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THE «FOSSA DELLA GAROFALA» IN PALERMO: A GEOLOGICAL SITE RICH IN CULTURAL HERITAGE

ABSTRACT: ERCOLI L. & RIZZO G., *The «Fossa della Garofala» in Palermo: a geological site rich in cultural heritage.* (IT ISSN 0391-9838, 2008).

The Fossa della Garofala is a short, narrow valley, enclosed by sub-vertical banks, which was carved out by the Kemonia creek on the calcarenitic table that makes up the bedrock of the Plain of Palermo. It forms the outermost hem of the Conca d'Oro landscape where, set in an urban area, geological and geomorphological features of value join historical cultural values dating from the Punic period to the XIX century. This combination places the entire area in one of the most significant, albeit little known, pages of history: the history of traditional suburban landscape. This rare synthesis of natural and man-made landscapes offers the opportunity to create theme itineraries of great cultural and tourist interest, in a city where, like in any densely built-up area, it is almost impossible to decipher the features of the original landscape: i) a geological and geomorphological itinerary: from a marine domain to a continental domain; ii) a hydro-geological and hydraulic-technological tour: from groundwater to supply and irrigation; iii) a botanic tour: from pastures and farmed fields to pleasure gardens; iv) a historic-architectonic itinerary: from quarries to artefacts; v) materials and technology science tour for the diagnosis of building materials and their decay. For the first time, this work presents both natural and man-made landscapes together, to underline the dangers that threaten our cultural heritage; dangers which are to be referred primarily to stability conditions. It further proposes that the public, from students to the scientific community, is allowed to take part in these itineraries.

KEY WORDS: Hydro-geological environment, Man-made landscape, Cultural heritage, Cultural fruition, Palermo Plain (Italy).

INTRODUCTION

The «qanats» (i.e. ancient underground galleries), the water towers and basins in the area of Fossa della Garofala, in Via Altofonte and all of historical Palermo, that are

witness to the ancient inhabitants' awareness of the extraordinary abundance of water underneath the city, bring to mind what Italo Calvino (1972) said about Isaura: «*Isaura, city of the thousand wells, is said to rise over a deep, subterranean lake. On all sides, wherever the inhabitants dig long vertical holes in the ground, they succeed in drawing up water, as far as the city extends, and no farther. Its green border repeats the dark outline of the buried lake; an invisible landscape conditions the visible one; everything that moves in the sunlight is driven by the lapping wave enclosed beneath the rock's calcareous sky.*».

These words by Italo Calvino, one of the most important contemporary Italian authors, written about the imaginary town of Isaura, could be used to describe the environment of the Fossa della Garofala. The Fossa is a narrow, unspoiled valley, bracketed by subvertical rock walls, 1.8 km long, with the valley profile developing between 70 m and 30 m above sea level having a mean slope of 2%. This valley, situated in and around the University of Palermo's campus, is only a few hundred meters from the Norman Palace, in the city's historical centre, which has been the seat of political power since 10th century. In fact, it is still the seat of the Sicilian Regional Parliament (fig. 1).

Two landscapes are examined. The *invisible landscape* refers to the rich aquifer in the calcarenitic rock body, to the ancient underground galleries excavated to tap water and to a stream dried up by man in antiquity. The *visible landscape* is the complex historical system of water storage and distribution for sacred, domestic, irrigation and pleasure purposes, as well as the traces of the exploitation of the rock mass for the inhabitants' various needs.

Rarely is such a strict relationship between landforms and anthropogenic landscape so evident in a densely built-up area. In the Fossa della Garofala, both geological and geomorphological events and archaeological and archaeo-technological events are extremely clear, almost didactic. This is the reason why the site deserves a distinct type of tourism, through the use of thematic paths.

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GEOLOGICAL ENVIRONMENT AND MORPHOLOGICAL FEATURES

On the rocky walls of the valley, the geomorphological and geological features of the Plain of Palermo, which show the development of its history, can be distinguished. For a densely populated area that has been inhabited for a very long time, this is a rare occurrence especially where the geological features of the land have been buried under buildings. These features narrate the neotectonic and climatic events that have occurred since the Pleistocene Epoch, from the alternating marine/continental phases to the final emersion. In fact, the calcarenitic body, which is well exposed on the valley cliffs, shows both the last marine sedimentation processes that the Palermo Plain underwent during interglacial periods and the erosion processes of the valleys during the continental phases due to glaciations.

