THE HUNGARIAN MINERAL OCCURRENCES

PRELIMINARY REPORT

BY S. KOCH

C. Leonard[1], V. Schönbauer[2] and A. Zipser[3] elaborated merely topographically the areas of the Hungarian mineral occurrences. They began their work at the beginning of the XIXth century. It was continued in the second part of the century by E. Fellenberg[5], V. Zepharovich[4] and M. Tóth.[6] In their writing they mostly only mentioned the areas in which the mineral species, enumerated in an alphabetical order, occur. Zepharovich also reports a few crystallographic data. His very precise work has served until quite recently as book of reference for the authors of text-book and manuals.

When A. Semsey offered a grant of 100.000 Forints to the Hungarian Academy of Science under the condition that it will conduct a competition at the annual meeting in 1890 for ten different scientific branches which are of special interest in Hungary, writing entitled »the Minerals of Hungary« was also mentioned.

The latter was never written considering that the mineral domain of Hungary was so little known at the beginning of our century that a life time would not have been sufficient to fill up the gaps, particularly in a period in which personal jelousy was such a great obstacle to all kind of collective work.

The data available were for the most part topographic and crystallographic these scarce mosaics made the production of a uniform picture very difficult.

After the first two decades of this century a few crystallographic monographies (pyrites, calcites, cerussites) appeared, furthermore the genetical system[7] of mineral occurrences of Hungary was completed and the microscopical examination of the ore occurrences commenced.

After the liberation the work was in part collective, the mineralogic and geochemical writings filled up many gaps and furnished new data relating to our knowledge of the Hungarian mineral domain enabling the elaboration of the mineral corresponding to the niveau of up to date science. The outlines of this work which is in progress are presented below.

As has been established on the basis of geological construction and structure by E. Vadász[8] in Hungary basic mountain ranges, deck-mountains, botton-mountains and basin formations, the latter extend over

most of the area can be distinguished. Corresponding to this geological structure the useful Hungarian mineral occurrences of magmatic origin containing few minerals are sparse, from the geological point of view, however, they are very interesting. Among the sedimentary occurrences those which are the most important from the economic point of view are not involved in our sphere of interest as their components are bauxite, bentonite, and coal which are rocks. The mineral occurrences associated with them, e. g. gypsum from Gánt, alunite, ajkaite from Ajka etc.,* as well as the minerals contained in the magmatic rocks or tuffs respectively, however, as developed crystals and crystal aggregates which can be freed, like for example the minerals of the olivine bombs and the amphibol crystals of the basalt tuffs around Lake Balaton, the granates freed at the decomposition of the andesites of the Dunazug Mountains are already included. Of the less significant and very frequent calcite, pyrite occurrences only those are described which have at least been crystallographically elaborated.

At the enumeration of the mineral occurrences the combination of the chemical elements occurring in the minerals of the deposites are always reported.

I. OCCURRENCES OF MAGMATIC ORIGIN.

a) Protocrystallization.

Szarvaskő (Heves). In wherlite separated from gabbro of the Jurassic or lower Cretaceous period: olivine, magnetite, ilmenite, a small amount of hematite, pyrrhotite, pentlandite, valleriite, chalcopyrrhotite, pyrite, cubanite, chalcopyrite.

Secondarily: limonite, prehnite.

Combination of elements: O Fe Si Mg Ti Al Ca Na K V H P C S Cu

Spectrographically: Cr Ni Pt could be detected.

Somoskő (Nógrád): in the basalt of the Medves Mountains extruded at the end of the Pannonian (mine Eresztvény) titanomagnetite.

