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THE CADASTRE OF ARTIFICIAL CAVITIES OF ROME AND LAZIO

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Abstract
In 1981 the Italian Speleological Society (SSI) created the Commission for Artificial Cavities, during the Symposium on the subsoil of the historic cities held in Narni (Umbria, Italy). Since the half of last century cavers have explored and studied artificial cavities. In the 70's the activity was intensified and specialized because it was discovered the immense underground historical-archaeological heritage of Italy, and there was the need to create an *ad hoc* structure. So, like the first initiative of the "Caves of Italy" was to give life to the Cadastre of Natural Caves, primary function of the Italian Commission for Artificial Cavities was to create a specific cadastre also for the man-made cavities and underground structures. This contribution describes the number and typologies of the hypogean structures surveyed in Rome and in Latium region since 1981 to the present from the cavers.
Keywords: artificial cavities, cadastre of artificial cavities, Rome, Latium.

Riassunto
Nel 1981 si svolse a Narni (Terni, Italia) il Simposio sul sottosuolo delle città storiche. In tale occasione fu istituita la Commissione Nazionale per le Cavità Artificiali della Società Speleologica Italiana (SSI). Sin dalla metà del secolo scorso gli speleologi si sono dedicati alla esplorazione e allo studio delle cavità artificiali oltre che delle grotte naturali. Negli anni '70 l'attività si è intensificata e specializzata in seguito alla scoperta dell'immenso patrimonio storico - archeologico sotterraneo d'Italia. Per censire le strutture ipogee che venivano studiate e non perdere memoria del materiale documentale che si andava acquisendo, si rese necessario creare una struttura deputata alla sua conservazione. Obiettivo primario della Commissione fu dunque quello di organizzare uno specifico data base catastale che consentisse di censire questo nuovo tipo di strutture ipogee: il Catasto Nazionale delle Cavità Artificiali Italiane. La struttura è articolata su base regionale. Per il Lazio la conservazione del data base documentale è affidata alla Federazione Hypogea - Ricerca e Valorizzazione Cavità Artificiali (www.hypogea.it). Il contributo presenta in forma schematica il numero delle cavità artificiali censite nelle aree di Roma e Lazio dal 1981 ad oggi per ciascun comune e la relativa suddivisione tipologica.
***Parole chiave**: cavità artificiali, catasto delle cavità artificiali, Roma, Lazio.*

Foundation of the Cadastre of Artificial Cavities in Italy

In Italy the term "cadastre" indicates an old technical and fiscal instrument, at first used for the registration of real estate. The purposes of the register are nowadays numerous: fiscal, social, administrative, legal and topographical. Early in the 20th century, with the great increase in underground explorations (natural caves and ancient abandoned cavities), researchers involved in speleology - an interdisciplinary scientific activity - realized the benefits of recording the positions and characteristics of each underground cavity. In fact, without this precaution, it would be difficult to keep memory of all the caves, since many of them are not easy to localize and, besides, are subject to substantial changes over the years. In 1927, Eugenio Boegan, one of the fathers of cave exploration in Italy, gave a concrete answer to this need, perhaps for the first time among the countries rich in caves.

Unfortunately, during the Second World War the entire archive was moved to Germany and remained there until after the conflict. Italian cavers reacted quickly and the Italian Speleological Society (SSI) gave it new impetus. A great improvement derived from the introduction of computers in 1973, rather an early date given their limited diffusion at that time: in fact, computers were still almost the exclusive property of large computing centres .

In the aftermath, registration into the "cadastre" was extended to the karst areas and gradually to the so called "Special registers": ancient underground aqueducts, artificial emissaries, caves at risk of environmental pollution, anthropogenic sinkholes, etc.

In 1981, thanks to the establishment of the specific Commission for Artificial Cavities, a specific cadastre for these structures was established. The first regulation of the cadastre was published in the journal Speleologia (issue no. 22, 1990).

The initial two pages of the form became four, because the description of an artificial cavity, if it has to be useful for scientific and historical investigations, requires detailed information on typology and conservation status. More and more speleological groups became interested and specialized in the study of artificial cavities, and the number of entries in the Cadastre increased accordingly, even if it is still far from the number of registered natural caves.

