Hypogea 2015

Proceedings of International Congress of Speleology in Artificial Cavities
Italy, Rome, March 11/17 - 2015

EDITORS

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SOCIETA' SPELEOLOGICA ITALIANA
ROMA SOTTERRANEA

URBAN UNDERGROUNDS: THE WORLDWIDE PERSPECTIVE

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Abstract
There are numerous man-made structures and objects to be found in the underground of contemporary cities. The underground presents a parallel world, the analysis of which helps to throw light on many aspects of the worldwide urban experience. There are common characteristics which mark the ways the worldwide populations have used the underground resources, but also many divergences. It is indeed surprising how it is frequent to find more numerous identifying aspects of the worldwide urban attitude in the use of the underground than in the use of the corresponding surface areas. The underground is often the result of the employment of over-ground development skills being utilized below ground: it is a fact that the idea of a negative building culture became very popular in order to resolve problems caused by common social and climatic conditions, such as defence from the harsh climactic conditions, communication, religious practice, scarcity of resources, etc. In these cases, the dominant local building know-how was reconsidered and new underground building skills were adopted. Thus, the underground architectures of diverse geographical locations have much more in common than their corresponding above-ground architectural styles. The variety of uses of the underground to support urban development is so vast that the locations are categorized by their function: stone-age, caved and cliff dwellings, religion, safety.
Keywords: underground, urban functions, world cities, underground identity.

Riassunto
Il lavoro esamina il ruolo rivestito dal sottosuolo nella gestione delle criticità urbane superficiali in un'ottica di lunghissimo periodo e in una prospettiva globale. Si esamina quali funzioni urbane sono state storicamente gestite in sotterranea con l'obiettivo di verificare se questa attitudine abbia assunto dei caratteri identitari che la caratterizzano indipendentemente dall'esperienza urbanistica superficiale.
Parole chiave: *sottosuolo, funzioni urbane, città del mondo, identità sotterranea.*

The overturned approach

What is the role of the underground in contemporary urbanization? Which functions and systems of urban life have historically been carried out below ground level as vital support for everything that happens at the surface? Which technical instruments and scientific competencies have enabled the underground to supply the solution to so many of the limitations to urban development posed by level 0? What is the role of the underground in the environmentally sustainable city? Can a universal approach which overrides regional identities be identified in underground construction, and if the answer is 'yes', what are the shared elements of such an approach to this particular category of development?

In order to find satisfactory answers to these questions, the underground has been the object of a comprehensive global study, spanning a very extensive timescale. The research has been gradual and methodical, departing from the identification of an interdisciplinary method based on the analysis of heterogeneous sources, which provided an initial functional classification. The city of Naples was the physical location of the analysis. The choice is particularly significant as the life and development of the underground of this city are probably, more than any other metropolis, so archetypal. The case of Naples has been considered together with a wider observation of urban sustainability from the historical and environmental points of view (Corona, 2001). This approach, along with those offered by the study of underground infrastructures in contemporary urban development (Melosi, 2000), has generated an effective method of research; moreover, specifically indicative urban functions for the aims of the study have been pinpointed (Varriale, 2009). The research was then extended to other European cities as far as the former Soviet block (Varriale, 2010). The subsequent phase touched the Mediterranean Basin, wherein the identifying characters of the underground urban experience have been established as confirmation of the initial hypothesis of the study (Varriale, 2014).

As the geographical reach of the study extended and as research uncovered differentiating urban features and functions in each new city observed, it became ever more evident that those geographical differences which are ever the focus of historical and geographical debate (AISU, 2014) and so obvious in surface development, became less and less defining in the use of the underground. Indeed, common traits became discernible. On the basis of the theories developed regarding the local area and as a verification of the above hypothesis, further study was undertaken at a global level. Many common characteristics which mark the ways worldwide populations have used underground resources are already discernible at the outset, as are the many divergences. It is indeed

surprising how it is frequent to find more numerous identifying aspects in urban development in the use of the underground than in the use of the corresponding surface areas. The underground is a sort of negative expression of the over-ground, being often the result of the employment of over-ground development skills utilized below ground. It is a fact that the idea of a negative building culture became very popular in order to resolve problems caused by common social and climatic conditions such as defence from the harsh climactic conditions, communication, religious practice, scarcity of resources, etc. In these cases, the dominant local building know-how was reconsidered and new underground building skills were adopted. Thus, the underground architectures of diverse geographical locations have much more in common than their corresponding above-ground architectural styles. Looking for the underground identity, five distinct urban functions can be found: stone-age, caved cities and cliff houses, religion, economy and finance and self–defence. The clearest and most interesting sites existing globally have been examined on an extended timescale to pinpoint any possible similarities in the way in which the underground has been employed to solve problems of surface development**.**

Stone-age

The history of the relationship between underground, urban development and natural resources is ancient: the passage from nomadism to stationary settlements has been worldwide marked by the progressive transformation of natural caves into places of permanent shelter.

