POSTVOLCANIC MOLYBDENUM-TRACES IN THE VELENCE-MOUNTAIN

BY A. FÖLDVÁRI:

On the base of a megascopic molybdenite crystal found by *F. Schafarzik* in 1908 in the Velence-Mountain, *F. Horusitzky* supposed that molybdenum might occur dispersed in the region. My duty was to investigate the occurrences of this unvisible substance relying merely on geological observations and analogies. The proof of the working-hypotheses was brought only later by spectrographic analysis of the collected samples.

The original specimen was found in altered palaeozoic granite on the contact of Tertiary andesite. Two alternatives: connection with old granitic intrusion or younger volcanic activity, were therefore borned in mind. Investigations were extended to each relative rock variety or kind of alterations.

The *Niggli*-parameters counted by analyses published in *Vendl's* monography help us to overlook the igneous rocks of the Velence-Mountain. (see p. 39.—41. in the Hungarian text.)

Andesite volcanic necks in the surroundings of Nadap On the eastern end of the mountain strongly kaolinized granite includes necks of eroded Tertiary andesite volcanoes. These might have followed tectonic lines terminating the granite laccolith on the east. Andesite appears even in the schists of the contact envelop intercalating them like sills. (Quarry 250 metre eastwards from -ọ- 236 Gécsi-hegy.) Including granite might have been kaolinized by the post-volcanic (fumarola and mofetta) activity following the andesite eruption.

The constitution of the volcanic necks may be outlined as follows:

The contact-zone of the granite forming the wall of the vent (in one to a few metre thickness) is more intensely kaolinized. The 1—2 metre thick border of the andesite-neck turned to a grey clayey-sandy matter. Towards the center of the neck follows a several metre thick zone of altered andesite with Fe-Mn oxyde impregnation along fissures. Veinlets are below 1 centimetre in width. In the quarry No II. this type of altered andesite shows orbitoidal parting. The inner border of the andesite with Fe-Mn oxyde network is intersected by zeolithe-, fluorite-, haematite- and pyrite- bearing veins. Including andesite is sprinkled with pyrite. In centripetal direction follows an undistinctly confined zone of altered andesite with weathered felspaths. The kernel of the neck is built up by «fresh» pyroxene andesite variety. This is also more or less altered, propylitized. Its femic constituents turned to chlorite and epidote.

Fissure-filling kaoline veins occur both in andesite and in granite.

All these alterations are due to postvolcanic activity. Dispersed molybdenum-content was certified in the marginal clayey weathering product of the andesite (quarry No. II. sample No. 45.) and in the Fe-Mn oxyde vein lying on the andesite and kaolinized granite contact (quarry No. III. sample No. 45.). All the other samples were free of determinable molybdenum-content.

The molybdenum-traces (including the specimen found by F. Schafarzik) are to be held for product of andesite postvolcanic activity.

Postvolcanic quartzites in the surroundings of Nadap. Between Pázmánd and Nadap several hills are built up by hydroquartzites partly impregnated by alunite. These quartzites were formed by the siliceous geysires and solfatars of the andesite volcanoes tapped by NW fractures. The exposure of a quarry on the northeastern slope of the Szöllő-hill reveals pyroclastic structure and some relics of andesite texture with kaolinized felspath grains, throwing any light to its origin. The quartzite vein having 333° strike is a silicification product of an eruption vent filled by volcanic agglomerate.

Alunite is an alteration product of felspath due to solfatara influence. Na:K ratio being in alunites 1:2, *A. Vendl* deducted them from the granites. The analyses show that even andesites are K-rich, so they could have yield it too.

The molybdenum-content of the hydroquartzites is also connected with andesite postvolcanic activity.

The NW—SE directed quartzite veins of the Meleghegy deserve any special remarks. These lie in the prolongation of the hydroquartzite peaks but lie more southwards along the marginal fault of the granite laccolith. These quartzites preserved locally the granite texture and include quartz grains, original constituents of the granite. These quartzites are free from alunite. *A. Vendl* marked them on his map, with the colour of the hydroquartzite. On the base of the mentioned textural characteristics the possibility cannot be excluded that they are older then the hydroquartzites and were formed by siliceous solutions connected with the granite intrusion. Notwithstanding analyses and geochemical principles suggest their postvolcanic origin.

