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CONTRIBUTION TO THE DEFINITION OF CARTOGRAPHIC SYMBOLS FOR ARTIFICIAL CAVITIES

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Abstract

With this work we would like to contribute to the debate on the development of a series of internationally recognised conventional symbols for the cartographic representation of artificial cavities. We therefore present the selection of specific signs and symbols that the Centro Studi Sotterranei (Centre for Underground Studies) of Genoa (Italy) has identified and developed for recording topographic surveys. Our surveys were made and published during the many seasons of exploration we have carried out since 1991 in a range of underground settlements in different areas of Turkey. The symbols are designed to be immediately comprehensible to the staff of the Turkish institutions (such as the Turkish Culture Ministry) with whom we collaborate in the projects. In this contribution we have schematically reproduced the symbols; these were either created ad hoc, or borrowed from other disciplines, like archaeology and architecture, to represent the different features found in Anatolian artificial cavities. The symbols vary according to the different scales used to document the sites. The iconography we illustrate, together with abbreviations, is subdivided into different topics which refer to topographic points, surface features, water features, and morphological and architectural features. Obviously, the symbols which we propose, originating from specific experiences of Centro Studi Sotterranei, provide only a partial contribution to the problem of illustrating in a conventional and consistent way the results of the experiences of many experts on artificial cavities, from a wide range of different geographical, chronological and, of course, typological contexts.

Keywords: artificial cavities, iconography, cartography, symbols, abbreviations.

Riassunto

Questo lavoro vuole essere un contributo alla discussione per lo sviluppo di una iconografia, convenzionalmente riconosciuta ed adottata a livello internazionale, relativa alla rappresentazione cartografica delle cavità artificiali. A tale scopo si presenta la scelta di simboli e grafismi specifici che il Centro Studi Sotterranei di Genova (Italia) ha selezionato ed elaborato per la restituzione dei rilievi topografici prodotti e pubblicati nel corso delle molteplici indagini condotte, a partire dal 1991 e tutt'ora in corso, in innumerevoli insediamenti sotterranei di differenti siti della Turchia, in modo da fornire una chiave di lettura di immediata comprensione anche per gli addetti delle istituzioni turche (ad esempio il Ministero della Cultura) con le quali i progetti sono condivisi. Nel lavoro sono schematicamente riportati i simboli appositamente creati o mutuati da altre discipline, quali l'archeologia e l'architettura, per le diverse situazioni morfologiche riscontrate nelle cavità artificiali anatoliche e in funzione delle differenti scale grafiche utilizzate per la rappresentazione dei siti documentati. L'iconografia qui illustrata, che si avvale anche di sigle, è suddivisa per temi che riguardano i punti topografici, i simboli di superficie, l'idrologia, la morfologia e gli elementi architettonici. Ovviamente, i simboli cartografici qui proposti, frutto del lavoro di specifiche esperienze del Centro Studi Sotterranei, non possono che fornire un parziale contributo alle effettive necessità di una rappresentazione grafica omogenea e complessa derivante dalle esperienze di molti altri esperti nel campo delle cavità artificiali ben più vaste e diversificate per ambito geografico e cronologico oltre che, naturalmente, dal punto di vista tipologico.

Parole chiave: cavità artificiali, iconografia, cartografia, simboli, sigle.

Criteria

The table of symbols proposed at this conference was produced following the criteria outlined below. The symbols and abbreviations summarise the various legends for the maps and plans published in the reports made to the Turkish Ministry of Culture and Universities, documenting the investigations carried out since 1991 by Centro Studi Sotterranei (Centre for Underground Studies) experts in Turkish rock-

cut sites. The sites are located across Turkey from the Aegean coast to the eastern borders, but mainly in Cappadocia (central Turkey), on Lake Van (Ahlat and Bitlis) and on the border with Armenia (Ani, eastern Turkey).

These symbols were variously adopted from other cartographic sources, modified, enhanced or specially created to represent morphological features (structural, architectural, decorative, archaeological or geological)

TOPOGRAPHIC SYMBOLS SIMBOLI TOPOGRAFICI		
GPS point (geo-referenced)		punto GPS (georeferenziato)
map-point (not verified with GPS)		punto-carta (non localizzato con il GPS)
reported site (not surveyed)		sito segnalato (non rilevato)
datum points outer polygon inner polygon		capisaldi poligonale esterna poligonale interna
height a.s.l.		quota s.l.m.
relative (local) level		quota relativa
ceiling height (at marked point)		altezza soffitto (nel punto segnato)
depth of water		profondità bacino idrico
section view direction		direzione vista della sezione

Fig. 1: topographic symbols (drawing R. Bixio).

Fig. 1: simboli topografici (grafica R. Bixio).

which are specific to the artificial cavities of Anatolia we documented.

