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Medieval Settlements and Etruscan Cities: Man-Made Underground Caves as an Aid in the Study of the Layout of Ancient Cities

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On the whole, up to a few decades or so ago, information regarding the ancient settlements of the center of Orvieto was limited to what could be gleaned from a few poorly preserved fragments, for the town had developed in patterns that provided for the superposition of one structure on the other. The natural conformation of the plateau of Orvieto, shaped by wind and weather, determined well-defined building spaces. Subsequent stratification resulted in the destruction and, due to the limited durability of the earliest structures, the partial disappearance of traces of these earlier settlements (fig. 1). On the other hand what the Etruscans built underground in the tufa mass, has never been completely erased and provides us with an invaluable source of information. This unique situation provides an opportunity for a new interpretation, physically turning upside down not the object of study, but the point of observation, thanks to the presence of around 1200 man-made cavities, which together with data that can be deduced from archaeological literature, enables a sort of underground survey, allowing the identification of structural elements that served the ancient city. The point of departure for this study was the fact that interest in the underground world of the cliff of Orvieto had been growing, above all in

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by Claudio Bizzarri
relation to problems of the stability of the cliff. The purely archaeological aspect has for some time been waiting to be dealt with in depth.\(^3\)

The mighty plaque of plio-Pleistocene pyroclastic deposits, the result of the activity of the volcanic mountain chain of Lazio,\(^4\) on which the modern city of Orvieto stands, is characterized by sheer cliff walls along the entire perimeter, varying in height from 30 to 50 meters. The plateau itself is elliptical in shape, with a maximum and minimum diameter of 1600 and 800 meters. The great visible mass of the cliff of Orvieto consists of black scoria lithoid tufa (tuff), a lithoid variety that is divided into two distinct \textit{facies}: the true yellow-orange tufa (tawny), well-consolidated and with consistent pumice inclusions (black scoria), and a grayish rock, poorly solidified or even incoherent, called, improperly, pozzolana.

The many-faceted archival documentation is an important aid to better understanding both the archaeological nature and the relationship between the man-made cavities and the inhabitants of the plateau.\(^5\) For example, the description by Monaldo Monaldeschi of the operations regarding the laying of the first stone of the Cathedral on November 13, 1290: “…. and Pope Nicholas entered the foundations already dug so deep that water and clay were found,”\(^6\) leads to a hypothesis that there was an Etruscan cistern lined with clay\(^7\) beneath to the fourth pier of the Cathedral, where the first stone was laid.

The author of this paper has previously organized the underground structures of Orvieto on a typological basis\(^8\) and a brief description follows.

The term “tunnel” (“\textit{cunicolo}”) refers to nearly-horizontal conduits with a maximum height of 1.80 meters and 0.60/0.70 m. wide. Tunnels are characterized on the basis of the various techniques used in creating them: dug below the surface, underground, or dug in the open, where man-made structural elements are used to line or cover a trench dug down from the surface level.

Tunnels dug underground without facing belong to type I, with two variations depending on the shape of the vertical cross-section.

Type 2 includes tunnels dug as open trenches,\(^9\) once more with variations depending on the type of wall used to face them or the covering\(^10\) (fig. 2). Most of the tunnels seem to fall into two systems, type I and type II. The first consists of a main tunnel from which lateral tunnels branch off at regular intervals, at right angles to the main axis. Occasionally shafts with footholds that open directly in the vault of the main tunnel\(^11\) or the secondary branches are encountered. The second corresponds to a series of tunnels arranged radially with respect to a vertical conduit, in communication with the surface.

With regards to the cisterns, or reservoirs into which rainwater was channeled, an attempt has been made to group them into a limited number of types and variations in view of truly distinctive features.

Type 1 consists of cisterns with a circular horizontal cross-section, with a waterproof lining in pure clay and an inner masonry facing (fig. 3). There are 5 variations\(^12\) depending on the building technique used in the internal facing.

Type 2 is characterized by the presence of \textit{cocciopesto} (mortar containing crushed ceramic aggregate) and the variations are determined by different shapes.

Type 3 has no type of waterproof facing\(^13\) and the shape of the container once
more determines the variations.

The term “vertical conduit” here refers to the numerous “wells” or shafts, best described as polyfunctional structures since, with few exceptions, it is difficult to determine exactly what they were used for, or better what they were originally meant for. The so-called shafts with footholds exist both as structures that connect the inhabited surface with the underground body of the cisterns, and as actual vertical “wells” reaching for the aquifer.

