SBORNÍK NÁRODNÍHO MUSEA v PRAZE
ACTA MUSEI NATIONALIS PRAGAE
Vol. IV. B (1948) No 4. Mineralogia No. 1.

REDAKTOR IVAN KLÁŠTERSKÝ

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NOVÝ NÁLEZ GLAUKOFANU V KRKONOŠÍCH.

A NEW FIND OF GLAUCOPHANE IN THE GIANTS MTS.

PRAHA 1948

NÁKLADEM NÁRODNÍHO MUSEA V PRAZE

V GENERÁLNÍ KOMISI MATICE ČESKÉ, PRAHA II.-1700, VÁCLAVSKÉ NÁM.

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A new find of Glaucophane in the Giants Mts.

(Předloženo 16. X. 1948.)

Při zpracovávání nerostů ze sbírky J. SOUKUPA byly podrobně zkoumány ukázky haematitu z okolí Víchové, ssz. od Jilemnice v Krkonoších, pocházející ze skrovných zbytků po bývalé těžbě železných rud západně od obce. Haematit tvoří zde rudní brekcii, v níž se vyskytuje ve formě úlomků i železné slídy spolu s jemně sloupcovitým epidotem a místy hojným žilným křemenem. Epidot i křemen jeví vždycky patrné účinky horotvorných pochodů, zejména silného tlaku (drcení krystalů, undulosní zhášení křemenných zrn). Již makroskopicky je na obou ukázkách patrný alkalický amfibol, tvořící jemné štíhlé černomodré jehličky, přecházející na jedné z ukázek dokonce v modrošedý jemně vláknitý asbest. Je řídce rozptýlen mezi epidotem nebo spolu s ním tvoří proužky mezi zrny křemene.

Ve výbruse shledáváme, že není nikdy terminální a také jeho omezení ve vertikálním pásmu s převládajícími plochami (110) je značně porušeno. Krystaly dosahují maximálně velikosti 2,25 × 0,05 mm. Na ploše (010) zháší v úhlu 4—5° k vertikále. Rovina os optických je kolmá k rovině souměrnosti, $b = \gamma$, $c : \beta = 4—5°$. Indexy lomu: $\alpha = 1.640$, $\beta = 1.658$, $\gamma = 1.660$, $\triangle = —0.020$. Nápadný je značně silný pleochroismus: α světle žlutozelený až žlutavý, β ultramarinově modrý, γ fialový až červenofialový nebo modrofialový. Absorpce: $\beta > \gamma > \alpha$. Až na menší úhel zhášení shoduje se s PELIKANOVÝM (12) pseudoglaukofanem z údolí Labe nad Horním Vrchlabím v Krkonoších, barvou pleochroismu také s jinými krkonošskými nálezy glaukofanu, zvláště v Rýchorském pohoří. Geneticky vznikl stejně jako v jiných zjištěných analogických případech (Taunus) nejspíše přeměnou diabasových vyvřelin za silného působení tlaku. V tom případě jsou nálezy glaukofanu dobrým příspěvkem pro geologické poměry pláště krystalinika krkonošské žuly, neboť přeměněné diabasové příkrovy mohou být obdobou diabasových erupcí Barrandienu. Vznik glaukofanu náleží na rozhraní mesozony a epizony, jak uvádí F. ANGEL (1).

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In the collection of Mr. Josef SOUKUP, won by the National Museum in 1938, my attention has been attracted by two specimens of hematite from the environ of Víchová. NNW from Jilemnice (No. s. 31.330, 31.331). In his detailed notices Mr. SOUKUP designes as the locality of these samples the rayon W from Víchová in the direction to Poniklá, at places where in the past century some prospecting works for iron ore (hematite) were opened. Evidently this are the environs of the hill Stará hůra W from Víchová, where up to this time abandoned pits and overgrown heaps are found. In the litterature there are only scarce notices on the exploitation of ores in these places: J. CZERWENY (4), J. UHLIG (16), B. KATZER (8). The hematite deposit, of average thickness about 1 metre, was suddenly inundated and abandoned in the second half of the past century. It was evidently a continuation of the limonite deposit of Poniklá, situated to the West from there, which was abandoned at about the same time because of the then insuperable obstacles hindering the ore transport.

Both deposits are stratified layers in the crystalline roof of the granite of the Giants Mts. Predominant rocks are in this rayon light green phyllades and chlorite schists, with intercalations of light green and greyish-brown quartzites with passages to hornstones, and with sericite schists of silver-like luster, passing into micaschists. In the connection with the occurrence of hematite, which locally appears in its micaceous variety, Mr. SOUKUP in his notes on his collecting travels mentions the occurrence of a glaucophane mineral, which actually has been determined in his samples.

Both specimens studied are rocks consisting prevalently of a very fine grained aggregate of epidote, accompanied by veins quartz, which is locally concentrated in larger lens-shaped aggregates and in smaller grains.

The abundant h e m a t i t e occurs as fragments of bluish-grey itabirite, of the size till 3 cm, or more frequently as smaller groups and as dissipated scales of micaceous hematite. The whole represents an ore breccia, formed by orogenetic movements from a primarily continuous hematite deposit.

In the rock the epidote parts are prevalent, but quartz locally occurs also in greater masses.

The e p i d o t e appears in short columnar crystals deformed by the orogenetic pressure, so that mostly the original outlines are marked only by the elongation and the cleavage fissures. Only where quartz prevails and epidote is accompanied by the blue amphibole, the columnar or acicular form of epidote is sometimes preserved, but even in this case there are no terminal planes. The average size of the acicular crystals is about $0{,}15 \times 0{,}02$ mm. Pleochroism is not conspicuous in thin sections.