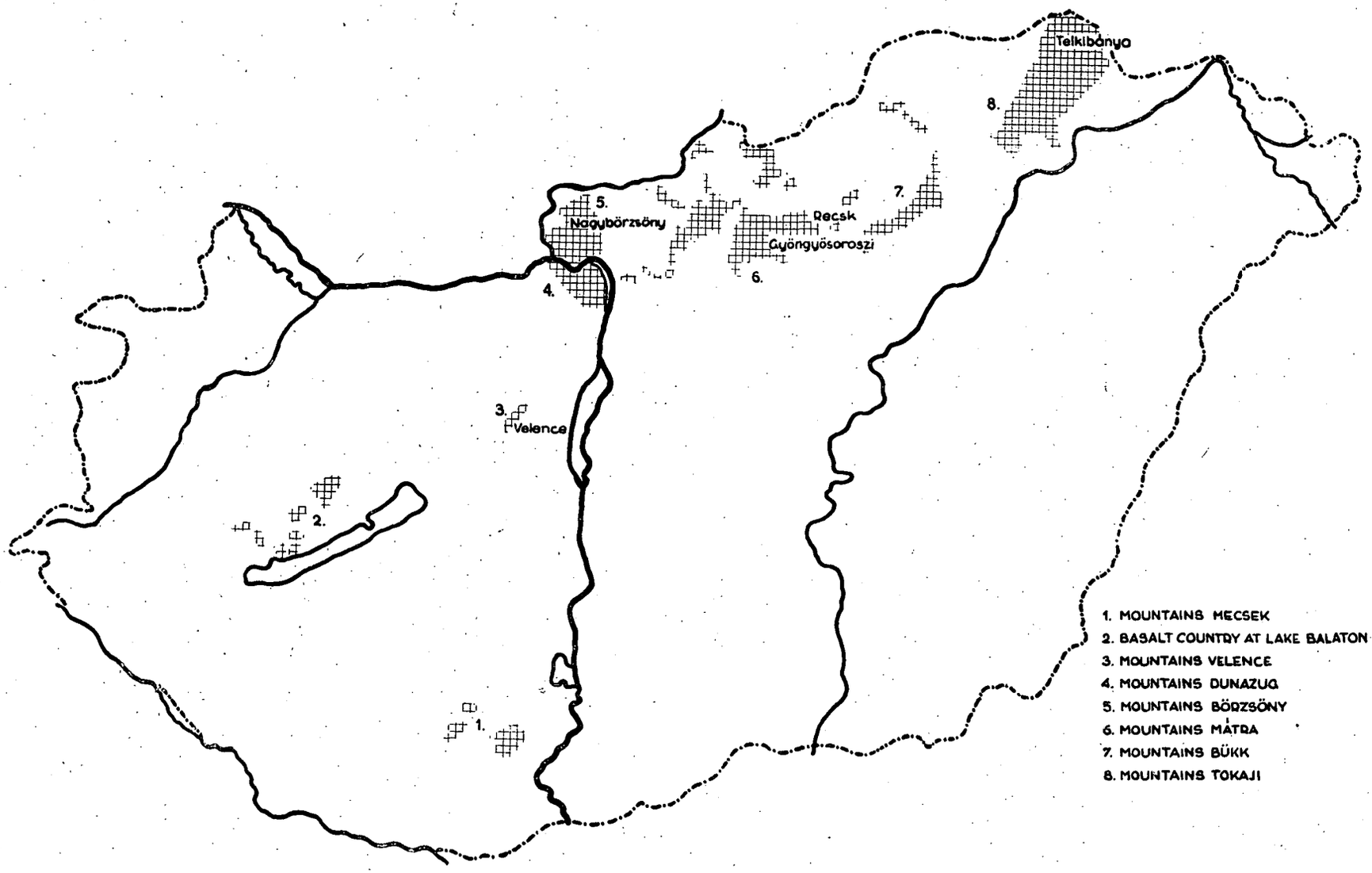
Mt. Gulács (Veszprém): in basalt derived from the same period pyrrhotite in drops exceeding 1 cm in size containing pentlandite, in which as dismixture valleriite, chalcopyrite, magnetite can be found.

b) Mesocrystallization.

Mt. Szentgyörgy, Bondoró, Magyargencs, Szentbékálla, Szigliget, Tihany, (all in Veszprém). Dobra, Szitke, (Vas): olivine bombs and olivine crystal aggregates in the tuffs of the basalt mentioned above.

Mindszentkálla, Balatoncsicsó (Veszprém), Tobaj (Vas), Balatonboglár (Somogy), Szilvaskő (Nógrád): amphibole crystals from the tuffs of the above basalt.

* The book of E. Szádeczky-Kardos — member of the Hungarian Academy of Science — entitled Szénkőzettan (Bp. 1952) deals in detail with the minerals of our coal mines.


Telkibánya
8.
5.
Nagybörzsöny
Recsk
Gyöngyösoroszi
7.
6.
4.
3.
Velence
2.
1.
1. MOUNTAINS MECSEK
2. BASALT COUNTRY AT LAKE BALATON
3. MOUNTAINS VELENCE
4. MOUNTAINS DUNAZUG
5. MOUNTAINS BÖRZSÖNY
6. MOUNTAINS MÁTRA
7. MOUNTAINS BÜKK
8. MOUNTAINS TOKAJI

Kapolcs (Veszprém): olivine, amphibole, biotite from basalt tuffs.

