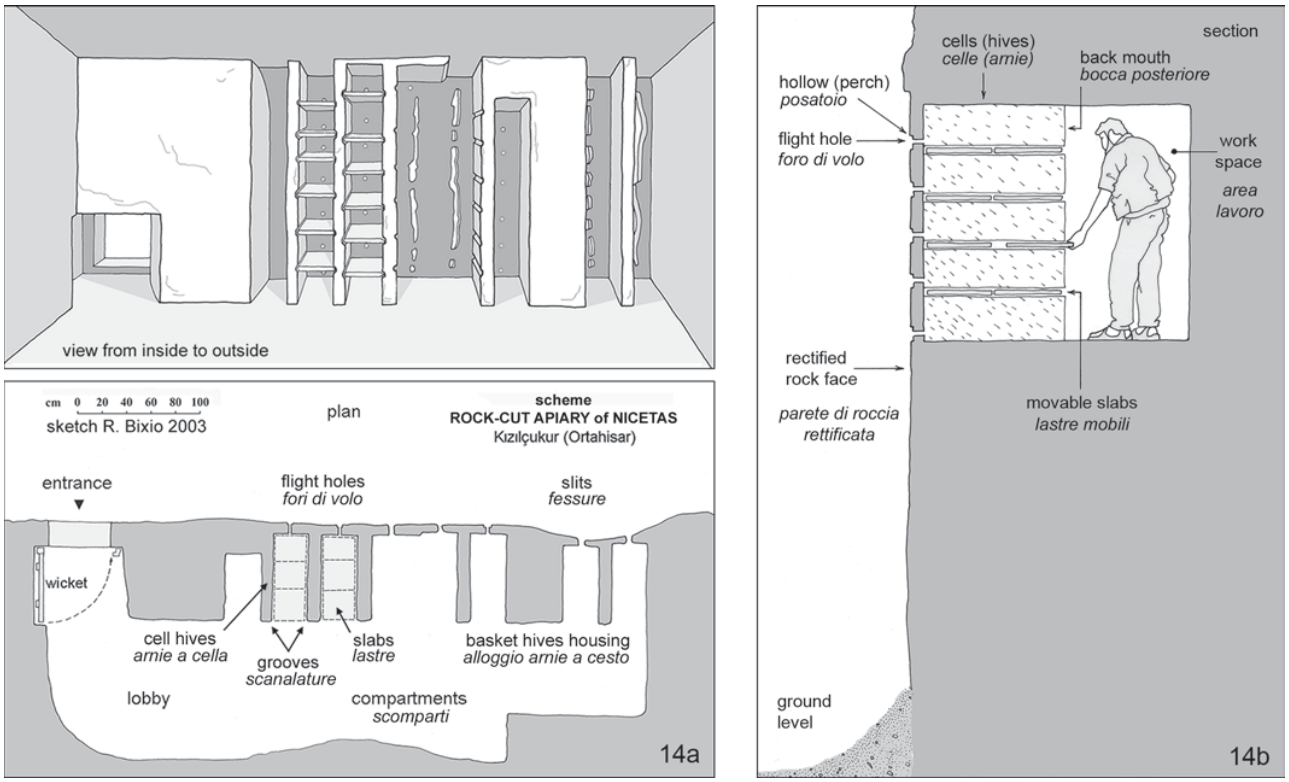


Fig. 14a, 14b – Scheme of the rock-cut apiary of Nicetas in Kızılçukur, right bank of Meskendir valley (drawing R. Bixio).

Fig. 14a, 14b – Schema dell'apiario rupestre di Nicetas in Kızılçukur, sponda destra della valle di Meskendir (grafica R. Bixio).

Fig. 15 – Interior of the Nicetas apiary. On the left, cells with fixed hives, three of which are still in use. In the background, the mobile tubular hives, now in disuse (photo G. Bologna).

Fig. 15 – Interno dell'apiario di Nicetas. A sinistra, le celle con le arnie fisse, tre delle quali ancora in uso. Sullo sfondo, le arnie tubolari mobili, ormai in disuso (foto G. Bologna).