It should be noted that the symbols were developed working on a large sample of rock-cut features, surveyed over a very long time period (24 years) and a wide geographical area in a considerable number (several hundred) of artificial underground structures. These were built by the many societies that have for centuries inhabited the Anatolian plateau: from Phrygians, Armenians and Carduchians, to Romans and Byzantines, Arabs, Seljuks, Mongols and Ottomans, perhaps also including the Bronze Age and the Iron Age (Hittites and Urartu).

The symbols presented in this work have been modified and adapted over the years as a result of our increasing experience and the need to make them simpler and easier to understand.

The symbols are divided into 7 sections.

- Topographic symbols (Fig. 1). These represent different classes of significant survey points: position, altitude, viewpoint.
- Abbreviations (Fig. 2). We have developed a set of abbreviations, consisting of two letters inside a frame, which represent specific elements. In our experience, we felt it sometimes appropriate to use these acronyms to avoid extended writing, or in addition to or in place

ABBREVIATIONS SIGLE		
barrier door		porta a barriera
connecting pit (manhole)		pozzo collegamento (passo d'uomo)
grape-treader		pigiatoio
horizontal trap		trappola orizzontale
millstone-door		porta-macina
loophole spy-hole		feritoia spioncino
shielding-door		porta-scudo
ventilation shaft		pozzo aerazione
voice-pipe		portavoce
vertical trap		trappola verticale
domestic cistern		acquaio (deposito idrico domestico)
wing-door		porta a battente
well		pozzo idrico

Fig. 2: abbreviations (drawing R. Bixio).

Fig. 2: sigle (grafica R. Bixio).

of icons. Abbreviations can be added to a serial number to identify reoccurring elements at different locations.

- Roads and water (Fig. 3). Map symbols for transit routes and water features in artificially rock-cut contexts.
- Cut marks (Fig. 4). Indicating the method of excavation of an artificial cavity: direction of work, junction and divergence points.
- Underground features (Fig. 5). Symbols used to highlight particular physical features inside the artificial cavities (levels, slopes, sediments, floodings), and functional elements such as footholds, niches for lighting, blocking systems etc.
- Cavity types (Fig. 6). Map symbols (at the entrance point) allowing a first identification of the type of cavity present at the site, with reference to the main function of the structure as deduced from the evidence preserved.
- Finds (Fig. 7). Symbols for archaeological evidence.

It is obvious that our table is only a partial contribution to the development of a general system of symbols. Those proposed here may refer to specific elements that are not found at any other site. Conversely, symbols related to particular features present elsewhere are definitely missing.

The table can be enhanced not only by adding symbols

ROADS and WATER VIABILITÀ e IDROGRAFIA		
rock-cut way rock-cut path rock-cut farm track rock-cut stairs		passaggio rupestre sentiero rupestre campestre rupestre scalinata rupestre
rock-cut aqueduct water channel underground aqueduct		acquedotto rupestre a cielo aperto (in trincea) sotterraneo
stone wall		muro in pietra
masonry shaft		pozzo in muratura
natural shaft		pozzo naturale
rock-cut pits manhole (connection shaft)		pozzi rupestri passo d'uomo (di collegamento)
inclined shaft		discenderia
ventilation shaft		pozzo di ventilazione
well		pozzo idrico
shaft with raised edges (for qanat)		pozzo con bordi rialzati (di qanat)
water body		bacino idrico
catchment mouth		bocca di captazione
water flow		direzione flusso acqua
spring		sorgente

Fig. 3: roads and water (drawing R. Bixio).
Fig. 3: viabilità e idrografia (grafica R. Bixio).

CUT MARKS SEGNI DI SCAVO		
direction of cut		direzione di scavo
superimposed cut-marks		sovrapposizione
junction point		punto di incontro
divergence point		punto di divergenza

Fig. 4: cut marks (drawing R. Bixio).
Fig. 4: segni di scavo (grafica R. Bixio).

specific to other situations, but also optimising those proposed or introducing more effective symbols.

Note to plates

- 1) The term “rock-cut” means “artificially carved in the rock”.
- 2) The symbols are in black and white.
- 3) The symbol used varies according to the scale and the level of detail.
- 4) Some symbols may be used for recording both surface and underground surveys.