Somoskő (Nográd): olivine, augite from basalt of the Medves Mountains.

Börzsöny (Pest): augite, amphibole, garnet from the agglomerates of the andesite tuffs of the Miocene period of Csehvár and Mt. Magos.

c) Telocrystallization.

1. Autopneumatolytic.

Celldömölk (Vas) apatite, ilmenite, pyroxene, labradorite in the basalt cavities of Mt. Ság.

In the basalt cavities of Haláp (Veszprém): ilmenite, magnetite, augite, andesine, biotite.

Börzsöny Mountains (Pest): in the cavities of hyperstenandesite of the Miocene period of Nagyinóc: amphibole, biotite.

2. Contactpneumatolytic.

Magyaregregy (Baranya): magnetite, martite, hematite, pyrite formed on the contactpneumatolitical action of trachydolerite in the early Cretaceous period.

Secondarily: limonite, goethite.

In the vicinity of Pátka (Velence Mountains) magnetite in traces.

3. Pneumatolytic.

Tornaszentandrás (Borsód-Abaúj-Zemplén). In the ladiniceous limestone on the action of pneumatolytic natrongabbro of the Cretaceous period: hematite.

4. Pneumatolytic-hydrotermal.

Velence Mountains (Fejér) non-ore and ore minerals formed in the course of telocrystallization of the granite magma of the pre-Permian period: turmaline, topaz, molybdenite, pyrite, quartz, arsenopyrite, sphalerite, galena, chalcopyrite, hematite, fluorite, barite, antimonite, cinnabar.

Secondarily: cerussite, pyrolusite.

Combination of elements: O Si Ca F Ba S Fe Zn Pb Al C Na K Mg B Cu Mo Sb Hg H Mn Ag As Bi

Spectroscopically: Li Sn Ga Cd W U could be detected.

The minerals formed on the pneumatolytical-hydrotermal action of andesite magma of the Eocene period occuring in the quarry of Nadap: quartz, pyrite, hematite, sphalerite, epidote, fluorite, epistilbite, levyn, laumontite, heulandite, chabazite, desmine, scolecite, mesolite, barite, calcite.

Secondarily: gypsum.

5. Hydrothermalmetasomatic.

Szabadbattyán (Fehér). In the Carboniferous limestone of the Mt. Szár on the action of the residual solution of the granite magma of the Velence Mountains: galena, chalcopyrite, tetrahedrite, bournonite, quartz.

Secondarily: cerussite, anglesite, pyromorphite, covellite, copper, cuprite, azurite, malachite, calcite, dolomite.

The combination of the elements: Pb S Fe O Ca C Si Mg Cu P Sb Ag Zn H.

Rudabánya (Borsod). The minerals of the ore mass formed out of dolomite of the middle-Triassic period on the metasomatical action of residual solution of granite-magma: ankerite, siderite, quartz, barite, hematite, calcite, galena, pyrite, chalcopyrite, bornite, sphalerite, tetrahedrite, jamesonite, bournonite, pyrargyrite, gold.

Secondarily: limonite, hematite, pyrolusite, psilomelane, barite II, quartz II, redruthite, covellite, native copper, tenorite, cuprite, azurite, malachite, anglesite, cerussite, aragonite, cinnabar, mercury, pyrite II, marcasite, cacoxenite, calcite II, sulphur, gypsum.

The combination of the elements: O C Fe Ca Mg Si Ba S Al Mn H Cu Pb Zn Sb Hg Ag Au K Na Sr P.

Spectroscopically: Li B Ga can be detected.

Martonyi (Borsod): the minerals are of the same origin as those of Rudabánya: ankerite, quartz, barite, pyrite, chalcopyrite, bornite, tetrahedrite.

Secondarily: limonite, chalcosine, covellite, malachite, azurite. The combination of the elements: O C Ca Mg Fe Mn Si H Al Ba S Cu Sb Hg.

6. Hydrotermal.

Bajpatak (Heves). In the amygdaloid cavities of the diabaz lodes piercing the layers of the Triassic-period in the vicinity of Bajpatak in the Mátra Mountains: native copper, calcite.