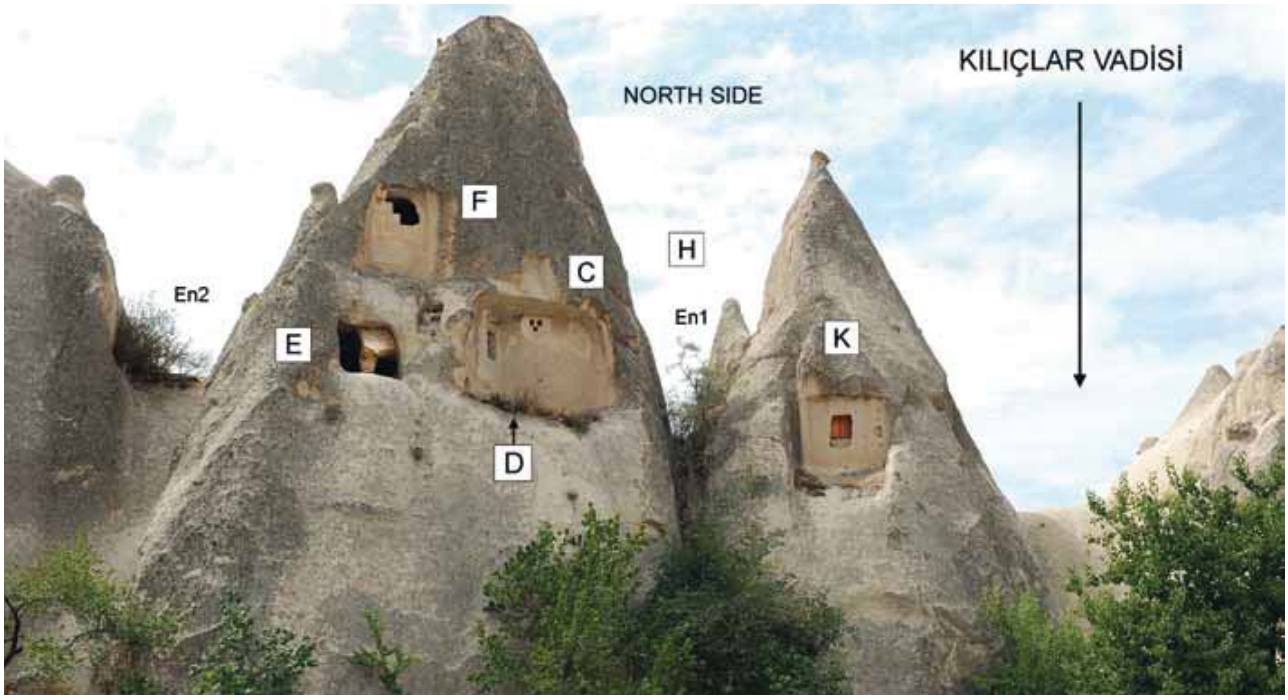


Fig. 16 – The shelter and apiary at Kılıçlar Kilise (photo A. Bixio).

Fig. 16 – Il rifugio e l'apiario presso la Kılıçlar Kilise (foto A. Bixio)