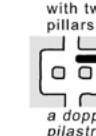
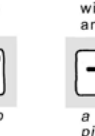
UNDERGROUND FEATURES MORFOLOGIE IPOGEE		
upper edge of cavity entrance		bordo superiore ingresso cavità
underlying structure		struttura sottostante
overlying structure		struttura soprastante
gradient at pavement level section view apex bottom plan view		pendenza suolo vista in sezione culmine fondo (gola) vista in pianta
step gradient		pendenza gradini
solid rock		roccia viva
rock-cut surface (anthropic)		superficie roccia scavata (dall'uomo)
earthy deposit		riempimento terroso
collapse		crollo
tunnel obstructed by collapse/deposit		cunicolo occluso da crollo / riempimento
tunnel blocked intentionally		cunicolo tamponato intenzionalmente
flooded tunnel		cunicolo allagato
tunnel lined with ashlar		cunicolo rivestito da conci
closing device with millstone-door dispositivo chiusura con porta-macina		
with pillar and groove		a pilastro e incastro
with two pillars		a doppio pilastro
with pillar and slab		a lastra e pilastro
with two slabs		a doppia lastra
rock-cut ring (hanger) wall ring ceiling ring		anello di roccia (attaccaglia) anello a muro anello a soffitto
handhold		maniglia (appiglio)
foothold		pedarola
pigeon nest (pigeonhole)		nido per piccione (celletta / casella)
lamp niche		nicchia per lampada
pole/bar hole (notch)		buca portaia (incastro per palo)
bayonet connection notch		incastro a baionetta (a virgola)
standard-small basin		vaschetta-campione
pillar cut off at the ceiling		colonna troncata sul soffitto
pillar cut off at the base		colonna troncata alla base
rock-cut manger		mangiatoia di roccia
silos mouths		bocche di sili
bell-shaped silo		silo a campana
wells: see ROADS and WATER / pozzi: vedi VIABILITÀ e IDROGRAFIA		

Fig. 5: underground features (drawing R. Bixio).
Fig. 5: morfologie ipogee (grafica R. Bixio).

CAVITY TYPES TIPI DI CAVITÀ		
generic cavity (artificial)		cavità generica (artificiale)
cave (natural cavity)		grotta (cavità naturale)
underground water work		opera idrica sotterranea
rock-cut apiary		apiario rupestre
rock-cut dovecote		piccionaia rupestre
rock-cut kitchen		cucina rupestre
rock-cut refectory (trapeza)		refettorio rupestre (trapeza)
domestic cistern		acquaio domestico
rock-cut grape treader/winery		pigiatoio/cantina (vineria) rupestre
underground shelter		rifugio sotterraneo
rock-cut tombs		tombe rupestri
chamber tomb		tomba a camera
trench tombs		tombe a fossa
rock-cut silo mouth		bocca di silo rupestre
sink-hole		sprofondamento
masonry in muratura	rock-cut rupestre	destroyed distrutto
fortress		fortezza
mosque		moschea
Buddhist temple		tempio buddista
church		chiesa
Christian monastery		monastero cristiano

Fig. 6: cavity types (drawing R. Bixio).

Fig. 6: tipi di cavità (grafica R. Bixio).

References

(from which the symbols are derived)

BIXIO R., CASTELLANI V., SUCCHIARELLI C. (Eds.), 2002, *Cappadocia, le città sotterranee*, Istituto Poligrafico e Zecca dello Stato, Roma.

FINDS REPERTI		
ceramic finds		reperti fittili
bone finds		reperti ossei
wooden finds		reperti lignei
hole with wooden remains (peg)		foro con resti lignei (piolo)
inscription		iscrizione
cross		croce
	 painted-carved dipinta-incisa	

Fig. 7: finds (drawing R. Bixio).

Fig. 7: reperti (grafica R. Bixio).

BIXIO R., CALOI V., CASTELLANI V., TRAVERSO M., 2009, *Ani 2004: surveys on the underground settlements*, British Archaeological Reports, International Series S1944, Archaeopress, Oxford.

BIXIO R., DE PASCALE A. (Eds), 2011, *Ahlat 2007. Preliminary surveys on the underground structures*, British Archaeological Reports, International Series S2293, Archaeopress, Oxford.

BIXIO R., DE PASCALE A., PEKTAŞ K., 2011, *Indagini preliminari sulle strutture ipogee del Kale di Bitlis (Turchia sud-orientale)*, in magazine Archeologia Medievale XXXVIII, All'Insegna del Giglio, Firenze, pp. 321-332.

BIXIO R. (Ed), 2012, *Cappadocia, records of underground sites*, British Archaeological Reports, International Series S2413, Archaeopress, Oxford.

BIXIO R., DE PASCALE A., KARAMAĞARALI N., (Eds), 2013, *Ahlat 2008. Second campaign of surveys on the underground structures*, British Archaeological Reports, International Series S2560, Archaeopress, Oxford.

DE PASCALE A., BIXIO R., 2012, *Underground passages in defensive structures of eastern turkey: the cases of Bitlis, Ahlat and Ani*, Proceedings International Seminars CRHIMA-CINP - May 2011 Massafra - "Rupestrian settlements in the Mediterranean region", Università degli Studi di Firenze (Dip. Architettura), Firenze, pp. 139-153.