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CHALCOSTIBITE: A NEW MINERAL FROM FELSŐBÁNYA (BAIA SPRIE, ROMANIA)

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ABSTRACT

Crystals macroscopically reminding of chalcostibite were found in mineral group from Felsőbánya (Baia Sprie, Romania) in summer 1988. Studies performed in the Department of Mineralogy, Geochemistry and Petrology warranted this inference.

Number of sulphide minerals from Felsőbánya (Baia Sprie) increased to 40 by identification of chalcostibite.

INTRODUCTION

Felsőbánya (Baia Sprie) is perhaps the most varied mining area of the mine region near Nagybánya (Baia Mare) in the Gutin Mountains from a mineralogical point of view. Andorite, semseyite, felsőbanyite, dietrichite, klebelsbergite, monsmedite and szmikite were first described here.

Chalcostibite was known as a mineralogical rarity in the three other mining areas (Kapnikbánya - Cavnic, Herzsabánya - Herja, Erzsébetbánya - Baiuţ) of the Nagybánya (Baia Mare) mining region, although it was not proved in every case (Lapis, 7-8./1996).

During the last decade, mining activity removed from the 'Bányahegy' to the pit 5 located in 2-3 km from and ENE of there. Veins produced here have similar genetics to those of the Bányahegy, and many of them are their continuations. Mineral assemblages occurring in the veins in a certain depth are absolutely similar to each other in some cases. Locality of the 'new' chalcostibite occurrence is a druse in a 40-90 cm wide polymetallic vein produced at the level XI (cca. -580 m) of the pit 5.

MINERALOGICAL CHARACTERISATION OF CHALCOSTIBITE

Name of this mineral cames from the Greek χαλκοζ (copper) and σΥιβι (antimony) words.

Zinken was the first who mentioned $CuSbS_2$ as 'Kupferantimonglanz' (ZINKEN, 1835), however, it was called as chalcostibite as early as 1847 (GLOCKER, 1847). After its German locality, Nicol called it as wolfsbergite (NICOL, 1849), and Cumenge named it as guejarite after its occurrence in Spain (CUMENGE, 1879). It can be found as chalcostibite again in Dana's mineralogical system (1868), the most accepted system at that time.

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Chalcostibite is an ABX_2 (A:B ~ 1:1) type complex copper-antimony sulphide, a sulfosalt as it was called earlier, and it is the denominative member of the chalcostibite group (PALACHE, 1944).

It is often ranged among the 'copper-bismuth sulfosalts' ($xCu_2S+y(BiSb)_2S_2$ in the mineralogical literature (KOCH, SZTRÓKAY, 1994).

The new mineralogical systems (WEISS, HOCHLEITNER, 1994) mention it as a copper-containing and (S:As,Sb,Bi=x; x=2.0) type sulfosalt, member of the chalcostibite-hodrushite series. However, hodrushite as an independent mineral is not absolutely accepted.

Chalcostibite often contains lead and iron less than 1 %.

$CuSbS_2$ is a rhombic holohedral mineral. It crystalises in the form of long acicular or short rhombic prisms (Bolivia and Peru: Huanchaca, Oruro, Machacamarca, Almona, Bustillos, etc.). The classic European localities are Wolfsberg (Harz Mountains, Germany) and Guejara (Granada, Spain), where chisel- and blade-like tabular crystals // (010) with strongly fibrous prisms are characteristic (wolfsbergite and guejarite types).

Mean size of the chalcostibite crystals is 1-2 mm, but prismatic crystals of 6-9 cm also occur in some localities, e.g., Oruro and France (Le Régne Mineral, 5./1998). However, it can be found as disseminated or massive grainy mass in the most occurrences.

Hardness of chalcostibite is 3-4, its cleavage is perfect along (010), its fracture surface is uneven and has high lustre.

The chalcostibite crystals have metallic lustre, and they are lead-grey or dark blackish grey. They are fibrous parallel to the c-axis. Their surface is often plated by metallescent blue or bluish green cover.