In the last thirty-four years five thousand registration cards for as many artificial caves have been collected, confirming the substantial validity of the original idea. The content of the Cadastre is "public", with the limitations necessary to comply with the protection of

Fig. 1: topographic survey in an ancient hydraulic work (typology "A") (photo C. Germani).
Fig. 1: rilievo topografico in una antica struttura idraulica (tipologia "A") (foto C. Germani).

intellectual property, especially before publication. At present, only some "synthetic" data are available (www.catastoartificiali.speleo.it), but in the future it will be possible to include images and topographic surveys.
It is worthwhile to remind that the National Cadastre of Artificial Cavities joins other thematic registers already compiled by the Committee, such as the "*Ipodata Project*" (thanks to the convention with the Italian Institute of Geophysics and Volcanology), the *Charter of the ancient aqueducts* and the *Charter of underground structures of artificial drainage*.

The Cadastre of Artificial Cavities of Rome and Lazio

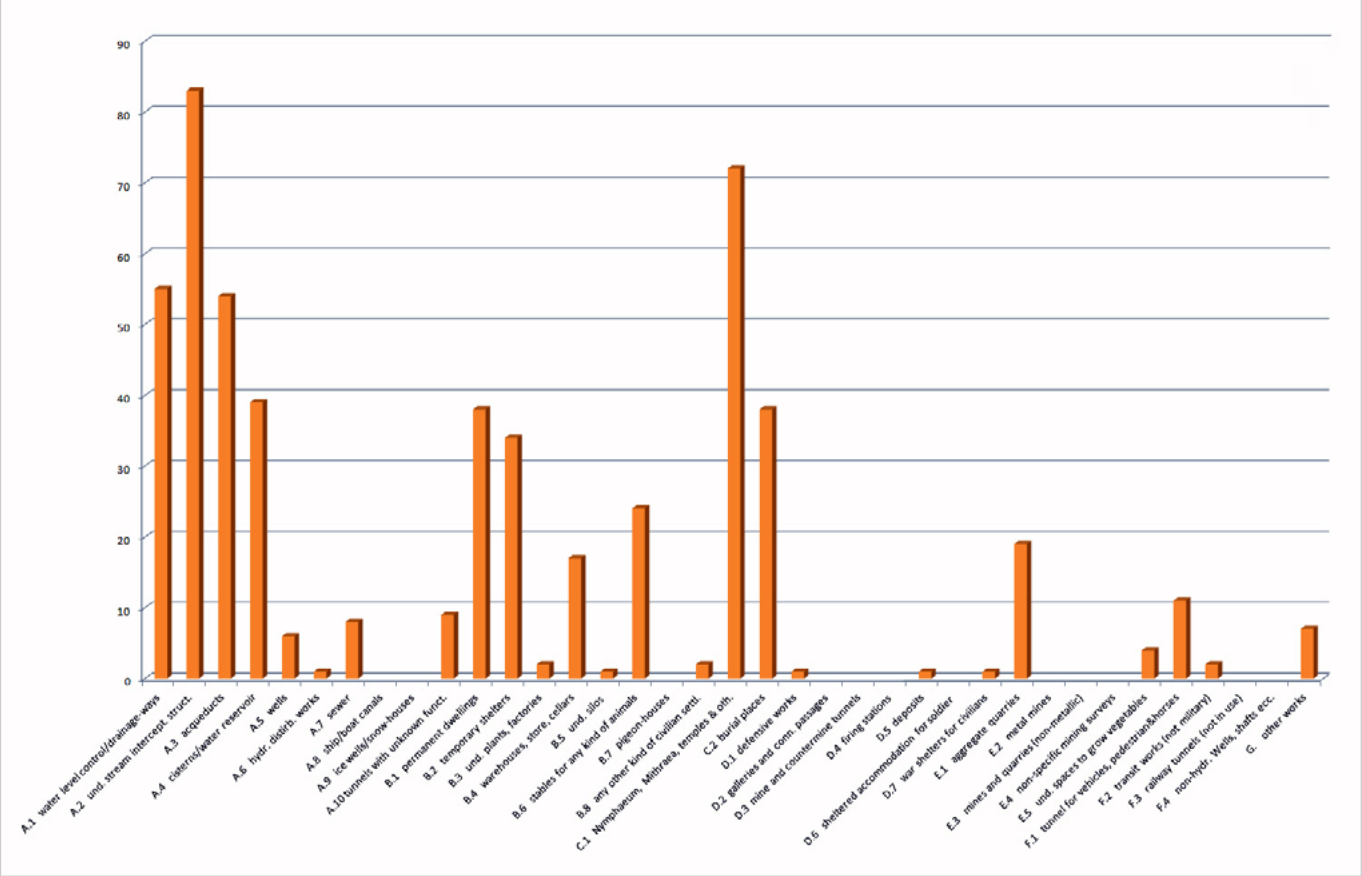
In January 2014 the Cadastre of the Artificial Cavities of Rome and Latium region have been entrusted to the Hypogea Federation for the Research and Valorization of Artificial Cavities (www.hypogea.it), which takes care of its preservation and updating. During 2014 all the cards already present have been checked, and about 80 new ones have been added for as many new structures. On December 31, 2014 the number of artificial cavities in the data base was 529, subdivided according to the typologies assigned by the researchers, typologies that are outlined in Table 1.
In Latium, hydraulic works and rock settlements are clearly prevailing.
However, let us point out that the Cadastre collects the studies performed by speleologists. So the prevalence of these two typologies, rather than others, appears due both to the training of researchers and to the nature and history of the region.
Latium has been inhabited without interruption starting from prehistory and it is well known that any human settlement has always required water for its development. Therefore it is no surprise that the works for finding, transporting and delivering water (typologies A) are so numerous.
Starting from the 6th century b.C. Latin populations, likely with the help of Greek and Etruscan skilled workers, undertook in Lazio a complex and intensive work of water canalization, in order to control lake levels, to drain swampy areas (typologies A1) and to capture and carry drinking water (typologies A2-A3).