Most of the calcarenitic bedrock of the Palermo Plain probably formed during the Sicilian Age in a coastal and shallow sea environment; the last transgressive cycle in the Palermo Plain is represented by the post-Tyrrhenian marine deposits found at an elevation of 21 m above sea level in the Papireto depression, near the Fossa della Garofala (Di Stefano, 1998). The author infers an uplifting of 30 m during the post-Tyrrhenian tectonic phase. The erosive phases, due to regressive cycles consequent to glaciations, are evidenced by detrital talus and aeolian deposits at the foot of the Mountains of Palermo, by paleosoils, by glacis and by alluvial deposits (Agnesi & *alii*, 2000). The eustatic variations occurred during the Middle Pleistocene and early Middle Pleistocene - late Lower Pleistocene in the area of Palermo are evidenced by eleven orders of marine terraces, in particular the X and XI order terraces date from Eutyrrhenian and Neotyrrhenian stages respectively. The VI-VIII order terraces could be ascribable to the Middle Pleistocene marine high stand and the I-V orders could be slightly more ancient (Di Maggio, 2000).

The rocky walls of the Fossa are made up of yellow bio-calcarenite, rich in macro-fossils in concentrated «nests» and sometimes in levels. The walls have a pseudo-nodular aspect to be referred to the presence of strongly cemented masses, while the inter-nodular spaces are filled with the same incoherent, arenaceous material, that has often been removed by floating processes. Two different levels can be recognised in terms of macro-structures: the lower one has sub-horizontal stratification, which is highlighted by selective erosion phenomena which gives it a nodular layer texture, and by localised structures, caused by currents, concentrated in the upper parts; the upper one instead shows a chaotic distribution of the pseudo-nodules which indicates more variable deposition conditions (fig. 2).

The most important aspect of the continentality phases is to be found in the valley's morphology. In fact, the deep incision of the valley, in respect of the Kemonia's small watershed, can be seen as the combined effect of the lowering of the sea level during glacial periods and the progressive neotectonic upgrowing of the ground at a rate of

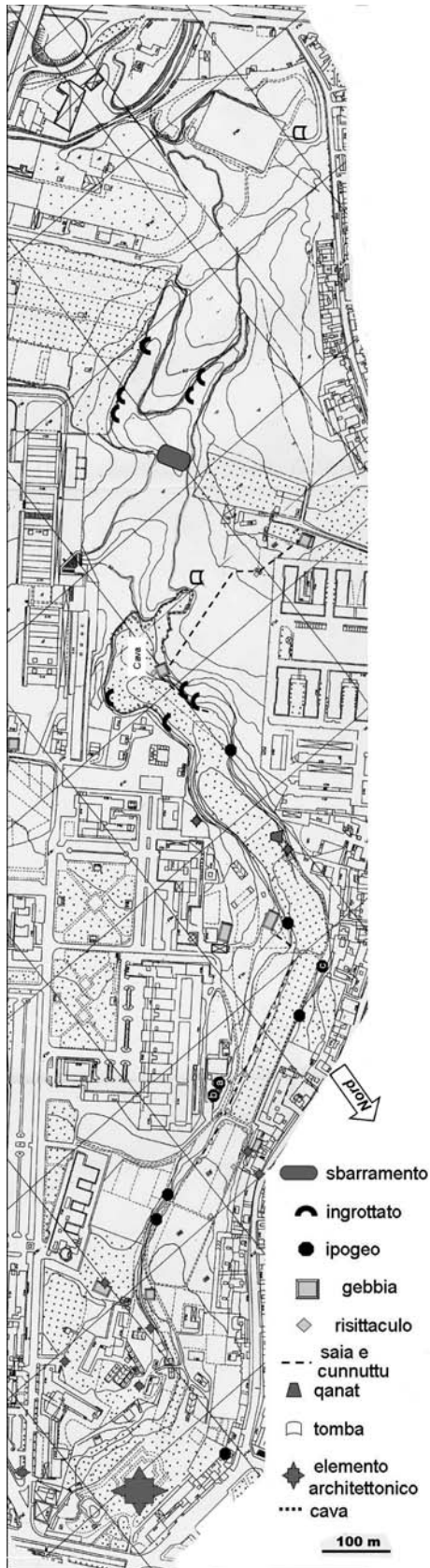


FIG. 1 - Map of the site with location of elements of cultural interest.

