A NEW MOLDAVITE SUB-STREWN FIELD IN LOWER SILESIA, POLAND

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Introduction: The Central European tektites (CETs) aka moldavites occur in several small areas (sub-strewn fields). These regions include south Bohemia and western Moravia [1, 2], Austria [3], Lusatia [4] and the Cheb Basin [5]. In addition to these larger accumulations, several scattered finds were reported [6–8]. None of these moldavite occurrences exceeds the distance of ~420 km from the center of the Ries crater – the parent impact structure of CETs. Recently, Brachaniec et al. [9–11] found moldavites at three localities in Lower Silesia, Poland: sandpits close to villages Rusko and Mielęcin SW of Wrocław, and sandpits in Gozdnica, NW of Jelenia Góra. The former two occurrences are located at a distance of about 475 km from the Ries crater center significantly extending the entire CET strewn field. Brachaniec et al. [9–11] based on electron microprobe analyses for several of the found moldavites together with their mass and size distribution concluded that Polish moldavites were re-deposited from the Lusatian sub-strewn field by fluvial transport in Late Miocene.

Goals of the study, methods and results: Since the importance of the finds of CETs in Poland for delineating of the strewn field, the main goals were (i) to collect major-, minor-, and trace-element data for a fragment of one moldavite from sandpit near Rusko and to compare them with existing datasets from other sub-strewn fields, and (ii) to review the local stratigraphy and paleogeography. These data may help to resolve the question if Polish moldavites were transported from the Lusatian sub-strewn field as suggested in [9–11] or form a new separate sub-strewn field.

The sample was imaged using a scanning electron microscope TESCAN VEGA 3XM. Major-element data were collected with a CAMECA SX-100 electron probe microanalyzer. Trace-element contents were determined using a Thermo Finnigan Element 2 ICP-MS coupled to a 213 nm Nd:YAG laser ablation system.

The surface of the sample displays marked sculpturing. The thin section reveals presence of numerous bubbles and lechatelierite inclusions. The specimen is chemically heterogeneous with overall fluidal fabric. Two types of glass are present. The high-Si (76–82 wt. % SiO_2) low-Ca–Mg glass mimics CETs from the Moravian sub-strewn field whereas low-Si (~74 wt. % SiO_2) high-Ca–Mg glass corresponds to moldavites from the Cheb Basin and partly also from the South Bohemian sub-strewn field. Chondrite-normalized REE patterns of the specimen match South Bohemian and Cheb Basin moldavites. The spiderplots demonstrate considerable enrichments in Cs, Rb and Li and substantial depletion in W, Pb, Sr, P, Sn, Sc, V, Zn, Cu, Co, Cr and Ni compared to UCC.

Discussion: At the time of the deposition of Polish moldavites the areal extent of places suitable for their accumulation was limited to several rivers heading to the North. Importantly, neither in the late Miocene nor in the Pliocene there was a river heading from Lusatia to Lower Silesia that might have potentially transported moldavites. Lange [4] and Bouška et al. [12] showed that the effective transport of tektites in water streams is limited to less than 10 km. Clearly, Polish moldavites could have hardly resisted re-deposition from Lusatian sub-strewn field for over at least 50 km in case of Gozdnica locality or >160 km in case of Rusko and Mielęcin.

Conclusions: The chemical composition does not allow unambiguously linking Polish moldavites to any other existing CET sub-strewn fields. Their morphological character and paleogeography of Central Europe in the last 15 Ma suggest that they represent pieces fluvially re-deposited from a new so far unknown separate sub-strewn field located south of the place of their recent occurrence.

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