Artificial caves shelters in vertical tuff escarpments in Cappadocia (Turkey) and Upper Mustang (Nepal)

Igor Grek[1], Nataliya Moldavska[1,], Mike Shyrokov[1]*

Abstract

Carved in vertical tuff escarpments systems of artificial caves shelters were explored by the authors in the territory of Cappadocia (Turkey) and Upper Mustang (Nepal). Plans of each of the underground systems were drawn. Defensive devices, dwelling rooms, premises for water and supply storage, cult structures, toilets, observation points, etc., were identified in the structure of the cave systems. Analysis of designation of separate premises and technological traces allowed to establish relative chronology of development of the underground systems. It is noted that creation of such underground structures did not take place at once. Similarities and differences in the structure of such objects in the territory of Cappadocia and Upper Mustang are discussed in the present work. Basic type of defensive devices in the complexes cut vertically are shafts, mouths of which were covered with wooden or stone lids. Development of defensive systems initially took place by way of creation of several defense lines. Later separate shelters, probably designed for single families, were connected into large systems.

Keywords: defensive devices, artificial caves, rock-cut complexes, Cappadocia, Upper Mustang.

Introduction

Cappadocia is a historical region located in central Anatolia. It is well known for large number of artificial caves cut in soft volcanic rocks. The latter formed due to eruption of volcanoes Erciyes, Hasan, etc. (fig. 1).

Complexes of artificial caves cut in vertical tuff escarpments are commonly referred to as rock settlements (Gülyaz *et al.,* 2007). One can see farms of the Byzantine period cut in the foot of stone slopes. Caves located a little higher above them, as a rule, are shelters – premises designed for defense of the residents or their property, equipped with special defensive devices.

Small shelters usually belong to one farm. Cappadocia shows a number of examples of such structures of various forms, depending on relief peculiarities and combining attached and cut in the rock constructions.

The main type of defensive devices in Cappadocia shelters developed vertically, are shafts, mouths of which were covered with wooden or stone lids (fig. 2). Millstone doors and loopholes were used alongside with other defensive devices.

Premises of the shelters can contain dwelling rooms, reservoirs for water storage or wells, chambers for storage of supplies or property, sometimes stables for cattle, cult structures (churches or aediculas) (Grek *et al.*, 2019), toilets and observation points.

Complexes of artificial cave shelters in Upper Mustang (territory in northern Nepal, on the border with China) are less known (fig. 3).

Nevertheless, explorations by Darnal, Simons and Schön (Simons *et al.*, 1998; Darnal, 2008), in this region found complexes of artificial cave shelters visually similar to those in Cappadocia.

Explorations of such rock cut defensive devices are of high importance because such forms of Medieval farm fortification among the monuments of above-ground architecture have not preserved.

Cappadocia

One of the examples of defensed cave complexes of the simplest form in Cappadocia is complex Zemi-2 in the vicinity of Göreme (Bobrovskyy *et al.*, 2015) (fig. 4).

Initially it was small farm cut in tuff cone. It contained winery, grain holes and feeders. Nevertheless, entrance to the premises was three meters above the surface (anti-ram device), protected with wooden door with massive door latch. At the next stage entrance corridor of the complex was closed with millstone door and the premises of the first level became well defensed temporary shelter of the simplest type. Its further development was related to cutting well K1 to the second level. Advancement of defense capacity of the complex at this stage is connected not only with creation of a group of premises of hard access at considerable height (figs 3, 4, 5), but also with digging of