Fig. 2: topographic survey in a rock-cut settlement (typology "B") (photo C. Germani).
Fig. 2: rilievo topografico in un insediamento rupestre (tipologia "B") (foto C. Germani).

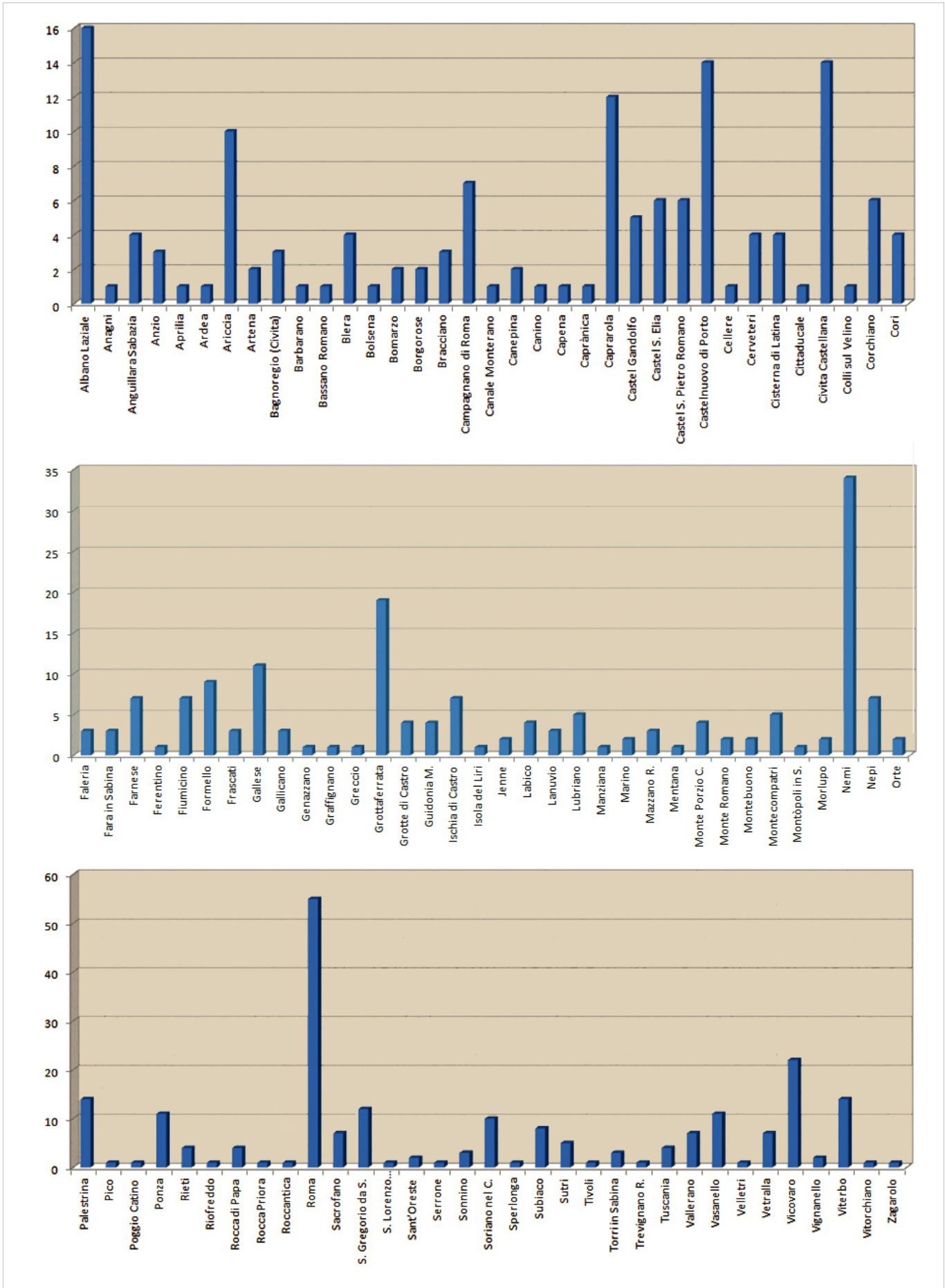
Fig. 3: topographic survey in a cult structure (typology “C”) (photo C. Germani).
Fig. 3: rilievo topografico in una struttura di culto (tipologia "C") (foto C. Germani).