Molybdenum-contents of the rock-specimens collected in the Velence-Mountain (Table see p. 28.—32.) *Granites, connected dikes* (granite porphyry, aplite, quartzite, kersantite) *and rocks of their contact envelop are free from determinable molybdenum.*

Molybdenum was testfified in the hydrothermally altered amphibol andesite of the Cziráky-quarry (SW slope of Templom-hill along the Nadap—Lovasberény highway) *and in the biotite-amphibol andesite exposed along the Nadap—Sukoró road.*

Spectrographical determinations lead to the conclusion that the molybdenum-occurrence is connected with Tertiary andesite eruptions and following postmagmatic processes. This is surprising because molybdenum-occurrences were related always in connection with intrusives, especially granites.

The region of Polgárdi—Falubattyán. Investigations were extended even to this region. In Falubattyán lead-ores appear in Palaeozoic limestone at the crossing of fissures. Surrounding limestone is impregnated with Fe-Mn oxyde along fissures in a few metre thickness. Iron was present previously in form of carbonates.

Molybdenum has been certified in the yellow incrustation of the lead ores, bound obviously in the form of wulfenite. Molybdenum is present even in the including brown limestone. Most surprising is the molybdenum-content of the ferric limestones on aplite-contact in the quarry of Polgárdi. This imply that ferrification of limestone, forming of lead-ores and infiltration of molybdenum were bound to granitic intrusion. There is no testimony of younger volcanic activity which could have effectuate these changes.

The molybdenum-traces of the Polgárdi—Falubattyán region seem to be connected — opposite to the Velence-Mountain — with granitic intrusion.

Considering the general characteristics of the molybdenum-occurrence, any similarities may be drown with the Climax molybdenum-occurrence (Colorado USA): Older granite is penetrated by Tertiary effusive, strong silicifications has taken place.

The large hydroquartzite masses of the Velence-Mountain cannot be deducted from the relatively small andesite bodies. The quartzites were formed rather by an underground intrusive mass, which could have been at the same time parent magma of the andesites. The silicification effected by this underground laccolith affected probably all wrapping rocks. Now only the farthes peripherical zone of this silicification is exposed. On the base of outcrops and tectonic position of the andesites and hydroquartzites the extension of the underground intrusive mass can be roughly sketched. It is located surely below the depression bordering the Palaeozoic granite on the east. The intrusive body might be closer confined on the base of a geophysical survey. Drillings on the hydroquartzite exposures might yield data about the distribution of the molybdenum in deeper layers.

By analogy of the silicification zones of Climax-mine a zone of greater molybdenum-content is to be expected towards the depth.

The presence of the underground intrusion is indicated even by the diorite reached by the drilling at the Székesfehérvár bath below palaeozoic shale. This does not imply the direct connection of the andesites with the chemically corresponding diorite, only the probability of a non-granitic intrusive body is enhanced on the eastern border of the Palaeozoic granite laccolith.

The molybdenum-contents determined in the Velence-Mountain do not reach the minimum of productivity (0.4% in Climax-mine).

Comparation of molybdenum-occurrences:

		Compared with the earth's crust average.
Average of the Earth's crust — — — —	7×10^{-6}%	1-fold
Lowest value in the Velence Mt. — — —	1×10^{-4}%	14-fold
Greatest value in the Velence Mt. — — —	7.9×10^{-2}%	11900-fold
Copper-Schiefer — — — — — — —	1.8×10^{-2}%	2500-fold
Lead-ores in limestone, dolomite (Eastern Alps) — — — — — — — — — —	2×10^{-2}%	2800-fold
Climax minimum — — — — — — —	4×10^{-1}%	57000-fold
Climax average — — — — — — — —	6×10^{-1}%	85000-fold
Climax maximum — — — — — — —	1×10^{-0}%	143000-fold

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