Initially the caves were open, and often only a fire marked the boundary between the outside and the inside. As there are no existing ruins of building structures to bear witness to the use of underground spaces, the only available evidence is to be found in the wall paintings. Various scenes of animals and diverse sequences of footprints, hunting scenes, religious rites and scenes from everyday life were engraved or painted onto the bare or purposefully polished rock with organic based colours. However significant they may be, these sites are not always protected or valued as they should be. The markings on the walls in caves used for shelter indicate that right back to the days of the Stone Age the underground has served a specific purpose.

The El Castillo (Spain) cave (a UNESCO site since 2008) is currently considered the oldest artificial cavity in the Mediterranean basin (Pike et al., 2012), and is generally held to be the actual location of the passage from nomadism to settled cave dwelling (Callaway, 2012). The traces on the walls of the cave can be dated from 37,000 to 20,000 years ago. The oldest caves reveal the somewhat symbolic gesture with which our ancestors stencilled their handprints onto the cave walls. Also dating back to the same era is a series of red circles marked along the corridor of the cave. It was only in a much later period (20,000 years ago) that the cavemen began to decorate the walls of their shelter with pictures of fauna: goats, bison, dogs, horses, deer and even mammoth.

Handprints - a seemingly typical way of claiming the underground space - reappear in the Cueva de las Manos (Argentina), in the opposite hemisphere. These drawings, recently brought to the attention of anthropologists (Snow, 2013), have been attributed to the female of the species thus implying that the role of "housekeeper" or should we say "lady of the house" has its roots way back with the earliest settled populations.

The Cueva de Altamira (Spain) is a natural cave, inhabited as from the earliest years of the history of mankind. Traces of the succession of human inhabitants have been conserved on the walls and recent studies date the earliest pictures to some 35,000-25,000 years ago. The power of these paintings featuring bison, horses, deer, wild boar and so forth to the most recent images of goats and handprints have given the caves worldwide notoriety as the "Sistine Chapel of Prehistory" (Curtis, 2006). The images on the untreated walls, which convey an extraordinary 3D effect, tell the story of peoples who settled in the spot where primary resources were most abundant. They tell of a dwelling place by no means casually fallen upon but, to the contrary, chosen in a strategic place, rich in fauna for food from the valleys of the surrounding mountains; the very fauna which had used those same caves for shelter. Since their discovery, they have been a destination for tourists from all over the world and many artists have been strongly influenced by them. Pablo Picasso, after a visit there exclaimed "After Altamira, everything is decadence!" (Clottes, 2003).

The Chauvet Cave (France) was, until a short while ago, deemed to be the oldest cave found in the Mediterranean area (Coye, 2011). Independently from this record position (later lost to the Spanish caves), the paintings which decorate it are of such an imposing nature that they render it quite unique. It is even more singular because of the figure of the horse, the principal element around which the rest of the cycle rotates. As man's working companion *par excellence*, the horse, the driving force of multiple production processes, the primary source of energy and an excellent source of locomotion, was truly celebrated in underground cave art as from the very beginning of man's settling.

The Lescaux Cave (France) constitutes another wonderful underground site that reveals something of the earliest relations between the underground and residential functions (Coye, 2011). The caves are the most famous of their type and have featured on the UNESCO site list since 1979. The wall paintings dating back to some 20,000 years ago depict the variety of local fauna on which the local population depended for sustenance. The passage to the representation of rituals not strictly linked to surviving practices is celebrated in Italy in the cave of Addaura (Varriale, 2012). Their depiction of human figures and animals in a ritual dance mark the appropriation of caves as places where a social life is celebrated and not only the rituals of subsistence. It may be exaggerated to see these as depictions of religious rites. For this reason the caves are categorized as being of the Stone Age period, however their uniqueness would warrant their listing as a UNESCO site.

Caved and cliff dwellings, the extreme underground living space

Sometimes the underground experience was extreme and the *below 0 level* was itself the place where urban life took place; this extreme urban experience is typical in itself and independent from urban development on the surface level.

There are two different types of underground development, both of which are interesting from the point of view of their optimization of available resources and in their role of sustaining overall urban development. The first (cliff dwellings) sees the occupation and modification of natural recesses in cliff walls. Here, the fragile construction or excavation work, mostly carried out using autochthonous materials, is protected within the shelter afforded by the caves themselves. These dwellings demonstrate how human ingenuity has, investing relatively little energy, worked to modify natural spaces in order to create protection from temperature change and the winds. The second type of dwelling (real cave dwelling) is what is referred to as the negative construction. This type of dwelling turns rules of engineering on their head and actually boasts a series of unique elements, as far as sustainability and urban expansion are concerned. This concept, even it stretches far back into antiquity, is actually being revisited as the new frontier of contemporary engineering because it allows for the extraction of material, with the cave or quarry itself then becoming the result of the process, in contrast to the first mentioned type of cave. Both cases, however, represent technical solutions to the problems which harsh natural surroundings present.