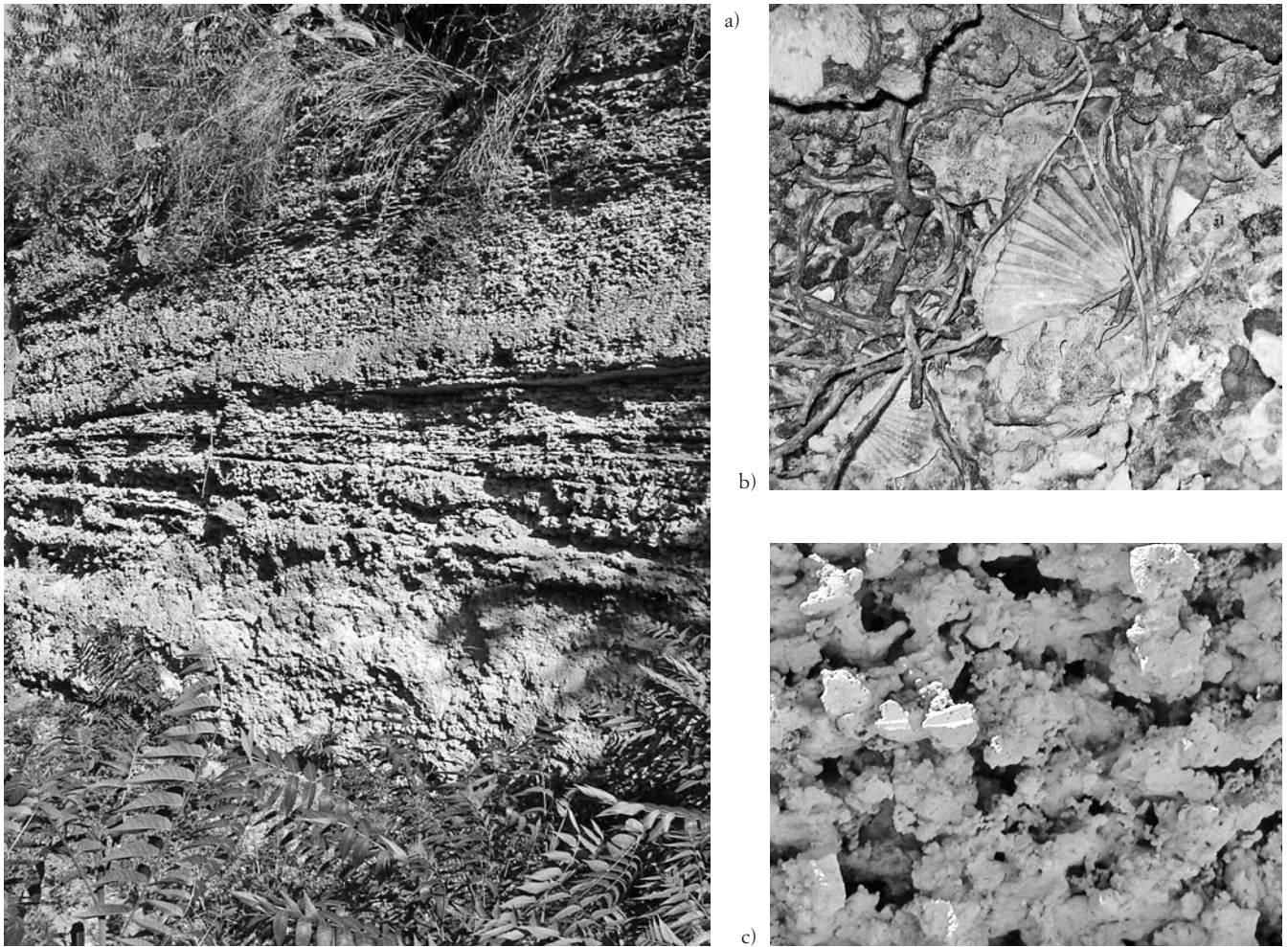


FIG. 2 - The outcrop of calcarenite (a), a particular of a fossiliferous layer (b) and of pseudonodular texture (c).

about 20 cm / 1000 y (Agnesi & *alii*, 1997). The Kemonia flows between the two faults that are the boundaries of the Monreale graben, and reveals how tectonics exerted a strong control over the subterranean and superficial hydrography of the Plain of Palermo. The valley's first erosion phenomena were triggered during the Middle Pleistocene when a sharp reduction in environmental temperature was coupled with intense tectonic lifting which caused the emergence of a vast area of the Plain. At the beginning of the Upper Pleistocene, the progressive heating of the climate caused another marine ingression that was, however, mitigated by slow tectonic lifting and a temporary interruption of erosion processes. These latter started again with great intensity at the beginning of the last glaciation (Würm), at which time both sea level and the depth of the valley were at their minimum. One of the most important proofs that a new continental phase started during the Upper Pleistocene was the discovery in the sediments of the Fossa (in the middle of the 19th century), of a molar tooth fossil that belonged to an *Elephas* sp.

This is now housed in the Geological Museum G.G. Gemmellaro (Burgio, 1997).

