HYDROTHERMAL TURMALINE FROM NAGYBÖRZSÖNY

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The *author* and Gy. *Grasselly's* paper[1] which appeared in the Acta Mineralogica—Petrographica Univ. Szegediensis Tom. VI. (1952) mainly deals with ore minerals of the mineral association of subvolcanic mesothermal origin of Nagybörzsöny. In the course of the then investigations besides the stocky small prisms of the less frequent apatite another mineral's extremely fine fibres and aggregations of entangled fibers were observed. Owing to the very small amount of the material available at that time it was not possible to identify this fine fibrous substance.

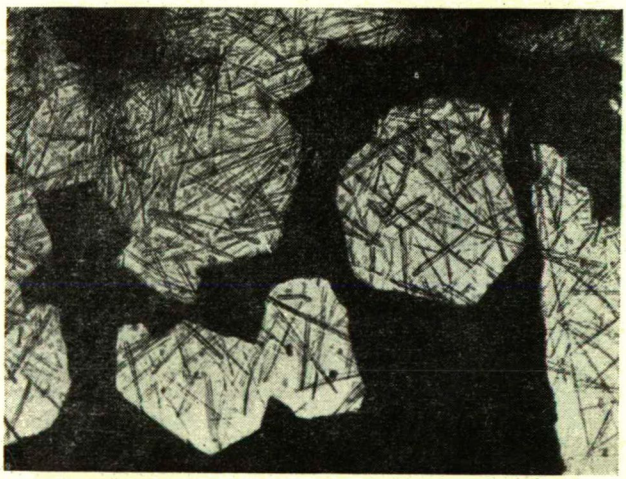

Fig. 1. Turmaline needles in quartz crystals. 1200 ×

Since then we succeeded in collecting a great deal of material from the ore dump and adit of the Alsórózsabánya of Nagybörzsöny. All the thin sections of this material, as well as the very altered accessory rocks, furthermore, the quartz and crystalline calcite associated with the ore, contained thin needle crystals — the size of which always is less than one mm — extremely fine fibers and the feltlike texture of the fibers of this

unknown mineral. *J. Erdélyi*[2] also found in the hydromuscovite which he collected in the adit and determined the unknown mineral mentioned above, according to him it interlaces the hydromuscovite with its fibers.

The small needles — usually 0,1 mm in size — and extremely fine fibres of the mineral appear as inclusions in crystalline quartz, calcite and the siderite rombohedrons of lenslike curved planes, but they also appear in ores, in pyrrhotite and sphalerite. The small needle crystals exhibit terminal endings and a trigonal-ditrigonal cross-section.

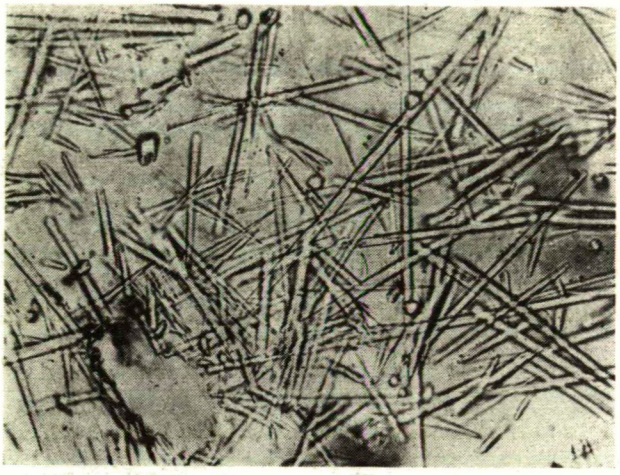

Fig. 2. Turmaline needles in quartz. The trigonale cross-section is well visible. 1200 ×

The needle crystals are situated in single, or concentric radiated groups (turmaline-suns), whereas the fine fibres may be found arranged at random in smaller or larger piles, feltlike manner. The single fibers are bent and curved.

The above mineral is mostly associated with a micaceous mineral determined by *J. Erdélyi* as hydromuscovite, from it the needles spread and branch out and it is richly interwoven with aggregations of the fine fibres.

The small fibers are colourless and the tiny needles exhibit a slightly greenish shade. The small fibers of the mineral are optically negative, their indices of refraction measured with the immersion method:

$$\omega = 1{,}65 \qquad \varepsilon = 1{,}63.$$

The small fibers were dissolved with dilute hydrochloric acid from the matrix containing calcite. The substance obtained in this manner containing in addition to hydromuscovite very many small sphalerite, pyrite and arsenopyrite crystals was first purified through manyfold settlement. Subsequently the heavy substance, the metallic impurity was separated with bromoform finaly it was purified in serial alcoholic settlements. Thus the slightly greyish substance examined consisting almost only of fine small fibers was obtained.