The practice of cliff dwelling is found across the globe and is therefore a characterising and valid example of development below ground: the Mesa Verde village (USA) is the result of a combined project aimed at economizing available resources and maximizing results in energy consumption terms. It is, in fact, the first example in the history of urbanization whereby the technique called 'passive solar design' has been employed by contemporary architects (LEA, 2010). Such building technique was developed in the face of impediments posed by the terrain and is similar to that of the Bandigara Escarpment in Mali (VAN BEEK, 2005). Cave dwellings, however, remain the most characterizing manifestations of underground systems for settled dwelling: in this type, the traditional building concept is inverted in as much as it relies on quarrying and removal rather than construction. This strategy became necessary in order to solve problems regarding safety, adverse climactic conditions or lack of water. The urban functions of the underground vary from one area to another but nearly always provide solutions for dwellings and shelter and always prove to be among the most environmentally friendly models of urban development and management of water and energy resources (VARRIALE, 2012).

In Matera (Italy), the Sassi districts originate from a troglodyte village, considered to be one of the first human settlements in Italy. The construction of Sassi reflects the progressive transformation of natural caves into closed caves and then into *lamiones*. The various levels of these single dwellings has over time created an urban landscape of underground habitations and cisterns, the complexity of whose structure can only be fully appreciated when observed in section. These caves are believed to have been inhabited since Palaeolithic times and the earliest findings date back to the VIII century BC. The demographic rise and the socio-economic decline of the area turned these dwellings into the socio-environmental disaster described by CARLO LEVI in his work *Cristo si è fermato a Eboli*. Following the success of this work and much consequent political pressure the Sassi were finally, definitively evacuated. In the 1980s, recovery of the site began and in 1993 the *Sassi di Matera* were granted UNESCO status as a World Heritage Centre.

The site of Guyaju (China), which was until recently kept in obscurity by the Chinese because of the extreme poverty of its underground inhabitants, has only in present times been given serious attention as it is now perceived as an example of settlement in the face of very difficult environmental conditions (HANG-KEY, 1990).

The debate over the recognition of the significance of caved cities is ongoing. Besides Cappadocia (Turkey), which has created a flourishing tourist industry around its underground sites, there are other sites too, which are battling with the threats posed by encroaching development. In Turkey again, but further into the Caucasus region, is to be found Hasankeyf, the cave city built into the walls of the canyon through which the river Tigris runs. Hasankeyf is in some ways unique among underground cities but at the same time it has many of the common identifying features of other cave sites. It was indeed one of the first fluvial cities and since its earliest development it has been continually inhabited. Hasankeyf preserves traces of all the civilizations and dominations which have colonized it: Byzantine, Arab and Ottoman. Along the walls of the canon are to be found cave dwellings which, when counted in with those situated in the little citadel, total some 5000-and these were inhabited right up until 1966, when the inhabitants were forced by the President Sunay to relocate for reasons of public decorum. Despite the cultural significance of the site and its patrimony, Hasankeyf risks being destroyed by the building of a dam which would result in it being completely submerged. There are plans for a huge hydroelectric plant at Ilisu, some 97 km away, as part of the Southeastern Anatolia Project which should supply some 2% of the entire Turkish energy demand. This plan will not only destroy the 300 fluvial sites along its path but it will also reduce the water supply to Syria and Iraq; an action which cannot but exacerbate the current conflict in these regions (HARTE, 2014). Even if the site was only partly submerged (TASTEKIN, 2013), the river front, the most significant area from the historical and urban point of view and that of the cave dwellings, would however be destroyed. It is indeed a very controversial plan, which actively involves many of the local inhabitants who will be forced to relocate against their will, and who are mobilizing to cries of