Vertical conduits dug in the various lithotypes without any type of specific lining correspond to type 1. They are further identified by their shapes (square cross-section with footholds, circular cross-section with footholds, circular cross-section without footholds).

A second type, 2, has a circular cross-section but is lined internally with superposed terracotta rings.

It is evident that the availability of a detailed picture of the location of service elements in the overall layout of the town is useful and at the same time an indication of how it is determined by the geological nature of the site. For Orvieto recent studies and the collation of information on masonry structures of Etruscan times supplies invaluable information for an understanding of the relationship between the modern settlement and the ancient town.

The urban fabric of this center is now cut in two by Corso Cavour, in which has been thought to be a legacy of the urban organization of the ancient city. On the basis of studies of the urban necropolis of Volsinii it may be supposed that there was an equally well-organized grid plan for the city of the living, but it seems likely that a distinction must be made between the layout of the Etruscan city and subsequent developments in the medieval Urbs Vetus.

Interesting data for further speculation can be deduced from the excavation of the archaeological area of Palazzo Monaldeschi and the structures found under the church of S.
Andrea. In July 1990 in the course of work for a basement classroom for the Istituto Statale d’Arte of Orvieto, a series of structures related to the Etruscan residential area and to buildings of medieval date was brought to light in the forecourt between Palazzo Monaldeschi and Via dei Magoni. The oldest structure, an area paved with small river stones, was found sloping slightly towards Piazza Ippolito Scalza, in other words in a direction echoed by the present street level (fig. 4). The paved area on the west touches on four aligned tufa ashlers, with a service hole cut in the center for a reservoir of rain water, and with a barely noticeable offset, probably to house another element which no longer exists. What we have is the mouth of a cistern of type 2G. A second vertical conduit has been partially studied and could lead to another cistern. So far, in addition to various Etruscan pottery fragments that provide chronological evidence for the material that filled the structure, large squared tufa blocks, belonging to the subfoundations of buildings, have also come to light.

The complex situation, due to the many superimpositions, however does not stop us from interpreting the remains found as evidence of domestic structures of the Etruscan city of Velzna. The paved area could be part of an inner courtyard of a private building (such as the well-known structures of the Etruscan Po valley). Other remains documented in the area confirm this hypothesis, although the stratigraphic relationship with the paved area was lost in the excavations carried out prior to archaeological inves-
tigation. The remains of a building were cut into by the excavation work. The narrow strip of remaining earth was examined stratigraphically and a large squared tufa ashlar with fragments of paving in tufa slabs at its base came to light. One of the latter had a hole in it and was slightly concave on the upper face. Beneath was a channel consisting of two curved tiles set together and sealed with pure clay and facing in the direction of the area where the cisterns lay. Part of a terracotta pipe was also recovered, probably similar in size and type to those previously noted by Gamurrini in the area.19 The ashlars through which one of the channels passes, the mouth of the cistern and the paving slabs with a water conduit below all had the same orientation.

A study of the underground structures of the collegiate church of SS. Bartolomeo and Andrea, better known simply as S. Andrea, identified as one of the most important centers for the political and religious life of the city,20 presents a similar case. The underground area of the church has an extremely complex stratigraphy and the lack of scientific publications concerning the various excavation campaigns that began in 1927 does not permit an exhaustive interpretation of the remains (fig. 5).21 The results of the exploratory excavations by Prof. M. Cagiano de Azevedo in 1967/69, in whose opinion the area already has a sacred character in the Villanovan period, are likewise unpublished.22

The remains of the Etruscan structures found during explorations carried out by the Soprintendenza alle Antichità dell’Etruria of Florence consist of “…imposing walls composed of large tufa parallelepipeds,” an “Etruscan paved area,” more than one “…platform of tufa blocks with shaped edge,” numerous small drains, channels, shafts and cisterns connected to them.23 The structure in large tufa blocks could be evidence for private buildings, as seems to be the case in other excavations recently carried out in the urban area.24 Further evidence seems to confirm the plausibility of this hypothesis. The platform of shaped tufa slabs, below the nave of the church above, seems to be in com-