The erosion of the valley continued until five centuries ago. In fact the Arab geographer Ibn Hawqual first reported in 934 AD that the Kemonia flowed forcefully down the Garofala valley and entered the city through what is now Porta di Castro, causing devastating floods. Beginning from 1511 various attempts were made to protect the city from the flooding of the Kemonia, until in the end the riverbed was completely dried up. In 1560, following the flood of 1557 that caused 3000 victims and destroyed 2000 houses, the Kemonia was initially diverted into the Oreto River by means of an artificial channel, but this did not protect the city sufficiently; in fact it was flooded again in 1666. For this reason, in the same year, the *talweg* was dammed and partially filled (Cusimano & *alii*, 1989). The most important part of this dam can still be seen at the convergence of the two lateral branches of the stream, where the riverbed forms a wide *varix*. This is also evidence of the city's hydro-geological history, the memory of

which should be preserved not only on file but also physically. These operations, which completely dried up the Kemonia, induced people to fill the riverbed with debris and soil so that it could be used for agricultural purposes. Evidence of the Kemonia's geomorphological history are the sub-vertical rocky walls of the valley that were cut by the flow of water, the shallow subsurface flow that feeds a rich riparian embankment, and several grottoes that were enlarged by man but that were originally created by the continuous flow of water. The calcarenitic body is the site of a rich groundwater table, the free surface of which is to be found at a depth of about 17 m from the level of the ground.

These hydro-geological aspects introduce the agricultural theme and the theme of supply and distribution of water in the Fossa.

HISTORY

The calcarenitic outcrops on the river banks and the vast amount of ground water, available since ancient times, have always been an important resource for man in this area. The first signs of human activity are of proto-historic age, as witnessed by the oven tomb found on the extreme southern edge of the Fossa and by another similar cavity, presumably of the same age, found a little further north on a big rocky outcrop. The visible erosion at the base of the escarpments, which caused the formation of large grottoes, certainly encouraged the inhabitants to systematically spend time there. These grottoes, a couple of metres high, about four metres deep and ten metres long, were in fact used as shelters from ancient times until quite recently.

In spite of the fact that the first signs of human activity date back to more than two thousand five hundred years ago, the first time the Fossa was mentioned was in 1166 when the site was referred to in Guglielmo II's diploma. Its name dates back to the end of the 1400s when it was bought by Onorio Garofalo. During the following centuries it was owned by several different people, but the best-known operations were undertaken at the beginning of the 19th century by Giuseppe Riggio, Prince d'Acì, who organised an experimental agricultural farm. In fact he planted vineyards, vegetable gardens and exotic trees, while also developing hunting grounds. Subsequently in 1809, the northern part of the estate, that extended for about 15 hectares, was bought by Luigi Filippo D'Orléans who transformed it into an elegant English garden. He created an ornamental and recreational area next to the mansion, whereas in the southern part he created an agricultural park, with orchards and citrus plantations. In 1857 Luigi Filippo's heir, Count Enrico Eugenio D'Aumale, enlarged the property until it reached the boundary with the agricultural land belonging to the noble family Forno, creating an estate that the Marquis De Flers wrote about in 1888: «*there were very few gardens as beautiful as these in Italy and Europe*» (quoted in Various Authors, 2000). When the Orléans' vast estate was requisitioned by the Bank of Sicily because it was considered «foreign

property» in 1940, the conditions of the park started to deteriorate. In 1950, after the Second World War, Enrico Roberto, the Orléans' heir, Count of Paris, recovered the property and sold part of it to the University of Palermo, who intended to build a campus on it; in 1954 he sold the mansion and the ornamental garden to the Sicilian Region who made it the seat of the Sicilian Government (Di Matteo, 1983). The part of the park that was close to the mansion was transformed from a romantic English garden into an Italian garden, part of which was used to create a very particular setting to house exotic fauna. Today it houses many species of rare birds coming from different countries. The part of the Fossa that belonged to the Forno family, used for traditional agricultural purposes, was farmed intensely from the middle of the 20th century. A few years ago it was bought by the Palermo Town Council to turn it into a recreational park.

CULTURAL HERITAGE

Quarries and hypogea

In the uphill section, that corresponds to the Forno family's former estate, on the level area at the summit of the calcarenitic body between the two dried-up branches of the Kemonia, there are traces of terraced excavations, of wheel-marks hollowed out in the rocks and of a strictly circular, artificial depression, possibly a big silo. A little further north there is an open pit quarry, full of vegetation, that we identified during our research as being the quarry where the ashlar blocks needed to rebuild Porta Nuova's façade were cut out in 1668. These had to be replaced because they had been destroyed by the explosion of the powder magazine situated there (Di Matteo, 1990).

The environment is fascinating: the walls of the quarry, all corners and edges, show numerous slanting marks left by the «mannara», a kind of very big axe that the quarrymen (or «pirriaturi» in Sicilian) used to cut the rock into square blocks. This «mannara» had been in use since ancient times; at least since the period of the Greeks (fig. 3).

There are indications that the walls of the quarry have been cut deeply at the base, and the upper calcarenitic stratum, that is made up of abundant fossil-bearing rocks unsuitable for building purposes, projects outwards forming the roof of the big grottoes that were used to shelter animals, where mangers and rings had been cut out of the rock. A tunnel branches off from inside one of these grottoes, that is partially enclosed by a wall, the vault of which is supported by big pillars towards west.