'Keep Hasankeyf Alive'.
In addition to those sites whose future lies in their cultural recognition, is to be found the village of Kandovan (Iran). Kandovan is kept alive by its 670 inhabitants who continue in the millennial tradition of cave–type living, reaping the benefits offered by the thermal protection of the rocky material into which the dwellings are excavated. Only recently has a cave hotel been opened (The Laleh Kandovan Rocky Hotel) to accommodate the ever more numerous tourists who visit, while the life of the settlement continues as usual along the narrow rocky stairways among the dwellings. Kandovan has indeed been the starting point of a recent study into vernacular architecture and how it optimizes the use of natural resources in urbanization. *"In vernacular architecture everything is inspired from nature, therefore, design principles are also based on nature"* (Yasaman, 2011). The natural elements which are dominated in this type of architecture are the direction of the sun, the wind, humidity, air pressure, temperature and rain fall. These factors do not only determine the initial development of the settlement but also its evolution. At Kandovan, the ongoing adaptation to environmental factors is evident; over time the E-facing side of the settlement which was originally developed has been subsequently gradually abandoned due to its excessive exposure to the sun (Yahyavi, Shaghaghi, 2012). The openings also represent a compromise between the necessity for light and air, and control of the temperature. Likewise, the division of the internal spaces into chambers, residential, service and productive areas and in many cases into stalls for animals, is a result of the prioritization of the needs of the inhabitants (Yasaman, 2011).
The wisdom of those who developed these dwellings and the particular criteria and autochthonous materials employed have proved to be the greatest success in overcoming the difficulties posed by such an extremely hostile climate (Oliver, 2006).
On the opposite shores of the Mediterranean is to be found, in a similarly difficult terrain, another example of underground development which denies the identity and limits typical of surface development: Shawbak (Jordan). It was discovered during the course of five expeditions from 2006 to 2010, but the research necessary to classify the site within the patrimony of Mediterranean underground developments is far from concluded (Burri et al, 2012).
The entire cave settlement depends on the crucial relationship between the settlement and its access to the water source, managed underground using a method called the *qanat*. This system made it possible to distribute water underground in an area of extremely dry climate.
Many other daily functions were carried out exclusively underground, from religious ones - places of prayer as well as burial - to cave painting, as seen from the outstanding wall graffiti; from dovecots to hanging terraced gardens for the cultivation of autochthonous plants; from stables for animals to storage for forage and food. The underground organization is as fascinating as it is complex, all accompanied by refined wall paintings and protected by imposing fortifications. Not all these functions were contemporary in the history of Shawbak, however. The site has undergone various transformations from its earliest days (calculated as being between the XIII and XIV centuries). Over time, the various spaces have been used and reused making this location an extremely interesting microcosm for the study of the allocation of resources and the transformation of urban areas prevalently in the underground.
The discovery of Shawbak came about thanks to a fortuitous event: a landslide along one of the rock faces uncovered some ruins which immediately excited the interest of experts. Fortunately this discovery occurred in a moment of great interest and attention to archaeological findings and the optimum state of the site discovered made of it a great opportunity for the analysis and evaluation of the cave cities of the Mediterranean. It is auspicious that the hard work of the archaeologists involved in the study and evaluation of this extraordinary site should be given the level of support required in order that it may be collocated justly in the cultural patrimony of the Mediterranean basin.
Not far from Shawbak, is Petra, one of the best known cave cities in the world, a UNESCO protected site since 1985, nominated among the seven wonders of modernity. Its uniqueness consists of it being an urban centre whose development has been extended underground as a way of overcoming the difficulties to construction of critical factors posed by the terrain: lack of water, a torrid climate and problems of safety.
As well as the well-known sites which are now destinations for tourism there are others which, although nearly unknown, share the same characteristic features. Gondrani (Pakistan) which is still undergoing archaeological research is the underground solution adopted in the VII century A.D in an area which was under strong Buddhist influence. The site of Vardzia (Georgia) has other origins but once again is a solution to the difficulties to construction posed by the surrounding environment. The monastery of Vardzia is in fact a medieval village built on orders from the Royal family in defense against the strongest wave of Mongol invasions that Europe had ever seen. Vardzia is built on 13 levels with 6000 apartments. Its uniqueness is in its underground access and the cultivable terraces which complete the urban development, guaranteeing autonomy of resources.

Religion

Urban underground spaces have always been used for the practice of forbidden religions, to bury or to preserve bodies, to erase the effect of mortality from the surface of the cities or to act as a passage to the world beyond.
The underground most classic use is arguably as a concealed place for religious ritual and as burial grounds. To support this theory, the parallel cases of extremely different cultures, from the E to the W, have been studied.
The Chinese Terracotta Army is undoubtedly the

most important example in the Oriental world of the symbolic role of the underground in the passage from life to death. It is an imposing collection of life-sized sculptures (Komlos, 2003), 7,000 of which came to light during an archaeological dig following the first discovery in 1974. They are a perfect reproduction of the troupes of Qin Shi Huang, the first Emperor of China who came to the throne in 221 B.C. at the age of 13 and died in 210 B.C. The army was symbolically buried together with the emperor to accompany and defend him on his journey towards the afterlife. Recent excavations with the important aid of new, non-invasive technology have occasioned the discovery of an underground chamber with vertical access which, it is hypothesized, will be the burial chamber for the soul of the emperor.