Nagybörzsöny (Pest). The ore and non-ore associated minerals of the lodes formed at high temperatures bound to propylitized biotite amphibolandezites and dacites of the early Tertiary period: quartz, pyrrhotite, valleriite, pyrite I, molybdenite, sphalerite, galena, arsenopyrite, bornite, chalcopyrite, tetrahedrite, gold, bismuth, bismutine, galenobismuthite, cosalite, tetradymite, telluride of bismuth, csiklovaite, argentite, hessite, petzite, jamesonite, semseyite.

Secondarily: melnikovite, pyrite II, marcasite, siderite, magnetite, cronstedtite, redruthite, barite, quartz II, calcite, dolomite, goethite, arsenolite, limonite.

The combination of the elements: S Fe O Zn Si C Ca Pb Cu As Hg Mn Sb H Ba Ag Bi Co F P Au Te.

Spectroscopically: Cd Ni Mo could be detected.

Recsk (Heves). The ore and non-ore minerals of the ore masses bound to biotite and amphibolandesites of the Eocene period of the Mátra Mountains: enargite, famatinite, pyrite, tetrahedrite, seligmannite, lautite, galena, sphalerite, bournonite, bornite, boulangerite, emplektite, galenobismuthite, wittichenite, gold, hematite, magnetite, quartz, calcite, dolomite, barite, whewellite.

Secondarily: melnikovite, markasite, redruthite, melanterite, brochantite, pisanite, halotrichite, sulphur, laumontite.

The combination of the elements: S Cu Fe As Sb Pb Zn Ag Bi O Au Si Ca C H Ba Al Mg Se Te.

Parád (Heves). The minerals of smaller ore formations bound to the biotite-amphibolandesite of the Mátra Mountains: quartz, sphalerite, tetrahedrite, galena, pyrite.

Gyöngyösoroszi (Heves). In the strongly alterated lodes of the Mátra bound to unbalanced andesite species containing a lot of quartz varieties. quartz, amethyste, chalcedony, jasper, calcite, pyrite I, galena I, gold, chalcopyrite, sphalerite, wurtzite, stannite, bournonite, galena II, sphalerite II, chalcopyrite, marcasite, pyrite II, jamesonite, semseyite, arsenopyrite, tetrahedrite, antimonite, fluorite, barite, coelestite, gypsum I.

Secondarily: chalcosine, covellite, cerussite, sulphur, laumontite, gypsum II, halloysite.

The minerals of the amygdaloid cavities: apatite, pyrite, sphalerite, fluorite, pennine, chalcedony, rock crystal, opal, calcite, the tuffaceous agglomerates contain apart from these also adularia.

The combination of the elements: O Si Ca S C Zn Fe Pb Mn Mg Cu F H Cd Sb As Ba Sr Al P K Ag Au.

Spectroscopically: Sn Mo can be detected.

Asztagkő (Heves). On the hydrotermal action of the residual solution of the above andesite magma: quartz, barite, antimonite.

Kéked (Borsod-Abaúj-Zemplén). In the pyroxenandesite of the Tokaj-Mountains extending in narrow veins: quartz, chalcedony, marcasite.

Telkibánya (Borsod-Abaúj-Zemplén.) In the trachyte of the Tokaj-Mountains and on the boundary surfaces of trachyte andesite extending in lodes: quartz, opal, pyrite, antimonite, gold, siderite.

Secondarily: alunite, antimony-ocher.

Erdőbénye (Borsod-Abaúj-Zemplén). Extending in veins of andesite of the Tokaj-Mountains: quartz, opal, antimonite.

7. *Not yielding ore, partly laterally secretive hydrotermal.*

The minerals of the cavities of the amygdaloidal basalt surrounding Lake Balaton.

Haláp (Veszprém): phillipsite, desmine, gismondite, natrolite, thaumasite, calcite.

Gulács (Veszprém): magnetite, phillipsite, desmine, chabasite, mesolite, scolecite, natrolite, aragonite, calcite.

Zalaszántó (Veszprém): phillipsite, natrolite, aragonite.

Diszel (Veszprém): phillipsite, chabasite, apophyllite, heulandite, thaumasite.

Sarvaly (Veszprém): phillipsite, apophyllite, heulandite, thaumasite.

Vindornyaszöllős (Veszprém): apatite, phillipsite, apophyllite, natrolite, desmine, calcite.