To the north of the Orléans' estate, along the flanks of the valley, there are many deep *hypogea* (i.e. underground cavities), that were dug out of the calcarenitic body. When they were excavated and what they are for is at present uncertain. Three of these *hypogea* are of particular importance. To the right of the valley is the «Gazebo» *hypogeum* (fig. 4), so-called because the part in the open air houses a cast iron structure covering a circular tank that is divided into four parts.



FIG. 3 - Signs of «mannara» on the wall of the quarry.

The shape of this tank could be compatible with an ancient system for retting plant fibres. Prince d'Aci used it as a fish tank, because of his passion for breeding fresh water fish, and connected it to subterranean tanks and to a shaft in the flat walking surface of the *hypogeum*. However, during the time of Prince d'Aumale it was reused as a covered dung pit (Biuso, 1881).

The Gazebo *hypogeum* was an open air cavity having a polygonal framework, the surface of which was about 400 m²; it was enclosed on all sides by vertical rock walls, onto which five rectangular rooms opened up. These rooms also had either a polygonal framework or were L-shaped, and each had a similar covered tank, the bottoms and walls of which were waterproofed. There were two accesses to the *hypogeum*: an arch dug out of the rock and a curvilinear gallery, the cross section of which looks like the mouth of a furnace. Next to this is a very big *hypogeum*, made up of a gallery from where other short galleries branch out; these are distributed irregularly along opposite piers, which come to an end at a shelf-like niche. Some speleologists (Biancone, 1999) believe that it was a «muchate», or tuff quarry, used to extract ashlar blocks or lime sand. However, the extremely nodular texture, which makes it unsuitable for building purposes, and size of the

underground passages and above all the shape of the niches have convinced us to reject this hypothesis.

The *hypogeum* «Stalla» (fig. 5), so-called because it was last used as a stable (Biuso, 1881), is situated on the left side of the valley. It has only one room and is about 230 m² in size. The flat vault, that juts out for a width of about 8 m, is supported by pillars made of calcarenite ashlar blocks. The same sort of stonework encloses the room, that is accessible through an ancient, pointed arch portal; it receives light through two windows of the same shape. There are traces of persistent water percolation on the walls, while the outlet of a traditional terracotta water pipe («catuso») can be seen on the roof. The back wall, shaped to fit a semi-circular niche that brings to mind the artificial Arab waterfalls of Arab-Norman buildings, is encrusted with carbonate concretions that indicate the presence of a now dried up spring. Other concretions can also be observed on the vault, while small channels of karst dissolution are visible on the walls. The shape of this *hypogeum*, with its semi-circular niche and its side tanks, makes you think it was used either for religious purposes or for retting papyrus fibres, presuming that the Kemonia, like the Papireto, was used to grow this plant, as theorized by an expert on Arab irrigation systems (Pizzuto Antinoro, 2002a).

Irrigation system

Each of the big agricultural estates situated in the Fossa della Garofala had its own irrigation system of clear Arab-Persian origin. The system consisted of i) a well, or a «qanat» that drew water from the water table; ii) a water tower fed by a «senia», with an animal or steam drawn pump, that in the 1800s was substituted by a steam «norria»; iii) a «gebbia» (water basin) connected by a «saia» to a series of smaller drop tanks («risittaculi»). These in turn fed the derivation system, made up of «cunnutti» in masonry or clay pipes («turciuniati» and «catusato») that led to «casedde», slight four-sided depressions dug in the ground around the plants and separated by mounds of earth called «wattali» (fig. 6).

The corners of the biggest «gebbie» had smooth edges and a central pillar, that served as a breakwater to mitigate the erosive effect on the mortar coating caused by the waves raised by the wind. Many of the components of the irrigation systems operating on the Forno's and Orléans' estates still survive, some of which are in perfect condition. The most remarkable component can be found on the Forno estate: a small canal dug into the rock runs along the cave wall for several tens of metres; it is coated in crushed terracotta mortar and is covered by the protruding layer of the rocky roof to protect the flow of water and keep it cool.

A qanat runs parallel to the left edge of the riverbed on the valley floor, at a depth of 10 m; it can be accessed from a serial shaft 1.8 m x 1.2. This was formed from the intersection of three galleries dug in the calcarenitic body, the longest of which can be negotiated for a length of 78 m. Water still flows through these galleries, the rectangular section of which is 0.7 m wide, and from 1.3 m to 3.7 m high (Biancone & Arrostuto, 1990).