The undertaking which employed the skills of some 70,000 artisans is absolutely unique, not only because of its enormity but also because of the quantity of detail in the anatomical sculpting of each of the figures. As well as individual physical attributes also personality traits and different positions are worked into the sculpture. Another extraordinary fact which makes the discovery so fascinating is that the whole site lay hidden and untouched for more than 2000 years. No written text mentions it. It seems as though the Emperor was swallowed up into this final resting place together with all those who had any knowledge of it. This unusual circumstance has led architects to question how no mention nor even legend of such a place has ever circulated or been made known. The discovery of burial chambers for all those who witnessed the construction of the site, along with communal burial pits where all the artisans who had worked on its realization ended up, partly explains the dilemma. Recent discoveries have brought to light the system whereby those involved in the work were, on entering the site to work, closed into the underground by means of bars for the rest of their lives.

The site of Xi'an (China) is therefore a place not only of symbolic and religious value but also a place where absolute security is guaranteed by violent, forceful means and where the eternal repose of the emperor was protected by the extreme sacrifice of all those involved in ensuring it. The decision to interrupt the excavations and leave the underground itself to safeguard the relics of the past makes this site one of the major attractions to tourists in China as well as a symbol of the battle against the damage caused to archaeological remains by their exposure.

That the underground is the best place to safeguard relics from the past has always been of common consent: no trace has yet come to light of the two Emperors who followed Qin, of whom descriptions of the funeral corteges have been recorded in texts of that time. However, traces have been found of the fourth Emperor, JingDi, who died in 141 B.C. He also decided on an underground sepulture and his own terracotta army. This site also remained obscure until the 1980s when it was quite fortuitously discovered. The place of sepulture is a veritable underground pyramid, very similar to the one he had made for his wife. The central position of the corpse with respect to the funeral dowry and the accompanying army is evident because of the different sizes of the statues of the warriors, varying from 70 to 90 cm; among them are various female figures of unclear function, and various small animals. It is supposed that the diverse dimension and composition of the entourage of the corpse was witness to a rather more peaceful lifestyle than that of his predecessor.

Another important use of the underground for religious purposes is again seen in China in the caves of Maijishan. This architectonic cave development comprises 7200 sculptures of Buddha and 1000 m^2 of murals, painted vertically, all dating back to the late Qin period (348-417) before the arrival of Buddhism in China. Initially, the religious role of the caves was for rituals and only following the Indian and Afghan influence did the formation of the complex acquire its final layout. Its period of splendor is to be related to the life of the monastic community founded between 420 and 422 B.C and the fact that it is situated along the E- W trade route. Alongside the representations of the monks are to be found classic figures of Buddha which hint at that the alternations of religion carried out underground correspond to the changes of dynasty. The history of an area which was always a political hotspot and a crucial point for commerce and culture can, to a certain degree, be read through the history of these caves.

The close relationship between the use of the underground for religious purposes and the Chinese trade routes is made clear in the caves of Mogao (China), along the silk route. Mogao is a magnificent development constructed between the IV and XIV centuries; its history spanning some 10 dynasties. The 45000 m^2 of mural paintings and more than 2000 colored statues, along with the cave development along the Mingsha Mountain make it the greatest Buddhist treasure in the world, as well as its being the place where the Dunhuang archives are conserved.

Western religious ritual, too, avail of the benefits of underground. This is, in fact, one of the common factors of different religions, much more so than another to be found in the 'above ground' experience.

Southern Italy has been object of study as a clear example of this parallelism; Naples (Italy) can be considered the first location of specific interest. In fact the long-standing capital of the Kingdom may be considered an archetype of an underground city, as far as religious practice is concerned. In order to make this unequalled cultural heritage accessible, an underground trail, the Holy Mile (Iaia, 2009), was created, winding through the underground religious sites of the city. In Naples the practice of burying the dead started during the period of Magna Graecia when tombs where dug out of the hills surrounding the city, in the area known as *Extra Moenia* because it was located outside the city walls. Later, this area underwent extensive urban development and the tombs were mostly absorbed by the urban architecture. Many of the numerous underground Greek settlements in the hills that surrounded the urban nucleus were submerged by mud and debris during periods of heavy rainfall. When,

over the centuries, these areas were finally uncovered many were ransacked of all remaining objects and ornaments. Fortunately people tend towards a very different attitude today and the only recently discovered underground settlements are of great interest both for their scientific significance and for their value to tourism. Examples of such situations are to be found in the underground settlements of Togati and Melograni which have featured on the cultural circuit only thanks to the work of the *Celanopoli* association and which have not yet been brought completely to light due to a lack of funds (Colussi, Leggieri, 2009).