Zsid (Veszprém): phillipsite, natrolite, calcite.

Badacsonytomaj (Veszprém): phillipsite, aragonite.

Tátika (Veszprém): phillipsite, calcite.

Szigliget (Veszprém): phillipsite.

Kistolmács (Zala): chabasite, desmine, calcite.

The combination of the elements of the mineral association overgrown on the cavities of the amygdaloidal basalt surrounding Lake Balaton: O Si Al Ca C Na K Mg Fe Ba Mn S Cl Sr.

A characteristic feature of the mineral associations contained in the cavities of these slightly alkaline basalt rocks in the permanent occurrence of phillipsite, and in some places that of apophyllite. K is always present in the element association.

The minerals of the cavities of the basalt district of North-Nográd.

Somoskő (Nógrád): in the basalt of Eresztvény mine: phillipsite, aragonite, calcite.

Vecseklő (Nógrád): aragonite.

In the Miocene andesite of the Dunazug Mountains.

Dunabogdány (Pest): pyrite, calcite I, chabasite, desmine, analcime, calcite II.

Visegrád (Pest): calcite.

Szentendre (Pest): pyrite, chabasite.

Szob (Pest): in andesite of the Mt. Csák: chabasite, desmine, epidesmine, calcite.

In the andesite of the Miocene period of Karancs.

In the vicinity of Somoskőújfalu (Nógrád) in the quarry of Sátoros: calcite I, epistilbite, laumontite, heulandite, chabasite, desmine, aragonite, calcite II, dolomite, pyrite, quartz, calcite III;

In the pyroxenandesite of the Mátra (Miocene).

Szücsi (Heves): aragonite.

In the pyroxenandesite of Tokaj-Hegyalja (Miocene).

Füzérkomlós (Borsód-Abaúj-Zemplén): chalcedony, calcite.

Mt. Nagy (Tokaj Mountains): tridymite.

In the rhyolite and andesite of Tokaj-Hegyalja.

Monok (Borsod-Abaúj-Zemplén): chalcedony, milk opal, precious opal.

Tolcsva (Borsod-Abaúj-Zemplén): quartz, jasper, chalcedony, opal.

Megyaszó (Borsod-Abaúj-Zemplén): wood opal.

8. Volcanic exhalation.

Pusztakisfalu (Baranya): in the crinoid limestone of the upper Dogger resulting from submarine exhalation: quartz, hematite, goethite.

Bernecebaráti (formerly Bernece, Pest): in the clay formed by decomposition of the hyperstene-augiteandesite of the Mt. Huszár: tabular scaly hematite.

II. OCCURRENCES CAUSED BY WEATHERING AND SEDIMENTATION

a) Weathering remnants.

Hunting box of Kozár (Mt. Mecsek, Baranya): azurite contained in the breccia filling the fissures of the Triassic limestone.

Tornaszentandrás (Borsód-Abaúj-Zemplén): brown iron ore contained in the limestone (ladinaceous) of the Mt. Osztramos.

(The minerals of the zones of oxidation and secondary enrichment of the occurrences of magmatic origin are discussed in the part dealing with the mineral association of the respective mining district).

b) Mechanical sedimentations.

In fluviatile placers of the Duna (Ásvány, Ráró, Hédervár) Dráva and Mura: gold.

Visegrád, Szokolya (Pest), Drégelypalánk: garnet (almandine).

Tatabánya (Bánhida, Komárom): in sandy clay saphire, zircon, garnet.

Siófok (Somogy): in the sand of the Balaton zircon and ilmenite.

c) Chemical sedimentations.

1. Ores.

Manganese oxide ores formed partly from sea sediments in the interstices of the Jurassic sediments, mainly in the marl clay of the upper Liassic, but also partly through the oxidation of the carbonateous sediments.

Urkut (Veszprém): pyrolusite, cryptomelane, psilomelane, magnetite, limonite, marcasite, quartz, calcite.

The combination of the elements: O Mn Fe Si Al K Ca H Ba Na Mg P C.

Spectroscopically Sr and Rb can be detected.

Eplény (Veszprém): pyrolusite, manganite, cryptomelane, psilomelane, limonite, quartz, (chalcedony, jasper, rock crystal) calcite.

The combination of the elements: O Si Mn Fe Al K Ca H•Ba Na Mg P C.

Spectroscopically Sr and Rb can be detected.