Fig. 4: topographic survey in an ancient hydraulic work: drainage tunnel (typology “A”) (photo M. Vitelli).
Fig. 4: rilievo topografico in una struttura idraulica: emissario (tipologia "A") (foto M. Vitelli).

In Latium a large number of springs is located at the foot of the Apennines and from these karst areas originate most of the aqueducts that reach the major urban centers, among which Rome.
Another important source of drinking water is given by the water layers present in the volcanoes lined up along the Tyrrhenian coast. Here springs have a limited capacity, but they are uniformly distributed on the territory, and have given origin over the centuries to a thick net of fountains and minor aqueducts. These have supplied with water coaching stations and country roman settlements, villages and country settlements of the early Middle Ages (*domusculte*), as well as Renaissance villas surrounded by lavish gardens, which needed great amount of water for their maintenance.



Tab. 1: scheme of the 529 underground structures in the Cadastre of artificial cavities of the Latium region in 2014, subdivided for typologies.
Tab. 1: schema delle 529 strutture ipogee censite nel Catasto cavità artificiali del Lazio al 2014, suddivise per tipologie.



Tab. 2: scheme of the underground structures in the Cadastre of artificial cavities in Latium region in 2014, subdivided for municipalities.
Tab. 2: schema delle strutture ipogee censite nel Catasto cavità artificiali del Lazio al 2014 suddivise per comune.

Fig. 5: home page of the Italian Cadastre of Artificial Cavities (www.catastoartificiali.speleo.it).
Fig. 5: home page del Catasto nazionale Cavità Artificiali (www.catastoartificiali.speleo.it).

The Apennine valleys, deeply cut by torrents, have given hospitality for a long time to monastic communities and hermitages, while the slopes of the volcanoes, made up by easily workable tuff deposits, have allowed the development of numerous rock settlements, both religious and civilian (typologies B1 and C1-2), and sometimes related to shelters for outlaws.
The widespread presence of tuff and *pozzolana*, building materials in use since the remotest times, has fostered the development of large quarries (typology E1). Over the centuries quarries have been used as stables (B6) or for mushrooms cultivation (E5). Most of these structures have been abandoned and forgotten, once their primary and /or secondary function came to an end. At present, abandoned quarries located underground are a source of serious dangers for the stability of the overlying buildings and their inhabitants in built-up areas. The census of "*Anthropogenical sinkholes*" will soon begin starting from the data already present in the Cadastre and supplementing them with the data acquired by professionals (geologists, etc).
The authors urge the adoption of websites (UIS) connected both with the Register of artificial cavities and with the Map of the ancient aqueducts.

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