In Naples during the Roman Period, catacombs were built next to the underground settlements. The most fascinating are the Catacombs of San Gennaro, named after the patron saint of the city. The catacombs are an articulated structure stretching from the hill of Capodimonte as far as one of poorest neighbourhoods in the city: *Sanità*. Today the combination of a modern lighting system combined with the presence of contemporary art displays has meant that this important element of artistic and cultural heritage has become more attractive to the general public.

Later in Naples, during the Middle Ages, the Dominicans created underground galleries for both burial and veneration of the remains of the deceased. In the Catacombs of San Gaudioso, the Dominican monks carried out a strange burial ritual: the corpse was lowered into the underground galleries through a hatch, placed in a *loculus* for the drying process and finally, if the deceased was famous or had held a prestigious position, the skull was cut off and hung on the peripheral wall, above a picture depicting him/her dressed in clothing in keeping with his/her occupation or his/her social role in life. Only on one particular occasion were the bones of various bodies combined with artistic elements to create one skeleton that was then hung at the entrance of this unusual underground gallery. The Fontanelle Cemetery, in the most popular area of Naples, symbolizes another milestone in the link between religion, afterlife and the Neapolitan subsoil (Esposito, 2007).

Here, victims of urban epidemics, which afflicted the city during the Modern Age, were buried. This mystical place is an old tuff cavity carved out in order to provide building material during the previous centuries; later, it was gradually filled in with the remains of hundreds of thousands of unfortunate victims from the various Neapolitan plagues. Over the following years, some remains were used to decorate altars whilst others were used by the faithful as a means of communication with the afterlife. Amongst the inhabitants of Sanità, adopting a skull was a very common practice and it transformed the aisles of the cavity into an exhibition of showcases of various shapes and sizes; today this practice has been stopped after intervention by the church authorities. Nevertheless, careful restoration by local authorities has meant that the fascination and mystery of this sacred place continues to attract visitors from all over the world.

The cult of the souls of the dead is not exclusively Neapolitan: the Capuchin Catacombs in Palermo (Italy) date back to 1599; it is the place where local priests started this practice by mummifying a holy monk in order that all could see and venerate his remains after his death. From that day on the practice was continued for the rich and famous. It is a touching experience to visit this underground cemetery and observe that all the mummies are fully dressed. The most famous mummy on exhibition is Rosalia, clothed in her pink celebration gown and seems to be sleeping peacefully.

Again in S Italy, in the area between Apulia and Basilicata, there are hundreds of cave churches which confirm the role of the underground for religious purposes (Bertini, Varriale, 2010). The cave churches, something between hermitages and refuges were built by a series of religious orders which followed one another between the VIII and the XV centuries. First the Benedictines and then the Basilian Monks, refugees from the iconoclastic laws, excavated and built underground areas giving rise to fascinating places of cult and religious worship where wall paintings were employed as a testimonial of their appropriation of these cave as a continuity of their tradition in Turkey. These locations have yet to be completely mapped: those in the Sassi at Matera (155 classified) were listed by UNESCO in 1993 together with the entire cave complex, whilst the Apulian caves have only featured on the official list of the World Wonders Project since 1998. It would be most useful if the entire complex of cave churches in S Italy could be featured as an autonomous site. A definitive dated classification and a complete itinerary would allow this part of Italy to obtain the international popularity and scientific relevance that it truly merits.

The remaining site in this section is the complex of the Cimitile basilica, N of Nola, in the province of Naples. An analysis of this complex of caves on the one hand demonstrates the crucial role of religion in a clear understanding of urban dynamics in the Mediterranean and on the other, emphasises the need to protect and maximise as examples the value of this and similar sites which are too often neglected and left unprotected from damage and technically unsolicited intervention.

The site is fruit of 2000 years of uninterrupted use of the area for religious purposes (Ebanista, Fusaro, 2010). The first traces of colonisation of the area date back to the IV century BC, however the use of the site for religious functions follows the burial of the remains of the priest Felice in the III century AD. From that time onward the destiny of the site was that of a noticeable development for religious reasons from its paleo-Christian beginnings until its XVIII century basilicas - which grew alongside the commercial developments due to its collocation along the principal transport route of S Italy: the "Strada Regia". The underground shows evidence of being a destination for pilgrimages; of the many times it was damaged by natural disasters such as floods, earthquakes, volcanic eruptions and collapse, yet just as many times rebuilt; of the increasingly central position of the religious complex with respect to the surrounding urban development. It is indeed a great cultural asset which has been open to the

public since 1985 but which still awaits the necessary investment and restoration in order to maximize its cultural value and potential for tourism.