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**figure 5 – The archaeological remains under the church of S. Andrea.**
munication with the adjacent area paved in small river stones. The presence of a nucleus comprising a shaft/cistern, platform, conducting channel and paved area in relation to the uncovered interior area of the dwelling can therefore be hypothesized.\textsuperscript{25} The same association of elements characterizes the other platform located beneath the left aisle, with a raised border and paved area next to it (the area in which the mouth of the cistern should be is at present hidden by the north wall of the church above).\textsuperscript{26} A parallel to the use of the tufa platforms with a raised edge that would act as barrier for water and in relation to cisterns included in building complexes, may be found in Artena. Here the slabs that covered the cistern had all around “…a raised border 1 cm high and 12 cm wide.”\textsuperscript{27}

It should also be noted that the two platforms under S. Andrea both deviate considerably from the axes of the streets above and are part of a single general pattern, relative at least to the individual complex to which they belong, if not to the regular organization that presumably characterized the Etruscan city of Velzna. Information regarding the zones adjacent to the area studied in the first half of the 20th century indicates the presence of other water-related structures. Perali reports that tunnels and shafts with clay were identified under the Caffè Martini, in Piazza della Repubblica (also known as the Piazza S.Andrea).\textsuperscript{28} The excavation assistant working underneath the church of S. Andrea in 1927 noted in his diary: “Under the right pier of the choir…there is a layer of very solid pure clay.”\textsuperscript{29} This could be what remained of one of the earlier type of cisterns, constructed before the later type of shafts/cisterns with tunnels in a type II system and cisterns of type 2, with a “diameter of circa three meters, with a layer of cement (calcestruzzo) on the bottom and the walls plastered.”\textsuperscript{30}

In addition to the nucleus composed of platform and cistern analyzed above, the underground structures of this area seem to include a second “well” or shaft faced with large blocks of tufa laid in a curtain wall in the upper part. Investigations carried out under the two aisles have brought to light other subterranean structures: in the left aisle a vertical conduit of type 1.C, one meter in diameter, with four radial tunnels that branch out at a depth of 3.20 meters, some for no more than a few meters; in the right aisle another shaft has been identified, but further study is hindered by the fact that it is located under one of the piers of the church above. Another vertical conduit in communication with a tunnel “tortuoso inexplorato” (tortuous and unexplored) was documented near the apse.\textsuperscript{31} The types of underground structures documented do not seem to differ notably from those found in other areas of the plateau and, more generally, in the panorama of underground Orvieto.

The stratigraphic sequence found above the Etruscan structures consists of a thick strata of filler sealed by a honeycomb foundation in preparation for the mortar needed to lay the mosaic floor attributed to the “original church.”\textsuperscript{32}

Structures thought to be old have been highlighted in the plan in fig. 5 and it is clear that they completely ignore the orientation of the tri-partite church, repeated in the medieval layout of the city. Renewed building activity in the 6th century,\textsuperscript{33} and, even more so, subsequent developments, were in no way connected with the earlier structures, contrary to what has up to date been suggested.\textsuperscript{34}

Another element that would bear out the theory according to which the regular layout of Etruscan Volisini does not coincide with the present urban pattern is provided
by the structure documented near the main artery of Corso Cavour during the restructuring of a building beneath Vicolo Michelangeli, (formerly vicolo Albani). A schematic plan presented by A. E. Feruglio indicates roughly what the orientation of part of the residential area of Etruscan Orvieto might have been, even if the hypothetical rectilinear reconstruction of the access route along Via della Cava is not convincing. The general direction “...east-southeast to west-northwest” can be further confirmed by the archaeological remains beneath Palazzo Monaldeschi and S. Andrea, where the deviation seems to be minimum: and the orientation has been observed as around 340 degrees. Great caution must be used in considering the layout of the cathedral as indicative of an earlier plan since the area was leveled to form a terrace for the transept.

The lack of consistency between the ancient and the present layout is further confirmed by the locations of the tunnels surveyed up to now. Cozza had rightly hypothesized the presence of these conduits beneath the arteries of the Etruscan urban fabric. In a plan of a section of the modern city the lack of superposition between present-day communication routes and subterranean structures is evident (fig. 6). The stretch of road of Vigna Grande, even if located in a suburban area, is an example of both. There is a tunnel beneath the paving and the direction does not correspond to the grid of the modern city.