Q u a r t z grains attain till more than 6 mm and show always undulous extinction. Beside this, the pressure manifests itself also by the

small angular quartz grains (about 0,1 mm) surrounding the large ones. The cataclase of the quartz grains appears even where they are only a small admixtion of the epidote rock.

The b l u e a m p h i b o l e is sometimes macroskopically developed in the neighbourhood of the hematite aggregates, as Mr. SOUKUP remarks; it appears as black or black-blue small needles, on one sample also as greyish-blue fine asbestos of silky lustre. Almost all blue amphibole occurs together with hematite, in the epidote parts it is scarcely dissipated among the columnar and acicular epidote crystals, in the quartz parts it accompanies the epidote in the fractured quartz around or as inclusions in the larger grains. In the aggregates of quartz these stripes of epidote and amphibole are often accompanied by hematite in aggregates and disseminated small grains.

Like on epidote, on amphibole crystals there are no terminal planes, and even the vertical zone is not always well developed. In some cases the prismatic angle of 55° has been measured. Beside (110) the orthopinacoid (100) is only locally present. The edges of the vertical zone are almost always rounded. Fan-like accumulations of amphibole crystals and fragments occur in some parts. The crystals have the average length of about 0,4 mm, but in some cases till 2,25 mm; the thickness seems to be constant nearly 0,05 mm. The extinction on (010) is 4—5° to the vertical axis, the character of the longitudinal direction is positive on (010) and negative on (100). The optical axes plane is perpendicular to (010), hence $b = \gamma$, $c : \beta = 4—5°$. The double refraction is of medium strength. Mr. J. KOUŘIMSKÝ has determined the indices:

$\alpha =$ 1.640
$\beta =$ 1.658
$\gamma =$ 1.660
$\triangle =$ —0.020

Except the little higher value for γ, these results agree with those quoted by ROSENBUSCH-MÜGGE (14).

The pleochroism is very strong,

α light yellowish-green or yellowish,
β ultramarin blue,
γ violet from reddish to bluish hues.

Absorption: $\beta > \gamma > \alpha$.

All properties correspond to g l a u c o p h a n e, except the orientation of the axial plane; this agrees with the so-called pseudoglaucophane, described by A. PELIKAN (12) from the Labe valley at Horní Vrchlabí in the Giants Mts. The only difference is the extinction angle, determined by PELIKAN to 11° 48′ for Na-light on (010). The glaucophane from Bois de Versoix on the Lake Leman N from Geneva, described by A. MICHEL-LÉVY in 1883 in the paper of CH. BARROIS (2), has the axial plane almost perpendicular to the prismatic zone and the negative acute bissectrix approximately perpendicular to (100); its pleochroism is identical with that of the glaucophanes from the Giants Mts.

and the double refraction —0.020 agrees with the glaucophane from Víchová, but the extinction angle on (010) is only 3°. M. STARK (15) confirms the data given by PELIKAN and compares them with similar glaucophanes from the chlorite schists of Val de Bagnes, canton Valais, described by P. LOHMANN (9). A. WATZNAUER (17) compares the glaucophane found by PELIKAN with that from the Modrý důl (Blue valley) in eastern Giants Mts.

The occurrence of glaucophane in the crystalline roof of the Giants Mts. massive has been ascertained for the first time by J. HAMPEL (6) in the amphibolites of the Rýchory Mts. in the eastern Giants Mts. The occurrence of glaucophane together with green hornblendes has not yet been stated in the rocks from Víchová. G. BERG (3) describes rolled masses of epidosite with abundant crystalloblasts of glaucophane from the Rýchory Mts. Probably this occurrence is analogous to that of Horní Vrchlabí, described by PELIKAN and WATZNAUER. A glaucophane schists comparable with all these epidote-glaucophane rocks has been described by A. FAVRE (5) from Veirier and Etrembières under the Mt. Salève, S of Geneva (France).

As concerns the genesis of the glaucophane, the view of ROSENBUSCH (13) is most probable for the occurrence in the Giants Mts., according to the glaucophane bearing rocks are metamorphosed product of gabbroid magmas, differing from the orthoamphibolites in the consumption of sodium for the forming of glaucophane, not for plagioclases. This does not exclude the interpretation of the glaucophane rocks of the Giants Mts. as metamorphosed diabases, perhaps analogous to the diabases in the Barrandian of Central Bohemia. The decisive moment of their origin seems to be an intense pressure, which manifests itself also in the cataclase of the constituent minerals. Analogous metamorphism of a diabase producing epidote and a glaucophane-like amphibole has been described by K. A. LOSSEN (10) and L. MILCH (11) from the Taunus Mts. in Germany an by JUN SUZUKI (7) from the isle of Hokkaido. There in the contact of ultrabasic eruptive rocks with the crystalline formations a metamorphic rock originated, containing together with glaucophane also other sodium bearing amphiboles (crossite, riebeckite, etc.). Undoubtedly beside the pressure also hydrothermal solutions there have been working.

The opinion of F. ANGEL (1), according to which the genesis of glaukophane is located in the border zone between the mesozone and the epizone, agrees with the features of the occurrences in the Giants Mts. The glaucophane originated at relatively lower temperatures and pressures, approximately between albite and talc, in the rocks rich in sodium. The glaucophane bearing rocks, being metamorphosed diabase flows, may design a stratigraphical horizon significant for the interpretation of the geological features of the crystalline formations of the Giants Mts.

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SBORNÍK NÁRODNÍHO MUSEA V PRAZE - ACTA MUSEI NATIONALIS PRAGAE
IV. (1948) - B (PŘÍRODOVĚDNÝ - HIST. NATURALIS) No. 4.
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