Safety

The underground is a perfect place to shelter against danger and also to hide secrets and goods. It can represent safety when escaping from threat or extreme condemnation when used as a place of reclusion; underground tunnels can be used as secret or emergency, undisturbed access or even unlawful access. The ambivalent nature of the underground between legal and illegal was well-known in the worldwide cities throughout history, many traces of which have been left behind.

During the medieval period the underground was the protagonist in the prison system, especially during the Spanish inquisition. The punishment for heresy frequently consisted of isolation of the prisoner in the underground. Saragoza, Barcelona, Valencia, Sevilla or Cordova (Spain) all have underground itineraries wherein the remains reveal much of that historical period and the barbarous tortures inflicted in the name of faith.

Imprisonment in the underground was reserved for the most serious crimes and the structure of castles and fortresses often reflects this. Manor houses and churches in medieval times concealed secret passages and chambers, and those hidden and dark places which were emblematic of that era, today are of great curiosity and fascination to visitors.

In some cases only written reference exists. In Turin (Italy), there are traces of what must have been a high security place of detention in the Carcere della Cittadella (Toppino, 2012) but it is more common to deduce pieces of urban history from the physical structure of the older buildings.

In Florence (Italy) the oldest prison of the City of the Giglio was the Burella, which has even gained a famous citation: the underground jails of the ancient Roman amphitheatre which was discovered in the medieval period, are cited in Dante's Inferno (XXXIV Canto) as a place of extreme suffering. It was there that the outcome of the fratricide war between Guelfs and Ghibellini was played out and more than 740 Ghibellini prisoners were captured and imprisoned, in the bloody battle of Campaldino in 1289. The Bellanda were other Florentine prison cells which were considered so unhealthy and inadequate to ensure detention, even by medieval standards, that they were closed down (Uccelli, 1865). The medieval period was slower to die away in different areas and its passing was much marked by the abandoning of the underground prisons. In the Kingdom of Naples the various stages of this development show how the concept of human rights was marked by this abandon. The reclusion in underground prison was reserved to women: in 1725 women's imprisonment underground was definitively abolished but it was maintained for men (Covino, 2006). It was not until 1820 that the legislator declared underground incarcerate and isolation to be a cruelty (Collezione delle leggi e de' decreti reali, 1820). This proviso must have been frequently ignored as it took the definitive bricking up of the underground cells some ten years later, in 1831, for humanitarian reasons, in order to bring this phenomenon to an end (Annali civili del Regno delle Due Sicilie, 1833).

The underground prisons today witness to a period in which the aim of detention was not rehabilitation but punishment. The prisons have in many cases been opened to the public as museums and their appeal makes them a useful tourist resource in towns which may otherwise be off the traditional tourist route.

As well as being a place of extreme suffering, the underground has always protected man in times of necessity: during the Second World War the underground became a crucial part of the urban wartime life. When the aircraft became a weapon carrier, the towns became strategic targets and the urban population had to seek shelter underground from the air raids.

In the Mediterranean area the phenomenon of aircraft shelters was limited to target cities such as Naples, Cagliari, and Bologna but the underground of some smaller towns such as Villar Perosa also offered shelter and protection to frightened citizens. Underground shelters ranged from private cellars to underground villages, complete with electricity and services. The history of air raid shelters is marked by situations of fear and escape but also denotes the ability to react to adversity and nurture hope for the future. Today these shelters, some of which have been turned into museums, are reminiscent of the way in which our grandparents lived and survived the war years. Naples, more than any other city, undoubtedly relied on its underground for shelter from air raids. This was because the city was a specific target of the English and subsequently the allied, air forces. Moreover, the Neapolitan underground is full of caves and cavities which lend themselves as shelters in addition to the other functions mentioned in this paper (Quaranta, 2003). There were family and communal shelters, sometimes accommodating the occupants of whole districts. Some were safer than others; however they managed to organize the spaces in order to make their occupation as comfortable as possible. In some cases the local authorities installed electricity, services and even places for religious worship. The war over, they were largely abandoned or used as illegal dumps or makeshift storage space.

It was only many years later, when the necessity arose to carry out a census of the underground cavities in the city, for reasons of public law and order, prevention of sinkholes and hygiene, that many underground shelters containing relics of life during the war were discovered. These still contained the paraphernalia of everyday life such as beds, chairs, tables and rudimentary cooking implements and more interestingly wall drawings depicting the fears, hopes, angers and passions of those who, to escape death, took refuge in the shelters. The graffiti of the metropolitan underground shelters show an aspect of history which does not usually feature in the history books; that of the ordinary folk whose lives were marked by the war experience.