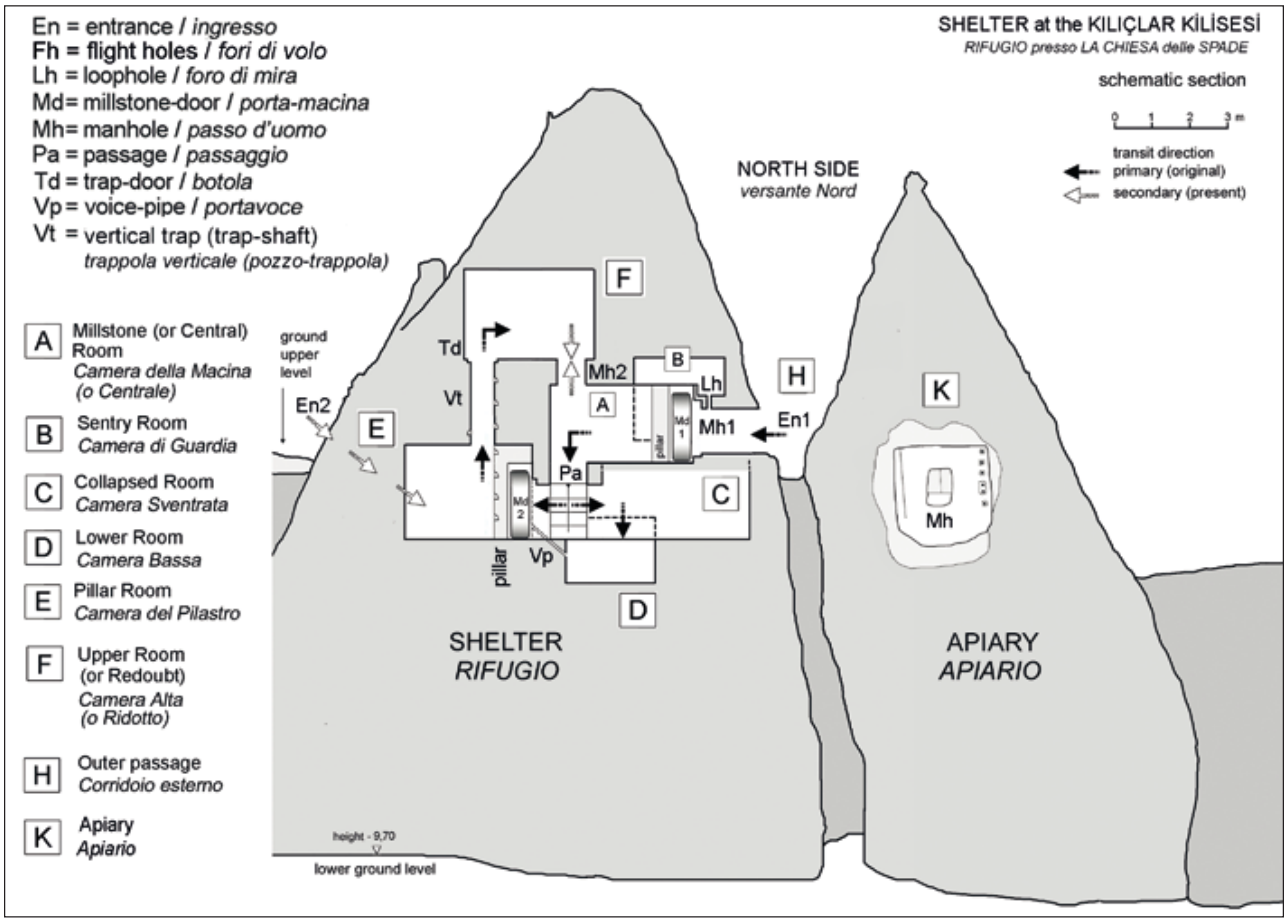


Fig. 17 – Schematic section (drawing R. Bixio).

Fig. 17 – Sezione schematica (grafica R. Bixio).

Fig. 18 – Upper mouth of a shaft-trap (photo A. Bixio).

Fig. 18 – Bocca superiore di un pozzo-trappola (foto A. Bixio).

of worship represent only the tip of a "stone iceberg"), there are undoubtedly the underground shelters.

These are structures excavated in rock formations in order to protect residents from incursions that have historically affected the region over the centuries. "*En générale* - De Jerphanion writes (1925, pp. 45-46) - *[...] ce genre de fermeture nous reporte à une époque d'insécurité. Et l'on pense naturellement aux siècles où les Arabes, maîtres de la Cilicie, avant les victoires de Nicéphore Phocas, faisaient de fréquentes incursions à travers le Taurus* (Authors's note: betweens the 7th and 10th centuries). *Derrière leurs meules de pierre les habitants des monastères pouvaient attendre, à l'abri des traits et du feu, que le danger se fut éloigné*".

These defensive works, widespread throughout the territory of Cappadocia, have in common the presence of circular monoliths, weighing up to two tons, made from stone (millstone-doors). They are placed in special manoeuvring chambers, supported by pillars or joints that prevent the overturning in case of attack coming from outside and were moved to close the entrance tunnels, "armoring" the interior rooms (figure 20). The millstones are often positioned in succession and integrated by additional devices, such as spyholes, loopholes, narrow elbow tunnels, defected emergency routes and, last but not least, vertical traps.

In some cases, despite the collapses and erosions, the configuration of interconnected systems, designed for mutual defence, is noticeable (Bixio R. *et al.*, 2015; Bixio A. *et al.*, 2018). Some reach considerable dimensions, such as the Filiktepe and Sivasa sites, west of Nevşehir, which, although only partially explored, reach respectively the extension of 1,673 m, with 55 millstone-doors, and 1,716 m, with 53 millstone-doors