[1] Speleological club «Poshuk», Odessa, Ukraine

* Reference author: m.nataliya.at@gmail.com

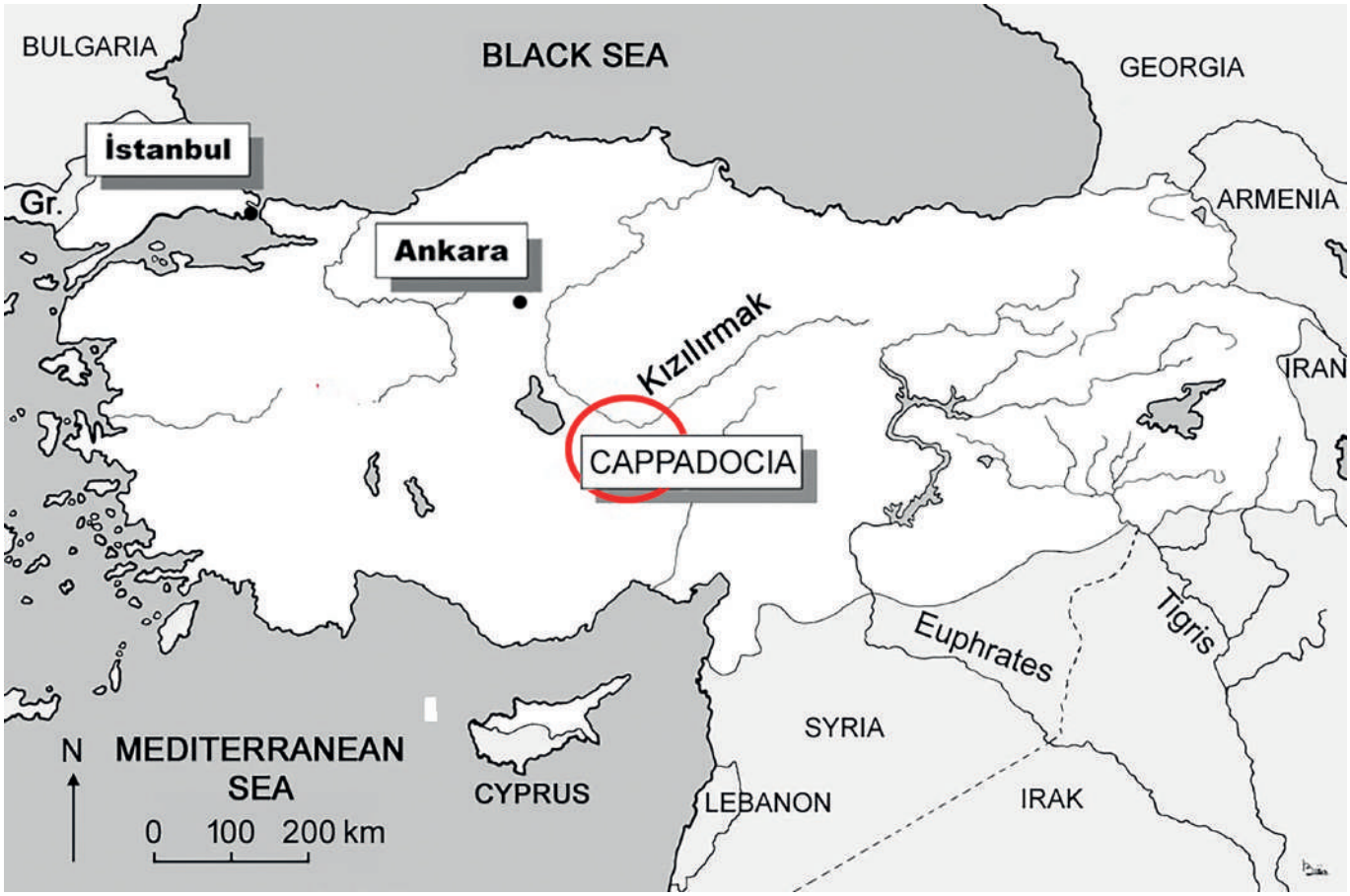

Fig. 1 – Cappadocia - a historical region located in central Anatolia (drawing R. Bixio).

Fig. 2 – Vertical mine in the rock settlement of Yaprakhisar (photo T. Skrypnyk).

