THE WATER CONTENT OF POLYGONALLY CRACKED LAYER OF MOLDAVITES.

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Introduction: Tektites are natural glasses formed by a fusion and ejection of porous target rocks during impact events. Currently, four widely accepted geographically restricted areas where tektites occur are defined and referred to as strewn fields [1, 2, and references therein]. The tektites of the Central European strewn field called historically also moldavites, are associated with the Ries crater in Germany (14.7 Ma old). Within their strewn field, they occur in south Bohemia, western Moravia, the Lusatian region in Germany, northern Austria, the Cheb Basin in western Bohemia, and central Poland. The water content of moldavites ranges from 0.006 to 0.01 wt. % [3].

Material and methods: This study is focused on moldavites found near the village Hrbov near Lhenice, about 1.5 km NE of the settlement Brusná (southern Bohemia sub-strewn field). Methods of the study applied so far included optical microscopy, scanning electron microscopy (SEM), electron probe microanalysis (EPMA), powder X-ray diffraction (PXRD), and Raman microspectrometry.

Results and discussion: Moldavites of the Hrbov-Brusná locality are characterized by atypical matt whitish- to grayish-colored surfaces. Observations under a binocular microscope revealed that the coloration is due to a thin, frequently polygonally cracked layer of whitish glass. In some cases, frequently as a filling of voids or cracks, the layer became thicker, composed of mutually separated twisted polygonal needles. A similar phenomenon described as the pyramidal sculpture was reported on the surface of moldavite from the Besednice site (southern Bohemia sub-strewn field) [4] with no additional data. Needles and flat polygons (further referred to as coating) transit to the compact moldavite material below them without any obvious interface. The needles are fragile and easily break off. Next to Hrbov and Besednice localities, we noticed the presence of the coating in moldavite samples from Krasejovka (also belonging to the southern Bohemia sub-strewn field).

In the polished thin sections, the coating is characterized by a significantly darker shade in back-scattered electron (BSE) images. The analyses of compact material and the coating carried out by EPMA showed ~ 4 wt. % deficit in totals in the analyses of the latter.

After noticing the amorphous character of the coatings with PXRD, Raman microspectrometry was applied to investigate the cause of the deficit in the EPMA´s totals. A broad peak in the range of 3100–3750 cm^{-1} has been observed in the spectra. Peaks in this region correspond to the OH stretching vibration of OH groups and H_2O molecules [5, and references therein]. Applying the procedure in [5], the water content of the needles/coatings was estimated at ~ 4 wt. % H_2O, which perfectly agrees with the EPMA data.

Although the formation mechanism of the coating is not known yet, there is an indication that the coating formation is closely tied to terrestrial weathering.

Conclusion: Some moldavites from the Hrbov-Brusná locality are unique being covered by polygonally cracked layers locally transiting into polygonal needles. Multimethodological study of the coating and needles reveals their amorphous character and the presence of water of up to 4 percent by weight. Finds at Hrbov-Brusná are partly similar to those described in [4] from Besednice. Our further study reveals the occurrence of the needles on top of samples from the locality Krasejovka. A thorough investigation of polished thin sections from other sites located in the southern Bohemia sub-strewn field will be conducted to determine if this phenomenon may be more common than first thought. Infrared spectroscopy is planned to complement the Raman microspectrometry. Furthermore, the thermogravimetric analysis (TGA) will be conducted to confirm the water content independently of spectroscopic methods. Finally, the formation mechanism of the coating will be investigated.

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