The $CuSbS_2$ is a non-frequent mineral of the hydrothermal polymetallic Pb-Zn-Cu-Ag-Sb mineral deposits. In general, it is formed under epithermal conditions together with bournonite, andorite, antimonite, berthierite, stannite, chalcopyrite, pyrite, sphalerite, galena and quartz.

RESULTS

The chalcostibite from Felsőbánya is a crystal aggregate which macroscopically has high lustre, and lead-grey or dark grey colour. A steel-blue cover can often be observed on it.

In general, the crystals are 1-2 x 0.2-0.4 mm elongated tables or chisel-like crystals of 0.1-0.2 mm width; some of them are 0.5 cm long (*Fig. 1.*). Crystals of this type are similar to the crystals found in Guejara (Spain), the face (010) is much more developed, therefore, these crystals have a well-developed thin tabular or blade-like habit. On the basis of the German analogy, crystals from Felsőbánya have a wolfsbergite-type morphology (*Fig. 2.*).

There are long, elongated prismatic, almost acicular chalcostibite crystals of Felsőbánya, too.

It is characteristic for both types that crystals do not have too many faces, and even the ends of the crystals did not crystalise, and faces parallel to the c-axis can be distinguished. Moreover, strong fibrous structure can be observed on these faces (*Fig. 3.*).

Mineral paragenesis occurs together with chalcostibite is also interesting and remarkable.

Fig. 1. Chalcostibite from Felsőbánya (15x)

Fig. 2. Chalcostibite crystal from Felsőbánya (25x)

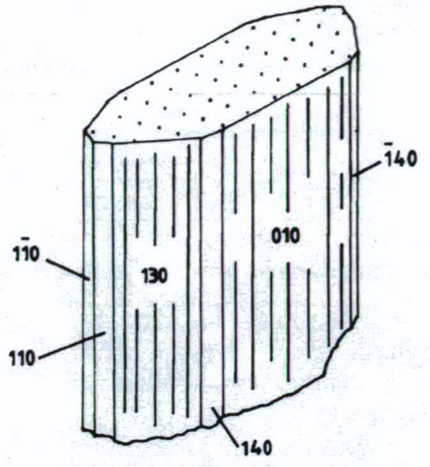

Fig. 3. Chalcostibite crystal from Felsőbánya

Fig. 4. Sheaf-like crystal group of chalcostibite on chalcopyrite (10x)

From an economic geological point of view, the ore deposit near Felsőbánya is a subvolcanic meso- and epithermal ore mineralisation that dominantly has the so-called Pulacayo-type Pb-Zn veins (SCHNEIDERHÖHN, 1962). The ore deposit is in connection with rhyolitic volcanism; it is quite uncommon in this mining area.

The ore veins were formed by pulsating phases thus they have striped-banded and often telescope structure. As depth increases as Au-Ag rich epithermal paragenesis is changed by mesothermal Cu-Zn-(Pb) mineralisation. Veins ramify in the 200 m zone near the surface.

The exact locality of chalcostibite is an exhausting but druse- and hole-rich end of a side vein at the level XI of the pit 5. The vein is dominantly of chalcopyrite and quartz in banded disposal, and subordinately of pyrite and sphalerite.

Amongst the minerals occurring on the wall of the druse of the vein pyrite and chalcopyrite represents the earliest phase. A metallescent, tobacco-coloured cover can be observed on the chalcopyrite crystals which often reach 2 cm. Further study is necessary to identify it.

Sheaf-like, or sometime acicular, aggregates of chalcostibite grew up on the chalcopyrite crystals (*Fig. 4.*).