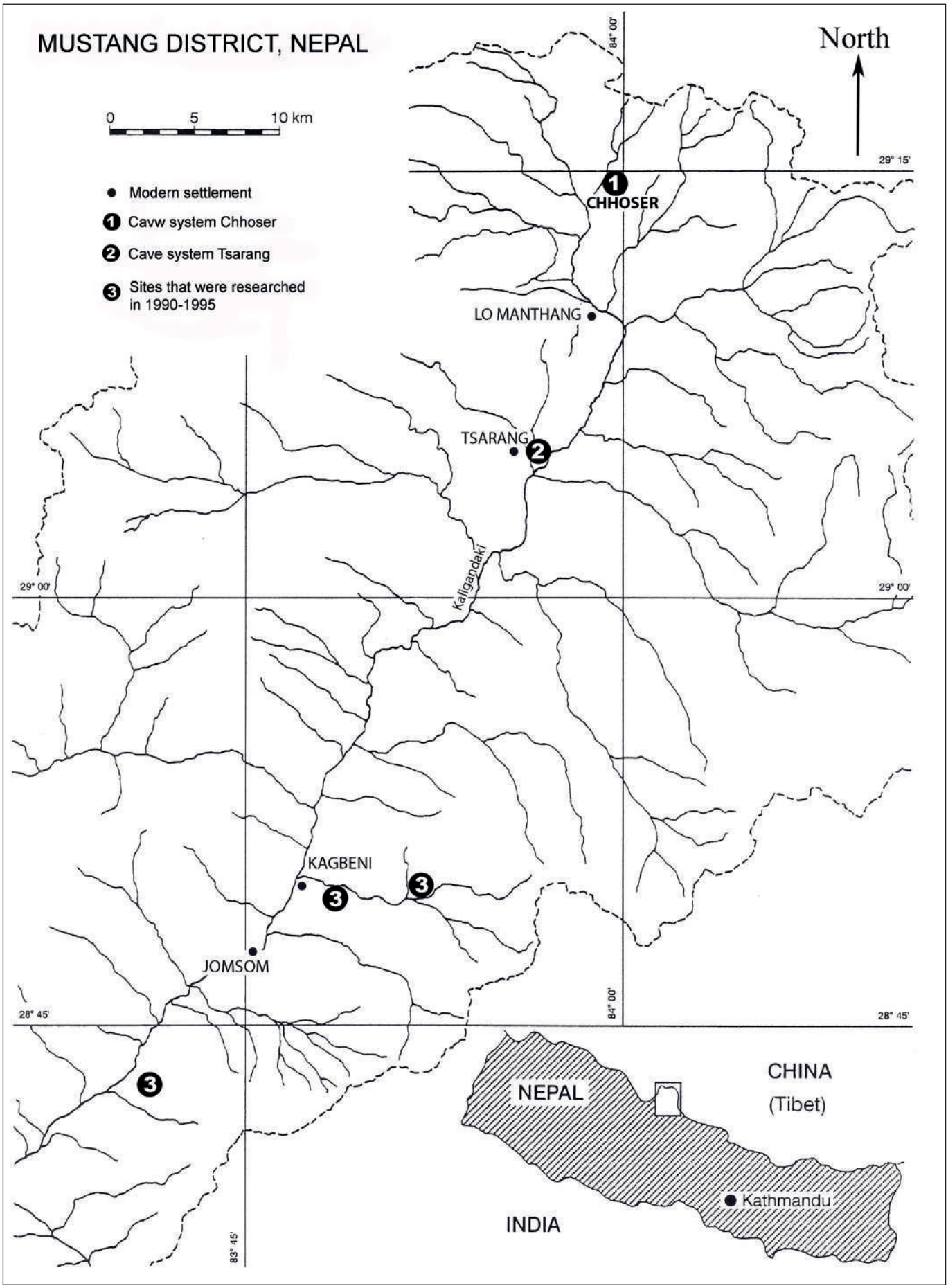

Fig. 3 – Complexes of artificial caves in Mustang (figure R. Bixio).