An analysis of underground structures is then of particular importance in reconstructions of the ancient topographical layout of heavily built-up city centers. It is interesting to note that the orientation observed in the underground structures of Etruscan Volsinii compares well with reconstructions based upon descriptions in Vitruvius where the ideal grid of a settlement diverges from the north by about 20/30 degrees.

NOTES

1. Stable settlements located on the slopes of the cliff developed around individual rural dwellings along the more traveled communication routes; for example Loc. La Segheria and Sferracavallo developed as clusters near the entrance routes to the city. For the suburban centers of medieval times - S. Matteo, S. Faustino and S. Angelo de Surripa - see Satolli 1983, Orvieto 1988, 140.
2. Devoted in particular to this problem and the urbanization processes of the city is a study currently in preparation by Stopponi and Bizzarri.

3. Perali 1928, 74.

4. Agreement as to the exact genesis of the tufa plaque of Orvieto is still not unanimous. The most significant studies are: Locardi-Mittempercher 1967, 131-152; Perni 1973.

5. See for example Bizzarri 1995.

6. Monaldeschi 1584, 156.

7. For the corresponding type see below.


9. Unlike previous proposals (Bizzarri 1991, 163 f.) preference is here for the inclusion in a single type of the tunnels with individual construction elements, such as internal stone facing, or covering in slabs arranged using various techniques.

10. For the specific types see for example Bizzarri 1995, until the study now in preparation is published.

11. There are no complexes of tunnels available for complete inspection because of the rubble that, invariably, fills all the examples identified. For further study see Bizzarri 1991, 165ff.


13. The practicality and presence of this type of structure is due only to the presence in Orvieto of a particular lithotype: this is a probable paleosol that acts as filter for the rain water, in particular near the Church of S. Francesco and near the Cathedral, in the highest part of the plateau. The absence of ignimbrites up to a depth of more than 10 meters below the current street level has been ascertained in recent core sampling (see also Bizzarri 1992, 195-212, in which cavity 779, where a considerable amount of water is still present today, is described).

14. A different hypothesis, suggested by Cozzo 1935, 11-29, according to which these niches were also used during the excavation phase of the conduit, seems unlikely, since the worker would have had to assume positions that were to say the least rather uncomfortable.

15. This is an unicum in the panorama of Orvieto underground (Minto 1936, 256, fig. 7b): the clay tubes are 80 cm high and 95-98 cm in diameter.


17. Palazzo Monaldeschi della Cervara later became Palazzo Marsciano and then Palazzo Lazzarini. In this paper it is called Monaldeschi even if some of the masonry structures found in the latest excavation campaigns could furnish useful elements for a hypothetical reconstruction of the original building, that differs considerably in plan from the structure as it is now, the result of changes made by two architects, Simone Mosca and Ippolito Scalza (Satolli 1993, 19). I wish to thank Dott.ssa A.E. Feruglio who entrusted me with the excavation on behalf of the Soprintendenza Archeologica per l’Umbria.

18. In Marzabotto, for example, Sassatelli 1991, 182ff.


20. For example, Satolli 1985, 145.

22. Only a synthesis has been published (Cagiano de Azevedo 1972, 242), and a few brief communications were sent to the Fondazione per il Museo C. Faina.
24. Emergency excavations were conducted by the Soprintendenza Archeologica per l’Umbria inside Palazzo Soliano and in the courtyard behind Palazzo Monaldeschi (see above).
25. The combination that seems to present itself again in Sant’Andrea is close to the one hypothesized for the archaeological area of Palazzo Monaldeschi.
27. Quilici 1974, 56ff.
29. Klakowicz 1976, 166.
33. One of the decorative motifs of the outer band of the mosaic, a lotus flower pattern, is specifically dated to the 6th century AD (Farioli 1972, 120). If it is true that “in the 6th century the tripartite plan was customary” (Mirabella Roberti 1982, 424), the structure in question fits well into the context of the history of the city, which following the barbarian invasions and the conflicts with Rome and Byzantium, reverted to its role of being a natural impregnable fortress. It is perhaps significant that as early as 410 AD Alaric’s Visigoths laid waste to nearby Bolsena.
34. See for example. Riccetti 1992, 87. The “cohabitation with the antique,” if it existed, does not seem to have determined particular choices as far as the development of the medieval city is concerned.
38. See Vitruvius I, 6, 7.

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