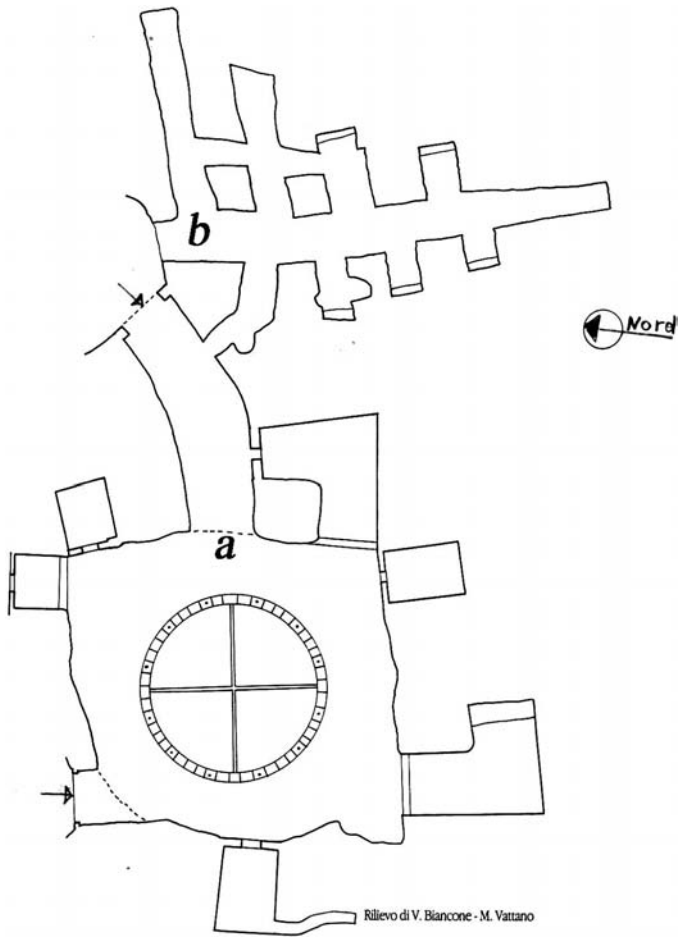


FIG. 4 - Map and photographs of the gazebo hypogeum (a) and the gallery (b).



FIG. 5 - The entrance of «Stalla» hypogeum.