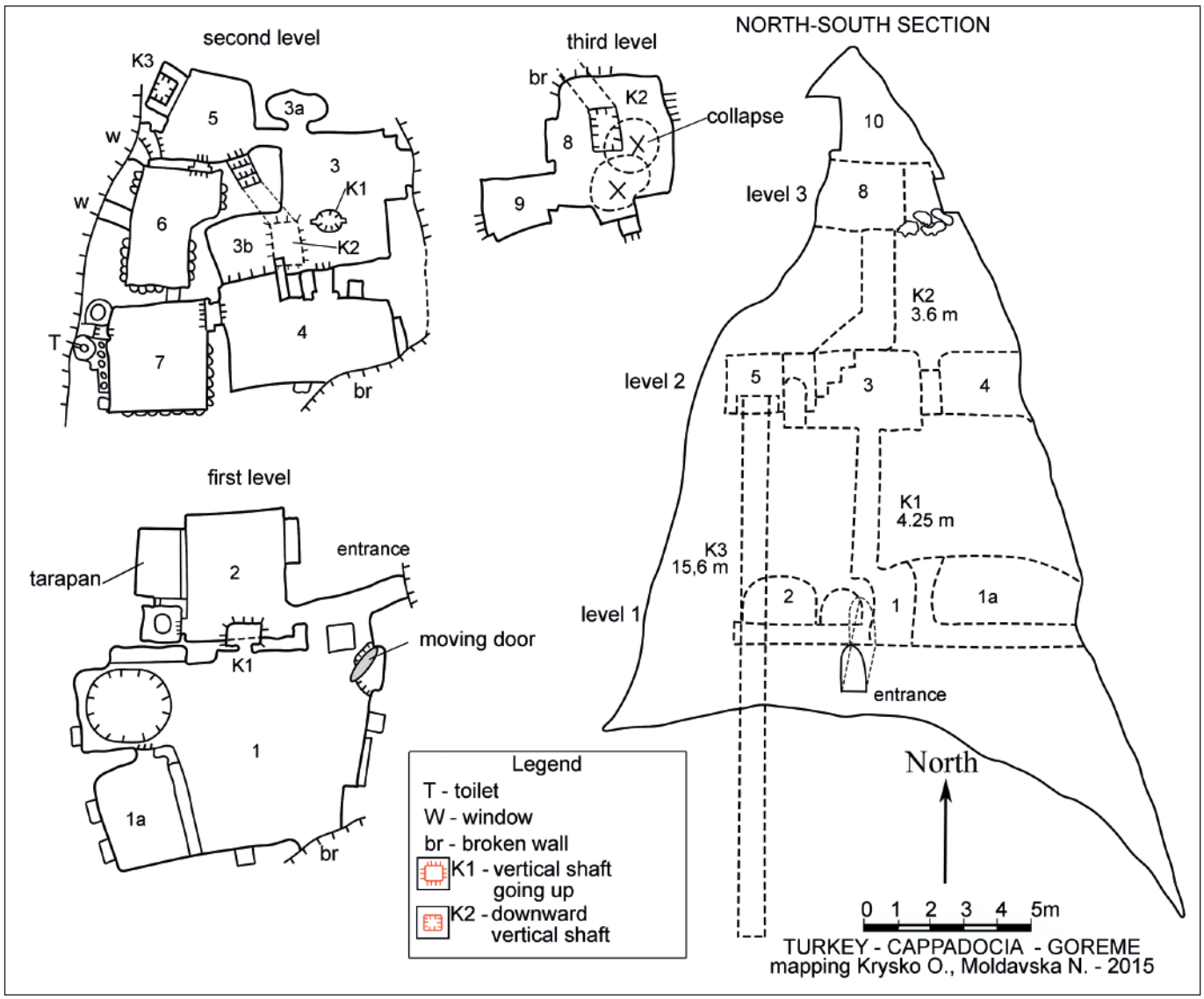

Fig. 4 – Complex Zemi-2 in the vicinity of Göreme. Plan and section. (mapping O. Krysko and N. Moldavska, 2015).

water well in chamber 5. This made the complex fit for long term siege. Among the premises of the second level there is only one storage room. Another chamber contains aedicule.

Probably after some time two more chambers were cut in the second level – chambers 6 and 7 that served as observation points. One of them was equipped with toilet. Either at the same time or at the next stage the structure of the shelter got even more complicated: premises of third and fourth levels were made with the only access through well K2.

An example of complex with similar structure is the object described by us in (Bobrovskyy *et al.,* 2015). It is located in the mouth of the Red Valley in the vicinity of Göreme (fig. 5). Unlike the one in Zemi-2, which was cut in cone, this object was cut in vertical cliff. It contains four levels and several defense lines protected with defensive devices: millstone doors, loopholes, small covered wells and steep stairs. The entrance located high above (anti-ram device), storage rooms, water wells, outer toilets also confirm the defensive nature of this construction. One may see that its development took place in several stages, too (Bobrovskyy *et al.*, 2015).

In case when several farms were situated near each other at foot of a high cliff, like in Yaprakhisar and Tekkaya (Bobrovskyy *et al.*, 2016). we found that initially all of them had had separate shelters protected by several defense lines of defensive devices. Later these shelters were connected, forming a structure that implied capacity of both common and separate use. Obviously, it allowed to save resources (e. g. common use of deep-water wells), as well as concentrate powers of the defending on focus areas of higher danger.

Upper Mustang

Complexes of artificial caves in Upper Mustang are not so well known. Here the valley of river Kali Gandaki pierces the chain of the Himalayas and is the only