Spectroscopical examinations of the quartz containing an abundant amount of the feltlike texture exhibited traces of boron. The examinations were made by *Mrs. Földvári.* The final results of the examinations proved the mineral to be turmaline.

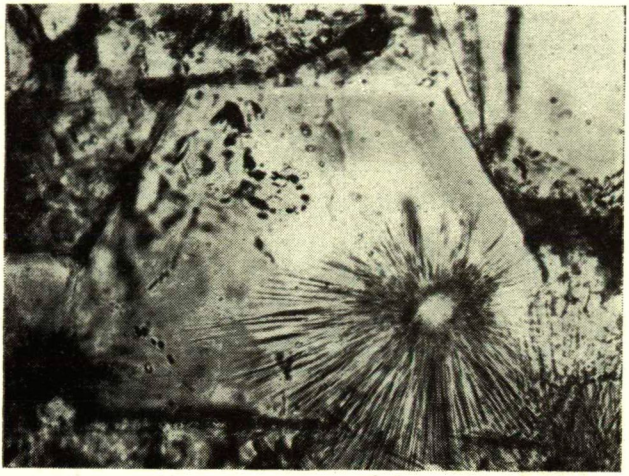

Fig. 3. Turmaline »sun«. 1200 ×

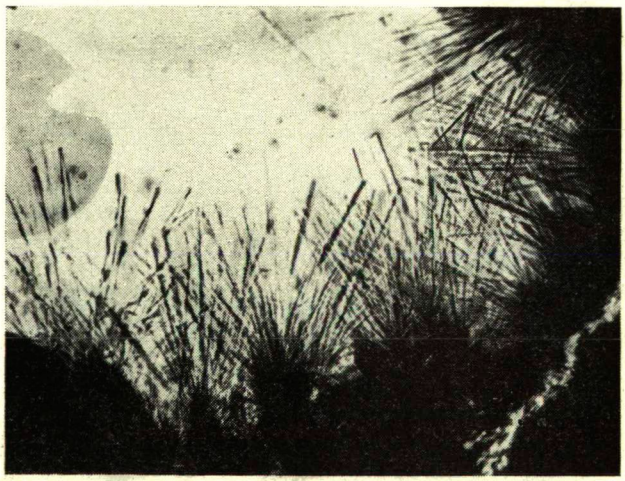

Fig. 4. Turmaline needles protruding from hydromuscovite. 1200 ×

At my request *dr. Karel Padera* docent of the Institute of Mineralogy — Crystallography and Geochemistry of the Charles University of Prague kindly examined and identified by means of X-rays the material of the fine fibers. The author wishes to express to him his gratitude for his kind

co-operation. He gave us the following information: »*Die Identifizierung des Minerals als Turmalin wurde auch röntgenographisch bestätigt. Die stärkesten Linien waren in guter Übereinstimmung (die Werte d und auch die Intensitäten) mit den Angaben in der Literatur*«.

The result of the analysis of the substance subtracting the sulphide impurities (mainly pyrite and arsenopyrite), as well as the O corresponding to the F content, furthermore the data concerning the part of the silicate recalculated to 100 per cent is as follows:

SiO_2	36,22%
FeO	1,97
Fe_2O_3	5,89
Al_2O_3	34,24
CaO	0,66
MgO	4,21
MnO	0,01
Na_2O	0,62
K_2O	1,17
P_2O_5	0,26
B_2O_3	11,24
F	1,10
H_2O	2,41
	100,00%

Analysed by *Mrs. Eve Klivényi*

The content of B_2O_3 was determined from the difference.

Turmaline this typically pneumatolytic mineral does not occur frequently in ore veins of hydrothermal origin. The ore found in Nagybörzsöny is associated with older ancient Tertiary biotite-amphiboldacite and andesite. The still very hot vapours and thermae of the residual solution *did not penetrated through well preformed cleavage systems*, but pushed up through a network of irregular fissures. In the system which was *under relatively high pressure* the alteration of the accessory rocks was very extensive, and besides the hydromuscovite, from the substance of the accessory rocks and of the boron contained in the vapours turmaline also formed which interwove with its fine threads the hydromuscovite. Both minerals were inclosed as inclusion in the younger quartz, ores and calcite. Turmaline is an interesting new member of the rich and multifarious mineral association of Nagybörzsöny.

REFERENCES

1. S. Koch, Gy. Grasselly: The minerals of the Sulphide Ore Deposit of Nagybörzsöny. Acta Min. Petr. Tom. VI. p. 1. 1952.
2. Personal communication of J. Erdélyi concerning his still unpublished paper.