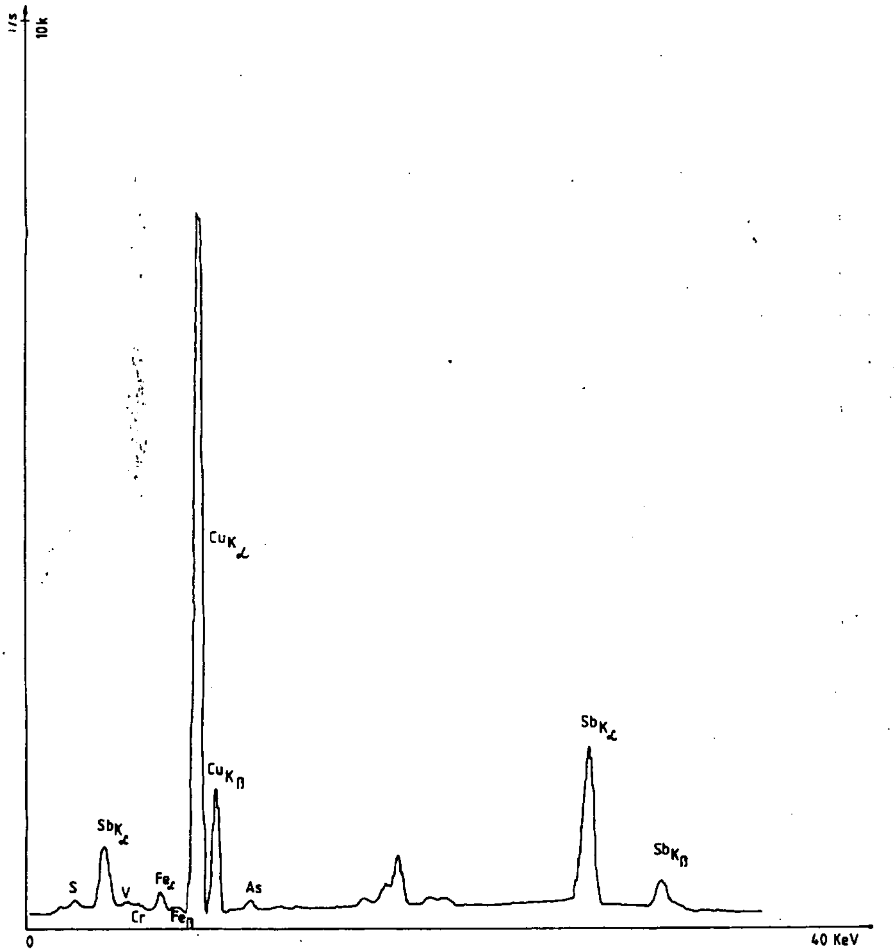

Fig. 5. XRF pattern of chalcostibite from Felsőbánya

The final phase is represented by dolomite perimorphs of calcite or dolomite rhombohedrons. The rhombohedrons and the discoidal crystal groups of rhombohedrons are spongy, and a cover of quartz crystals of smaller than 0.2 mm can be found on the lower and upper surface of the dolomite crust forming the rhombohedrons. The perimorphs and the larger quartz crystals might be formed at the same time because building of the carbonate perimorphs in the quartz crystals can also be observed almost everywhere.

The XRF study of the chalcostibite shows that beside Sb, Cu and S the studied sample contains some iron and arsenic, too. Unfortunately, chalcostibite crystals can not totally be separated from the associated minerals (mainly from the chalcopyrite), and this can also result in contaminating element content (*Fig. 5.*).

By XRD studies, our samples were compared with standard chalcostibite samples from Bolivia (9-143/ SMITH, J. V. ed., 1966) and from an unknown locality (200/ MICHEEV, V. I., 1957). Results also suggest presence of chalcopyrite contamination (Table 1).

TABLE 1

Result of XRD studies on chalcostibite samples

Standard 9-143 Index of the powder diffraction file Editor: Smith, J.V. 1966	**Standard 200 Micheev, V.I.: Rentgenometritseskij Opredelitel Mineralov Moszkva 1957**	**Sample from Felsőbánya (Baia Sprie) Attila József University Department of Mineralogy, Geochemistry and Petrology 1998**
d(Å)	**d(Å)**	**d(Å)**
7.38	-	7.24165
4.67	-	4.62231
3.65	3.63	3.61931
3.13	-	3.13583
-	3.10	3.10374
3.00	2.98	3.00953
2.79	-	2.98744
2.56	2.54	2.94914
2.31	2.29	2.30493
2.24	2.23	2.24229
2.12	2.11	2.11910
1.895	1.888	1.89877
1.831	-	1.83050
1.817	1.818	1.81234
1.762	1.751	1.75704

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