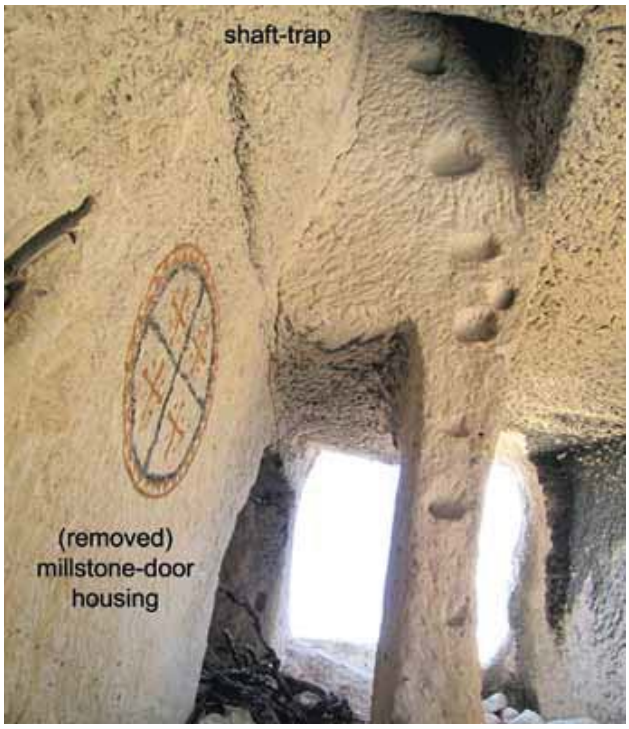


Fig. 19 – Shaft-trap seen from below (photo. A. De Pascale).
Fig. 19 – Pozzo-trappola visto dal basso (foto A. De Pascale).

(Bixio R., 2012). These shelters essentially develop horizontally, but others, generally smaller, have a vertical configuration, with overlapping levels communicating by means of narrow and high vertical passages that served as traps (figures 16, 17).
In summary, the shaft-traps were intended to provide further defence, in the event that the millstone-doors downstairs had been forced, allowing residents to retreat to an upper chamber for the last shelter (redoubt). The shaft was climbed by means of footholds carved into the walls, or with ladders or ropes that were then withdrawn from above, anchored to dedicated rock rings cut in the ceiling (figures 18, 19, 21).
We can imagine that the assailants, in their turn preparing a system to climb, would have been under the vertical of the shaft, exposed to the launch of projectiles; these could also consist of simple stones specifically stored in the redoubt. Even if they were able to start the ascent, they would have to proceed one at a time, in opposition and with their hands engaged to support themselves, therefore always at the mercy of the defenders. Moreover, in several cases, the upper mouth of the trap is finished with a frame carved into the rock useful to house a horizontal wicket to close the passage as a last resort.
We cannot exclude that the shelters, considering the great quantity and a remarkable design similarity throughout the Cappadocia, are the result of the in-

Fig. 20 – St. Eustachius shelter. Millstone-door and support pillars (photo A. Bixio).
Fig. 20 – Rifugio di Sant'Eustachio. Porta-macina e pilastri di sostegno (foto A. Bixio).

tervention of a population largely formed by soldiers who, even before the beginning of the Arab raids, had been assigned lands with the commitment, extended to their descendants, to defend them (Thierry, 1971, pp. 129; Runciman, 1997, pp. 47-48). Certainly these soldiers, and the peasants employed by them, possessed the mentality and technique to plan appropriate underground fortifications.

In the specific site of Göreme, apart from the extraordinary concentration of religious works listed above, at the time of De Jerphanion (1925, pp. 45-46) only three defence devices were reported, to which another was added in more recent times (Lucas 2003, pp. 36-37). It was thought that, given the special attention spent on the site by many researchers who have succeeded in this long period of time, there was no possibility of further significant discoveries. So surprising, was the identification, in recent years, of another fourteen underground shelters, previously unknown (yellow icons in figure 5).[2] We also believe that, as already argued for apiaries, as a result of further investigations, the number may still increase. We note that most of these works are set on overlapping planes with ascending trap-shaft.

From the symbols shown in the map it is immediately evident that the rock-cut apiaries are located in an area largely coinciding with the refuges that result in having the greatest concentration at the highest church density. At least in four cases shelters and apiaries are particularly close. The most significant is that of the "concentric shelter" at the Kılıçlar Kilise, no. [29] (Bixio A. *et al*., 2017/b): here the shelter is not only adjacent to the apiary, but there is a good chance that, originally, it was directly reachable by means of a ledge which later collapsed (figures 16, 17).