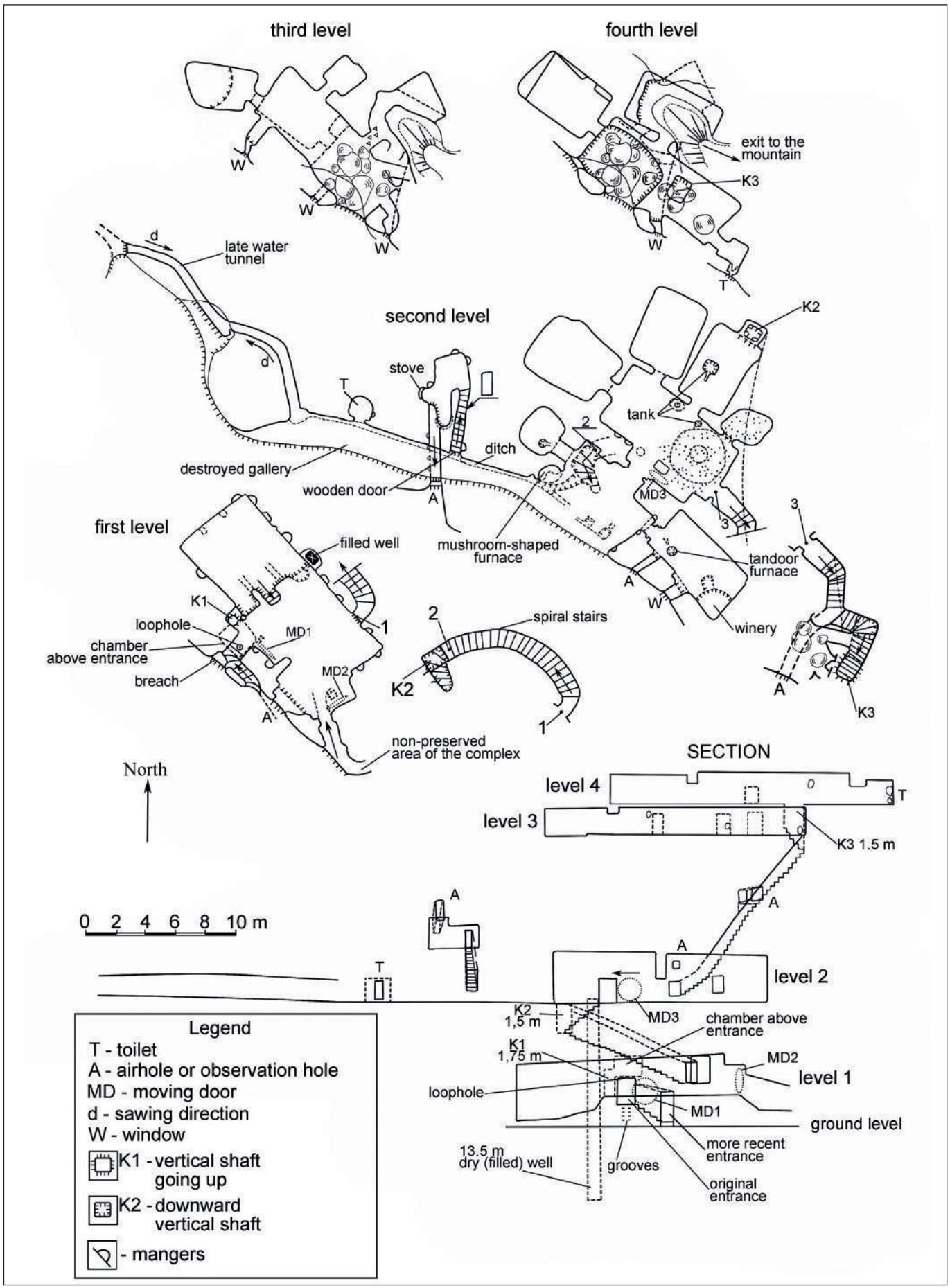

Fig. 5 – Complex at the mouth of the Red Valley. Plan and section of the underground system (mapping N. Podrutska, drawing N. Moldavska).