Lábatlan (Komárom): in the limestone of the meso Liassic in the quarry of the Tölgyhát of the Gerecse Mountains: pyrolusite, manganite, psilomelane, chalcopyrite, barite.

Almagyar (Heves): in Oligocene clay: pyrolusite.

Bátor (Heves): in Oligocene clay: pyrolusite, manganite.

Cserszegtomaj (Veszprém): bog iron sulphide separated in the upper-Pannonian layer of the Keszthely-Mountains: melnikovite, marcasite.

Balf (Sopron), Nemesvite (Zala), Lesencfalu (Zemplén): gnarly and crystallized marcasite in clay.

Mád (Borsod-Abaúj-Zemplén): the ores of Dióshegy formed from spring sedimentation: limonite containing a small amount of pyrolusite, ungvarite.

Nagyléta, Bagamér (Hajdú): vivanite and bog iron ore.

2. Evaporites.

Perkupa, Tornakápolna (Borsod-Abaúj-Zemplén): in the Werfen layers: anhydrite, gypsum, halite, glauberite.

3. The mineral occurences of the Hungarian bauxite mines.

Iszkaszentgyörgy, Gánt (Fejér), Nyirád (Veszprém): alunite. In Gánt pyrite and in the clay gypsum.

4. Other minerals.

Aggtelek, Lillafüred (Borsod-Abaúj-Zemplén): stalactite contained in the limestone of the Triassic period.

Csővár (Pest): fluorite contained in limestone of the Triassic period.

Szentgál (Veszprém): calcite in »Dachstein« limestone.

Üröm (Pest): aragonite in »Dachstein« limestone.

Lábatlan (Komárom): aragonite in limestone of the Liassic period. (Nagypisznice).

Buda (Pest): hornstone gnarls in dolomite of the Triassic, sometimes containing quartz. In nummulinous limestone of the Eocene period: calcite, barite, fluorite, pyrite, limonite, goethite.

In clay of Kiscell of the Oligocene period: limonite pseudomorph after pyrite and marcasite, barite, calcite, gypsum.

In limestone tuffs: pisolite.

In nummulinous limestone of the Eocene period:

Békásmegyer (Pest): calcite

Kosd (Pest): calcite, marcasite, gypsum

Tokod (Komárom): calcite

Dorog (Komárom): calcite, aragonite

Halimba (Veszprém): pyrite, limonite

Tatabánya, Felsőgalla (Komárom): aragonite

Sümeg (Veszprém): calcite.

In limestone of Lajta:

Kemence (Pest): calcite

Hidas (Baranya): calcite

Márkháza (Nógrád): calcite

Of the numerous calcite occurrences of Hungary only those are enumerated which have already been crystallographically elaborated.

Komlóska (Borsod-Abaúj-Zemplén): spring limestone, manganese ore in traces.

Székesfehérvár (Fejér): pinquite.

Gönc (Borsod-Abauj-Zemplén): ungvarite.

In the Hungarian brown-coal mines:

Ajka (Komárom): marcasite,

Tatabánya (Komárom): alumino-hydrocalcite, pyrite, calcite.

Dorog (Komárom): huntite.

Tokod (Komárom): halotrichite, tschermigite.

d) Minerals of organic origin.

Zengővárkony (Baranya): between alterated trachydolerite and granular Dogger limonite of biogene origin, some goethite.

Buda (Pest): in clay of Kiscell: kiscellite, and a krantzitelike resin.

Ajka (Veszprém): ajkaite contained in brown-coal of the upper Cretaceous period and on the waste tips sulphur.

Pilisszentiván (Pest): on the waste tip of the brown coal mine originating in the Paleocene period: sulphur.

Serényifalva (Borsod-Abaúj-Zemplén): resin contained in clay of the Oligocene period belonging ot the rumenite-krantzite group.

III. Metamorphic mineral associations.

Minerals from the crystalline bottom mountain ranges of Kőszeg:
Velem (Vas): fuchsite, manganese in traces.
Felsőcsatár (Vas): talc, serpentine.
Csák (Vas): quartz, pyrite.

IV. Meteorits found in Hungary:

Siderite: Nagyvázsony (Veszprém) 1890.
Aerolites: Kaba (Hajdu) 1857, Ófehértó (Szabolcs) 1900, Malomháza (Sopron) 1905, Kisvarsány (Szabolcs) 1914, Mike (Somogy) 1944.

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