A different war and another continent yet it is, again, the underground to save the day: the tunnel of Cu Chi (Vietnam) reveals the surprising backdrop to the war which witnessed the participation between 1965 and 1973 of the United States (Mangold, Penycate, 1986). The digging of the network of some 129 km tunnels was the most effective defense mechanisms against the guerilla of the Vietcong during the war. These tunnels also represent a key to the interpretation of what was to be the most frustrating and painful of the American interventions in international warfare where, on the cards, the advantage in terms of numbers appeared obvious. The excavations began in the late '40s at the time of the conflict with the French, hoping to offer an escape route from enemy troops. The tunnels were fortified in the '60s to accommodate the more consistent attack from USA. In this successive step, the old network was integrated with various functions which went well beyond being a simple passage underground offering a series of other services as well as being a hideout and a communication route. There were dormitories, schools, shops and places of entertainment ensuring that life could go on, even in times of conflict. The situation of emergency caused by the conflict occasioned incredible underground development from an architectonic point of view, but the extreme conditions soon became unhealthy with the promiscuity due to lack of space, lack of drinking water and poor aeration together with the obvious problems connected to refuse disposal. All of these resulted in various illnesses breaking out. It has been calculated that only some 6000 of the 16000 people who found the refuge survived the rigors of underground life. To the Vietcong from a military standpoint, building of this parallel reality underground was one of the most efficient defense strategies. All attempts to break into these settlements failed. The attacks on the surface were completely useless: fires lit in the jungle were ironically put out by the combined effects of the napalm, the leaf destroying chemicals and the tropical climate. Not even the incursions of the men on the ground had the desired effect. The complicated system of entry into the underground tunnels made them impossible to penetrate thanks to a careful alternation of U-turns which were impossible to negotiate with weapons of attack and above all with the physical prowess of the marines. Even the use of trained dogs had an unfortunate outcome as the refugees began to use American soap to confuse their sense of smell. Only towards the end of the conflict did the precision bombing begin but the war had already come to its tragic end, and the underground tunnels remained inviolate until they gained the fame of being the winning tactic against the invincible enemy. Today, the underground city, which is symbol of the victory of cunning use of the underground, has been transformed into a memorial park and is a popular tourist attraction, as well as being a source of national pride.

The most extreme example of a situation where the differences experienced on the surface are annihilated underground is connected to the horror of the racial persecution of the Jews during the period of Nazism, and the use of the underground as an extreme refuge which was used by both persecuted and persecutors.

It was underground that the recluses of the ghetto of Warsaw (Poland) attempted defense against persecution. They dug out a tunnel in an attempt to create an opening toward the outside and toward certain bunkers where they could hide during the sweepings. The relationship between surface and underground was so charged to have been remembered in a famous musical tribute of the Shoah: the work of Arnold Schonberg "A survivor of Warsaw", taken from the testimony of one of the few who survived the ghetto, finding refuge in the underground. This was an extreme situation where some families even had themselves bricked in to avoid deportation to the extermination camps.

The hideous situation of the deportation of 650 Italian Jews who were to leave from Milan station, coming from the prison of San Vittore on route to Auschwitz on the 30th of January 1944 was all played out underground. Platform 21 was built beneath the station, away from the eyes of travelers but connected to the rolling stock by a sophisticated system of vertical-to-horizontal interchanges, an astounding sophistication of technology for the era. This system had been studied so that the painful operation of embarkation took place removed from main traffic of the station, so as not to spark reaction or disturbance from other railway users. Once the operation of embarking had taken place the wagons were sealed and taken by an ingenious system to the surface, to then be attached to a locomotive which would transport the captives to their final destination. The wagons then returned empty. Today, Platform 21 is one of the most visited memorials and one of the reasons for this is the ingenuity employed in the underground to carry out the most horrendous aim in history.

The bunker of Berlin which was the extreme refuge of Hitler and of his faithful entourage is a perfect scene of Dante's fitting punishment. It was in this bunker that the Fuhrer took refuge during the last stages of the war, from there he guided the last attempts at organizing the delirium of his counter attack and there he opted for suicide rather than stand and be judged for his crimes by contemporary history. The history of the bunker is among the most renowned and investigated. The bunker itself is undoubtedly the most infamous underground development in the work; despite this, it is still perhaps the most shrouded in mystery (Guido, 2002; Kellerhoff, 2006). It was built in two phases on the basis of very complex plans, surrounded by underground fortifications 4 m-thick and some 8 m-deep. It could be considered the physical venue where, along with the demise of Hitler, the Second World War actually ended. But paradoxically it is the place which has most willingly been relegated to the back rooms of collective memory. There have been many attempts at its destruction mostly by the Russians during the occupation, after which followed years of abandon and the subtraction of any documentation. Only

subsequent to the fall of the Berlin wall did a move to rehabilitate the construction begin, which, far from being a celebration of Hitler's regime or having some nostalgic appeal, is today a place from whence to begin a scrupulous study of the events which overturned the world.

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