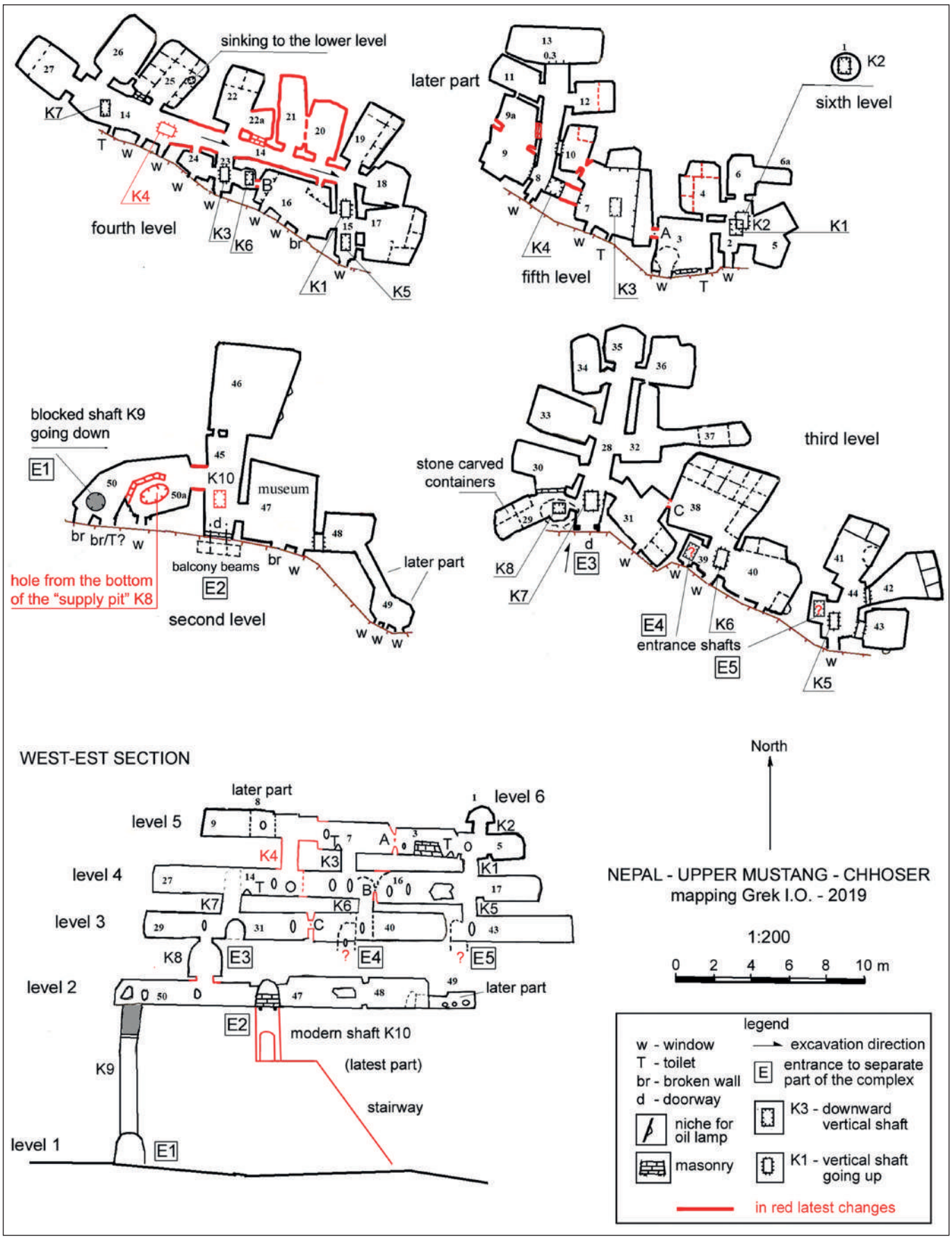

Fig. 6 – Choser. Upper Mustang. Nepal. The evolution of the underground system (mapping I. Grek, 2019, drawing R. Bixio).

Fig. 7 – Tsarang (Charang). Upper Mustang. Nepal. Front wall of the cave complex (photo N. Moldavska).

trade way that was used during hundreds of years for transportation of salt from Tibet to northern provinces of India. Ability to control this trade way in the past determined significant strategic position of Mustang.
The authors visited Upper Mustang in November 2019 and examined about 30 cave complexes located at height from 3500 to 4200 m (Grek *et al*., 2019).
We should note that a number of artificial caves in Mustang were cut in rock escarpments at considerable height. Obviously, such cave complexes first of all have the defensive function. Such cave systems were not designed for permanent residence that is clearly evidenced by the fact that they coexisted with settlements on the ground. Besides, the explorers noticed periodical nature of their use (Simons A *et al*., 1998).
According to local residents, some small cave systems designed for one family are there along with large systems.
Two large cave complexes were explored by us in Choser and Tsarang (Charang) (Grek *et al*., 2021a; Grek *et al*., 2021b).
The complex in Choser is well preserved, contains 53 chambers located at six levels connected with vertical shafts used as defensive devices.
The chambers of the system are of the following kinds: 9 living rooms and 32 storage rooms. There are windows in the living rooms. Sometimes there are sleeping ledges and toilets in such chambers.
In two cases small arched doors come out to facades of rocks at third and fourth levels (in one case it was equipped with a small balcony). In our opinion, initially these doors were entrances to separate parts of the cave system.
One may notice that in the case with the cave complex in Choser the functions of shelter and storage place are combined.
Studying of direction of cutting in the underground complex showed that it had initially consisted of several – four or five – separate parts that, probably, belonged to different families and later were connected with each other into one system (fig. 6).