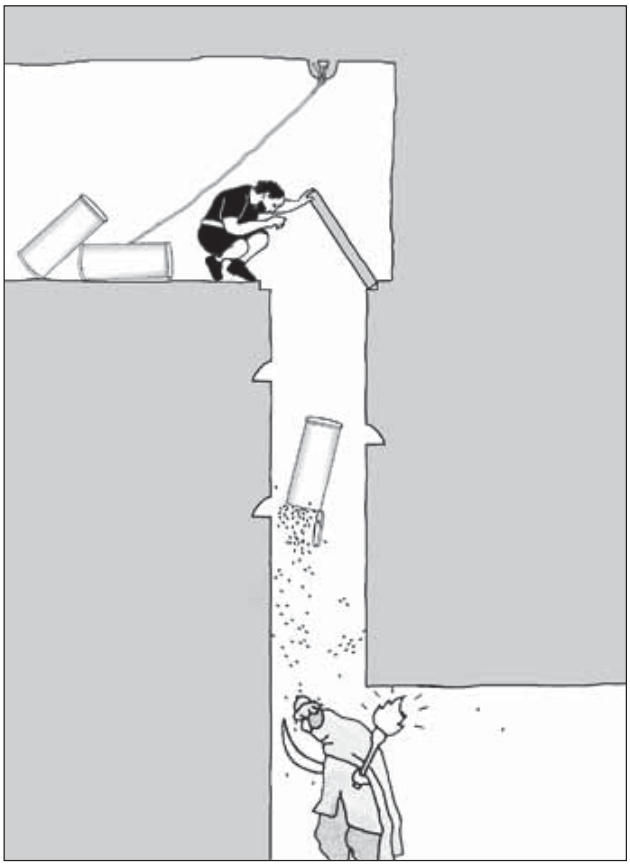


Fig. 21 – Reconstruction of a possible use of bees in the defence of a shaft-trap (drawing R. Bixio).

Fig. 21 – Ricostruzione del possibile uso delle api nella difesa di un pozzo-trappola (grafica R. Bixio).

Bees as a defence?

In consideration of the arguments outlined above regarding the function of the shaft-traps for the defence of shelters and their proximity to the apiaries, we believe that the suggestive hypothesis of the use of bees as a defence weapon should not be discarded. In fact, after throwing the hives (previously taken from the apiaries) into the trap and closing the trapdoor, the assailants would have been attacked by swarms of bees, with even deadly effects, while the defenders would be safe. As anticipated, we note that the shape and size of tubular hives, still available today in some apiaries, would have been particularly suitable for insertion into the shafts (figure 21).

This hypothesis is corroborated by some indirect sources: "The use of animals as a military weapon, particularly the sting of bees, doesn't consist an invention of the Middle Ages. It is traced as early as the Biblical times. First references are recorded during the Roman campaigns in the region of Pontus, while the lethal biological weapon of bees was further developed as a method of defence and attack mainly in the West, and especially during the Crusaders' sieges. In all probability, Byzantium employed biological weapons, including bees, following Roman practices" (Germanidou, 2013, pp. 91-104). Indeed, the use of bees and other animals is attested during the Roman wars. For example, Bonetto (1997, pp. 356, 392 note 66) cites the late Greek classic author Enea Tattico (*Poliorketkà* XXXVII: 1-4, about 360 BC, in Bettalli 1990) who, in describing the strategies adopted during the sieges, argues that to stop the attacks launched through the underground tunnels the besieged dug real countertunnels in which various tricks were implemented, including the introduction of bees and wasps.

Moreover, Bonetto adds that: "[...] during the siege of Lucullus at Themiscyra in Asia Minor during the Mithridatic wars (72 BC) [...] they were introduced into the attack tunnels, through holes made from above, even bears and other fairs besides the more usual swarms of bees" (Bonetto 1997: 360).

[2] A significant part of the findings in Göreme was implemented between 2012 and 2014 by the team of the Centro Studi Sotterranei as part of the Italian mission "Rock painting in Cappadocia, for a project of knowledge, conservation and enhancement" and of the research project PRIN "*Arte e habitat rupestre*", directed by prof. Maria Andaloro of the University of Tuscia and authorized by the Turkish Ministry of Culture.

As argued on Germanidou (2013, p. 94), this use is also indirectly reported in the treatise *Taktika* of the Byzantine emperor Leo VI (895-907), in the chapter on naval battles: "Among these would be snakes, vipers, lizards, scorpions and other that venomous creatures. When the pots are shattered, the animals bite an by their poison wipe out the enemy..." (Dennis 2010, p. 527). Almost the same passage is quoted in Naval Warfare of Byzantine general Nicephoros Ouranos (950-1010), which in turn wrote another manual also titled *Taktika* (Dain 1937, pp. 83-84).

We do not know if this particular use of bees was applied also in the shelters of Göreme or, more generally, of Cappadocia, but, given the premises, we would not be surprised at all, although in specific historical sources, such as the military tactical manual "Skirmishing" (Dennis 1985) (or "Treaty on the guerrilla") attributed to Nicephoros Phoca, strategist of Cappadocia (and emperor, 963-969), the argument is not mentioned. But, on the other hand, there is not even mention of a phenomenon as striking as that of underground shelters, neither of the functioning of their peculiar millstone-doors: therefore, we believe it would not be particularly unusual that the usage of bees as "biological" weapons has been neglected, too.

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