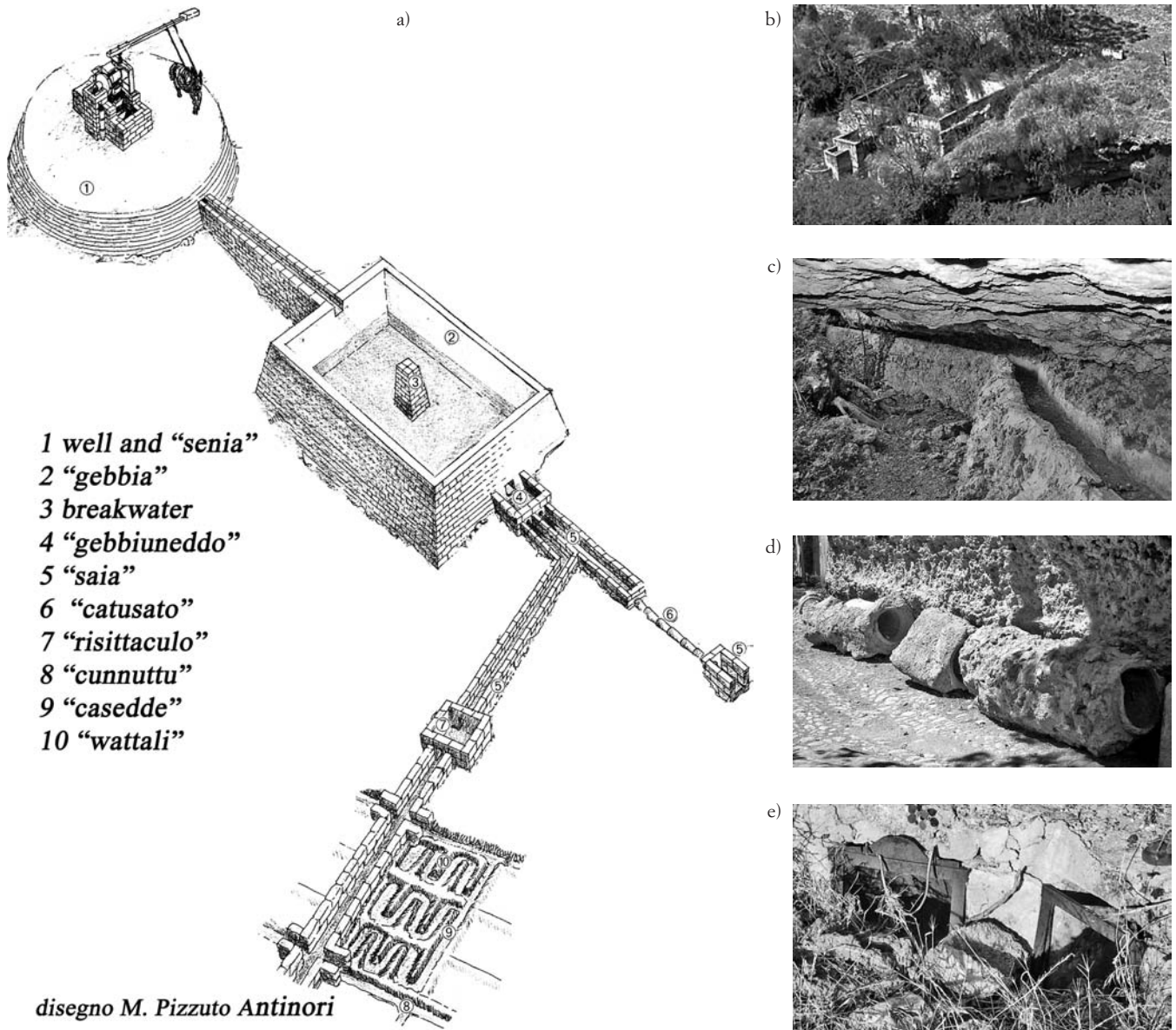


FIG. 6 - The irrigation plant: a) scheme, b) «gebbia», c) canal, d) fragments of terracotta pipe, e) old slide valve.

Architectonic and monumental aspects

Aside from the architectonic value of the 18th-19th century mansions built on the edge of the estates that were scattered over the Fossa della Garofala, numerous carvings can still be seen that decorated the parks' paths or adorned the tanks of the irrigation systems, cut out of the calcarenite or the Billiemi stone. The most important can be found in the southern part of the Fossa, today part of the Faculty of Agriculture: an obelisk with a vase on top; a seat moulded in calcarenite situated under a great Aleppo pine tree; a monumental frescoed milestone, a plant shelter; circular fountains and a water lily tank.

The most important building is a small hunting house, built at the beginning of the 1800s with tower and battlements, which is situated near the boundary between the Orléans and Forno estates, towards the centre (fig. 7). Nearby there is another valuable seat moulded in calcarenite. Some other bits of carvings that once decorated the park can also be found in the thick artificial wood that opens out onto the belvedere overlooking the cliffs surrounding the ancient quarry.

Materials

In addition to the calcarenite used for the buildings and for the construction of water tanks, water towers and



FIG. 7 - The hunting house and a monumental water tower.

distribution basins, that were duly waterproofed, Billiemi stone was also used in the Fossa della Garofala. This stone, a dense rudite of polycyclic origin, was used to craft the components of the irrigation systems that were most subject to wear and tear. Sometimes it was cut into big curvilinear ashlar and placed on the edges of basins; at other times it was carved in the form of drain covers, man-holes and stoppers which were positioned in the filling and distribution tanks. It was also used to make carvings that decorated the parks.

Other material of historical interest is mortar of various types: the decorative plaster used on historical buildings, that today shows clear signs of various types of decay, of which there are significant examples of «flos tectorii» (Rizzo & Ercoli, 2002); hydraulic mortar, used to waterproof tanks and small drains, that is still in good condition and even now adheres to the material to be waterproofed, thereby proving its durability.

The cast iron gazebo is also of interest both on account of the typical composition of the material, that can be dated on the basis of physical chemical analysis (Barcellona, 2000), and because of the corrosion phenomena visible on the cover that is a good illustration of metal decay processes in an urban environment.

Botany and cultivation

The Fossa della Garofala, which escaped the overbuilding in the area contained between the wall of cement called Corso Pisani and Palermo's University campus, forms the outermost hem, still visible today, of the Conca d'Oro's traditional agricultural landscape. Citrus fruit plantations and mulberry trees were planted both in some areas of the summit level of the calcarenitic body, next to vast pastures, and in the bottom of the ancient quarry. Today they mingle with other thick spontaneous vegetation, which is almost impenetrable, and trees and shrubs, among which you can admire monumental *Celtis Australis*, giant trees of *Ailanthus*, twist-

ed fig trees, unusually big *Rhamnus Alaternus*, thick stumps of laurels and big lantana shrubs. The mulberry trees are an awesome sight: in fact there are several very large examples of creeping stumps. The presence of these plants is probably to be attributed to silkworm breeding, that flourished from Norman times (Pizzuto Antinoro, 2002b) until the 1800s. The walls of the quarry are partially clad with monumental ivy and cascades of capper plants.

The last significant parts of the Orléans' elegant landscape garden, with its citrus plantations, woods and grass lawns crossed by winding paths and tree-lined avenues in the English style, although adapted to the local vegetation, can still be seen in the southern section of the Fossa. There are exotic plants like *Erythrina* sp. *Yuccas* and centuries-old palm trees that live alongside species of Mediterranean flora such as holm oaks, carob trees, almond trees and hackberries that were planted for ornamental reasons. This created a mixed landscape, typical of Sicilian gardens. Majestic pine trees line the resting areas and paths of Parco d'Orléans, while the remains of the historical citrus plantations, with their typical cultivars and orderly growing arrangement, are witness to the twofold purpose of the park, i.e. that of mixing of business with pleasure, which was inspired by a common 18th century idea of park.