Another large eight- leveled cave complex was explored by us in the vicinity of Tsarang (Charang)[1]. It was cut in cliff of southern bank of a creek, right confluent of the river Kali-Gandaki, to the east of Tsarang (Charang). Ruins of a building, fundament of which is made of coarse pebbles on clay, preserved at the foot of the cliff. This building slightly covers approaches to entrances into the cave system (fig. 7). Rock façade preserved in fine condition at upper levels of the cave complex. Two lower levels are too destroyed, whereas the third one preserved partially. Plan and section of the underground system are shown in (fig. 8).
Cave complex in Tsarang (Charang) consists of 37 chambers, two galleries, two corridors and seven wells. Total length of the system is 225 m. Height from the foot of the cliff to the upper point is 23 m.

[1] Two large cave systems, northern and eastern ones, are known in the vicinity of Charang (Parkash, 2008). We described the one located to the north of Charang.

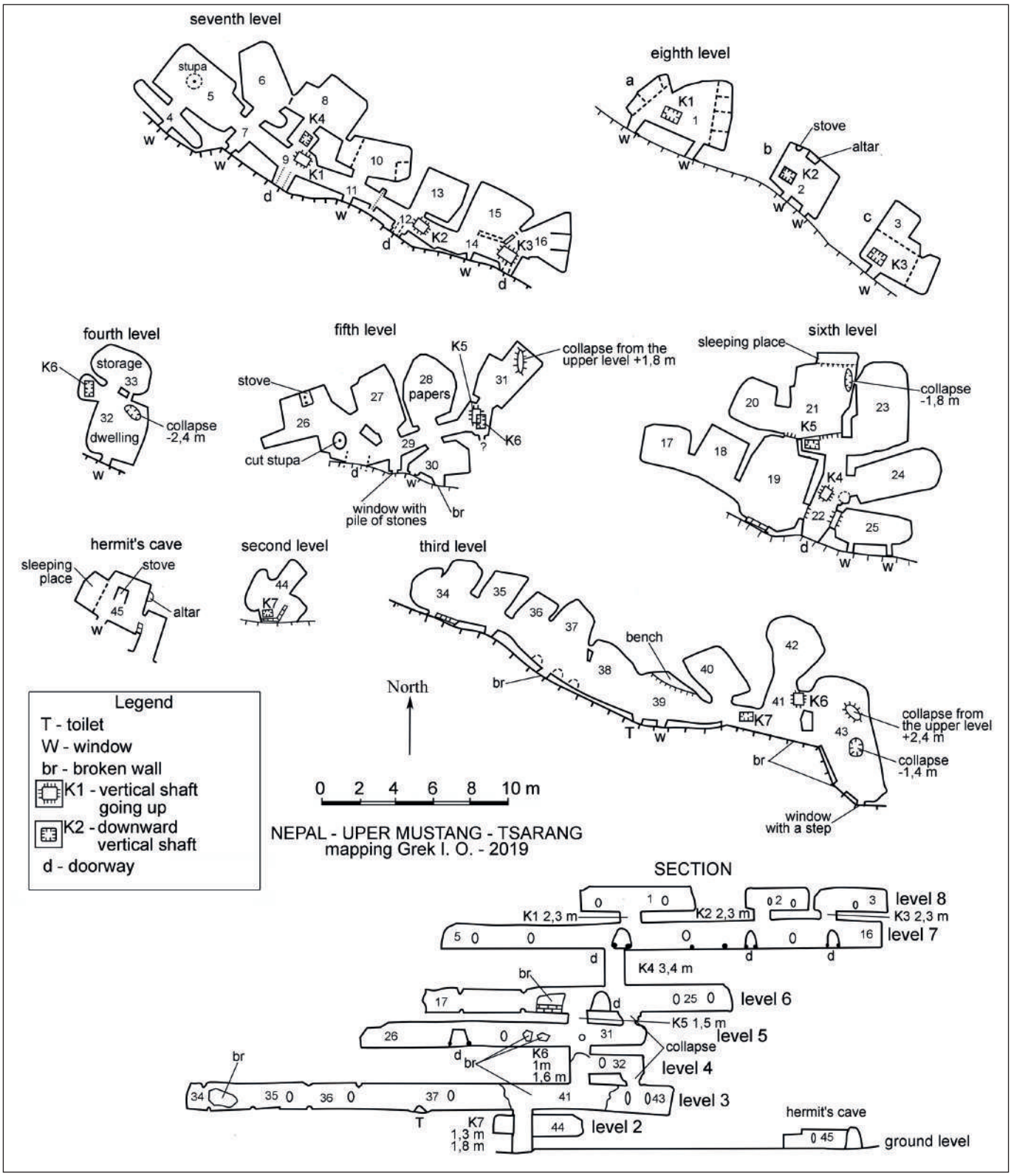

Fig. 8 – Tsarang (Charang). Plan and section of the underground system (mapping I. Grek, 2019, drawing N. Moldavska).