GEOLOGICAL AND MAN-INDUCED HAZARDS

The conditions of stability of the *hypogea* are at present somewhat precarious. The situation got worse following the earthquake that hit Palermo in 2002, partly because of the poor mechanical characteristics of the rock, partly on account of the thinness of the covering of the vaults, and partly due to the syndepositional joints and fractures of the rock's mesostructure.

Detachment processes are clearly visible inside the cavities; these regard ample slabs of rock that are coming away from the vaults. Furthermore, on account of the re-

cent formation of persistent fractures in the walls of the rock, we fear that it may be difficult for these *hypogea* to outlast the passage of time. Moreover, on the right flank of the valley, some very large high-rise buildings were constructed on top of some of them in the 1960s.

Other hazards should not be underestimated. For example the Palermo Town Council is carrying out a plan of a modern recreational park that has already greatly transformed the southern part of the valley; in fact some important grottoes have been filled in and a lot of the riparian vegetation, which was fed by water situated under the riverbed, has been uprooted. Even the historical quarries where the stone for Porta Nuova was cut out have been partially damaged by bulldozers to make way for a concrete pillar that supports a bridge that, in spite of its remarkable dimensions, is supposed to be part of a pedestrian walkway.

PUBLIC CULTURAL FRUITION

The curiosity that geology arouses in a great number of people drives from the discovery that you can often find fossil shells in rocks that have the same shape as those that can be found on beaches. This prompts the inevitable exclamation: «there must have been sea here at one time!». The history of the Fossa della Garofala is certainly linked to the fluctuation in the level of the sea in the most recent era, the Quaternary. This was the era when man first appeared on earth and when most of the rocks on which Palermo is built were formed. For this reason the Fossa della Garofala offers the possibility, somewhat rare in today's big cities, of organizing a geologic itinerary, that should tell the story of the three main phases of the Plain of Palermo's geological history: 1) calcarenite deposition, when the sea lapped the slopes of the limestone mountains which today surround Palermo; 2) the incision of the valley during the subsequent lowering of the level of the sea, that was much lower than it is today; 3) the end of the natural evolution of the stream's bed during the 16th century, and the first human intervention in the Fossa.

The geomorphological history of the valley, that needs to be set in a more ample hydro-geological framework that should include the Oreto Valley and the Gabriele Springs, fuses with anthropic natural history (i.e. exploitation of the walls for shelter, for worship and for burial, and as quarries). Furthermore, «water» as a resource links up with the theme of the qanats and past irrigation technologies, and relative materials, which in turn is connected to exploitation of the land for agricultural purposes which brings us to the theme of botanical-agricultural itineraries.

By way of these irrigation systems and historical handmade articles, we now have a large collection of traditional building materials and various types of decay, that could be used to organize tours for qualified members of the public interested in taking a material and technology tour for the diagnosis of building materials and their decay.

The didactic paths should be duly, albeit discreetly, signposted and there should be notice boards giving information at each step of interest on the itinerary.

Each of these steps should be explained by means of notices and suitable signs should be placed on the walls and along the valley floor. There could also be references to other didactic paths.

A) For university students of Civil Engineering and Architecture, of Geology and Natural Science, of Chemical Engineering for Cultural Heritage protection and students studying restoration and preservation:

- didactic-project galleries in one or more of the *hypogea* in which stabilization and consolidation processes effected to preserve the grottoes can be illustrated;
- traditional construction materials such as calcarenite, Billiemi stone, mortars and types of decay.

B) For junior high and high school students and for university students of Natural Science and Agronomy:

- the geological environment from the marine regime to the continental regime;
- the grottoes and the historical filling and damming;
- the traditional irrigation system and the qanats;
- the productive park and the amusement park;
- the spontaneous vegetation.

C) For lovers of cultural tourism and speleology

- the *hypogea*, the graves, the wheel marks along the cart paths, the quarries;
- the calcarenite of Porta Nuova, from the quarry to the monument;
- the traditional buildings used in agriculture, the mansions of the nobility and the decoration of the parks.

As a final consideration, we are convinced that the hypothesis that the exploitation of the Fossa only dates back to the 14th century is considerably limiting, due to: a) its proximity to the city's most extensive Punic necropolis of Palermo; b) the proximity to the seat of central power during Arab and Norman times; c) the enormous amount of surface and ground water available, well known under the Arab rule. For these reasons, it is to be hoped that archaeologists and historians study in depth the site.

Furthermore, investigation on the peculiar erosion patterns could contribute to an improvement in the knowledge of the geomorphologic history of the Palermo Plain.

In our opinion this site, because of its extraordinary cultural and scientific value, definitely deserves an interest to public fruition.

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