At least 10 of these premises are living rooms and at least 17 of them are storage rooms. It is interesting to note that walls made of mudbricks, which split the rooms into sections for storage, preserved only in several premises. It shows that in this complex such walls, which can be found all-round in cave complexes in Mustang (Simons *et al.*, 1998, Grek *et al.*, 2020), were demolished at later stage of exploitation.

Besides, this cave system contains 7 wells connecting different levels of the system. Grooves for hands and feet preserved in the walls of the wells.

Such wells are defensive devices, indicative of the fact that the cave system was initially formed as a shelter. Mouths of wells were covered with lids, and in some places, they were locked with special devices, traces of which are well preserved, for example in well K7.
The available data do not allow us to build the exact model of development of the cave system in Tsarang (Charang).
Probably the first stage of development was the badly destroyed first level with the chamber of shelter of the 2nd level. The third level, which.h includes the chamber with stupa, chamber with toilet and chamber of 4-th level shelter, in our opinion, also was one of the earliest stages of development of the complex.
It can be assumed that three separate 2- leveled shelters existed on 7-8 levels of the cave system. These separate systems, as we assume, were cut from the façade entrances 7, 9 and 14, and later connected with the gallery on the seventh level into one system.
Obviously, the cave system with the adjacent wall form a defensive complex (quite strong by local standards).
There are several premises in the explored cave system that have signs of religious use: chamber 5 (square stupa), 26 (cut stupa) and 45 (chamber for meditation used at the present time as well). Hence it is possible that the cave complex at some stage, probably at the last stage of its existence, was an important religious center.

Conclusion

One may note wonderful similarity of appearance of the large complexes of artificial caves of Upper Mustang and rock complexes of Cappadocia. This similarity of appearance becomes more intriguing during analysis of specific construction details and techniques used at construction.
Comparing the artificial caves in Cappadocia and Upper Mustang, we should highlight the following:

- We are studying two regions with similar environmental conditions: dry, without forests, with tuff rocks (more homogenic in Cappadocia), pierced with deep valleys and with lots of rock escarpments.
- Caves of various designation had been created at these territories for a long time. Both in Cappadocia and Upper Mustang the earliest artificial caves were tombs.
- We saw similar traces from tools on walls of the caves. Probably, in both regions pick-axe was used to cut the underground spaces.
- Artificial caves cut at considerable height in rock escarpments bear the function of shelters. They contain: premises for temporary residence, storage chambers, aediculas – places for praying, observation points and toilets. Creation of such structures did not take place at the same time. Initially development of the defensive systems took place by means of construction of several defense lines. In some cases, separate shelters, probably designed for one family, were connected into large systems.
- Large complexes of artificial caves in vertical escarpments both in Cappadocia and Upper Mustang show similar architecture: galleries stretching along the cliff at several levels and connected with vertical wells. Internal premises are grouped around the galleries or small corridors that stretch deeper into the rock massive.
- Vertical shafts were used as defensive devices both in Cappadocia and Upper Mustang rock cut complexes.
- Active development phase of the large cave complexes took place in the Middle Ages, mostly from the 10th to the 15th century. The territory of Mustang in this period became the arena for battles between Tibet and Indian princely states that continued for several centuries (Simons et al., 1998), whereas the territory of Cappadocia was constantly attacked in several large-scale military campaigns and a number of internal strifes (Gülyaz et al., 2007).

At the same time there is an array of differences between the rock complexes of artificial cave shelters in Cappadocia and Upper Mustang:

- Defensive devices in Cappadocia are more various. For example, millstone doors were not used in Upper Mustang, unlike in Cappadocia. First of all, it may be explained by the rock quality.
- By the same reason we did not find traces of extraction of stone blocks during cutting of the underground complexes in the territory of Upper Mustang. Tuff blocks were not used for construction there.
- To make sections in storage chambers in Upper Mustang mudstone walls were built.
- Complexes of artificial caves in Upper Mustang were equipped with balconies, sometimes quite prolonged ones. We never found such technique in cave complexes in Cappadocia.
- One should also point out the difference in construction of furnaces used in Upper Mustang probably for heating the chambers for temporary residence in the shelters.

In conclusion, we should note that only a small and the most accessible part of cave objects in Upper Mustang was explored by us. There is a number of unexplored complexes of artificial caves in this region and in the territories bordering with Tibet. Further explorations of these monuments will be highly significant for understanding the general laws of development of rock architecture.

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