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Reminiscent of an old book

"Critical Review of Minerals from Transylvania" by A. KOCH, Kolozsvár, 1885

PROOFS FOR THE EXISTENCE OF ANORTHITE-SPINEL-GARNET PERIDOTITE SERIES OF INCLUSIONS IN BASALTS OF THE PERSÁNYI MOUNTAINS TRANSYLVANIA, ROUMANIA.

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ABSTRACT

On the basis of the correct descriptions of mineral componensts of different geological finding sites in the book: „Erdély ásványainak kritikai átnézete" (Critical review of minerals from Transylvania) by ANTAL KOCH, Kolozsvár (1885) it has been possible to identify the basalts of the Persányi Mountains as host rocks of different mafic and ultramafic xenolith inclusions.

INTRODUCTION

There are about 200 places all over the world where alkalic basalt volcanism has delivered peridotites and other related mafic derivates as xenolith inclusions from the upper mantle and lower crust regions to the surface of the Earth. (FORBES, KUNO, 1967.) The mineral assemblages of peridotites are not in equilibrium with the host basalts in which they are embedded. During the last three decades the peridotite xenolith inclusions containing basalts became important sources for mantle petrology because these are the most widely distributed test places where mantle rocks can be detected. (GREEN, RINGWOOD, 1967). In measuring mantle-crust processes inclusions from any new finding sites may have individual features over the general similarities of peridotites and their derivates.

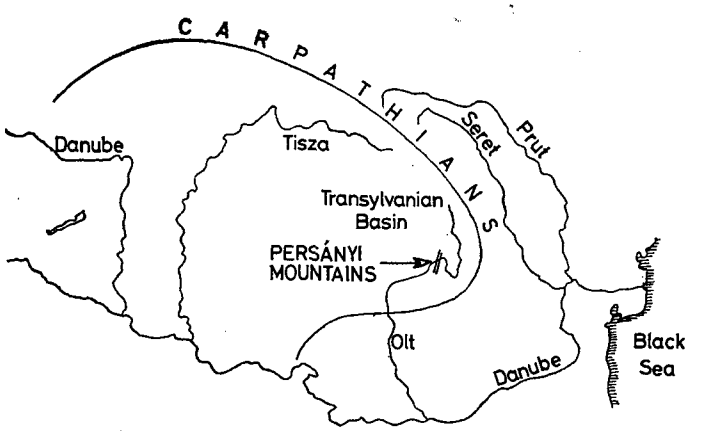

Fig. 1. The location of the Persányi Mountains in Transylvania, Roumania.

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Due to the old traditions in mining since medieval ages and because of wealthy and variable rocks and tectonic setting, the Hungarian geology was among the most developed surveys in Europe during the Austro—Hungarian Monarchy. The most outstanding scientific achievement of XVIIIth centurian Hungarian geology was the discovery of the tellur, in the Transylvanian gold-tellur ore minerals. On the level of the geology of the world every important informations have been collected and published in the last century. On the basis of one of these collections which has been made about the minerals of a historical region of Hungary I should like to call the attention of interested geologists to a probable source region of peridotite inclusions and some derivates in Transylvania. These peridotite containing basalts can be found in the Persányi Mountains, 50 km northwest from Brassó (Brasov). The collection which has preserved informations about these sources is the book by ANTAL KOCH (at that time the professor of the Kolozsvár University); the title of the book: Erdély ásványainak kritikai átnézete (Critical Review of Minerals from Transylvania), Kolozsvár 1885. (Clausenburg, today Cluj-Napoca, Roumania).

MINERALS OF PERIDOTITES IN KOCH'S BOOK

Koch's book has been based on disciplinary works and descriptions of minerals finding places known 100 years ago. The book specifies the known important minerals of its age alphabetically with their finding places, characteristics and rocks which contain them. All mineral names are followed by the name of the investigator who has introduced it. The text of the book is written in Hungarian language.

At minerals the different finding sites are specified. There not only the local characteristics of minerals are described, but their mineral environments, too. Reading over the book the finding sites of the minerals which are the major constituents of peridotites (e.g. at olivine, pyroxene, spinel and garnet) some finding sites were repeated. These finding sites — e.g. Hidegkút, Hévíz, Kőhalom, Alsó-Rákos (their names recently in Roumanian: Fintina, Hoghiz, Rupea, Racos, respectively) — all were groupped in a local neighbourhood: on the basaltic region of Persányi Mountains. The cross references at mineral components of peridotites and other supposed inclusions (anorthite, bronzite, diallag, pyrope, and the earlier mentioned components) have made it clear for me, that in the basalts of the Persányi Mountains the so called "olivine bombs" were peridotite inclusions — may be of different types from different depths. I exhibit here the most characteristic places of the book in English translation in order to confirm my suggestions.

p. 14. AMPHIBOLE. HAÜY
Black, so called volcanic amphibole.

Kőhalom. From the hill named Turzon (Freythum) ACKNER also mentions thin nice amphibole crystals but more recently M. SCHUSTER described a size of a fist inclusion which was covered with a melted crust and it consisted exclusively of massive brown-black basaltic amphibole. But when he broke to pieces an inclusion consisting of ashy augite he found some nice crystals, too.

p. 52. BRONZITE, KARSTEN

Alsó-Rákos. In the break-through of the Olt river according to TSCHERMAK a dark, white-dotted, tough rock consisted of olivine, clearly splitting large, oil-green-brown diallag and bronzite leaves to which yet white anorthite grains contributed.

Hidegkút. According to M. SCHUSTER the olivine bombs lying in the basalt-lapilli of the la Gruju Hill consist of the mixture of olivine, grass-green augite, black-conchoidal augite, black spinel and a little bronzite which last mineral is intergrown inside the grass-green augite and its colour is also green but turning to brown.

Kőhalom. M. SCHUSTER has found the most amount and the most beautiful bronzites in the olivine-bombs scattered in the basaltlapilli of the hillside named Turzon. These minerals occurred in brown-green grains with one well splitting direction and with an other one which forms 87° 54′ angle with that of the earlier direction. In very thin splinters it melted into a dim green-like email, a larger piece of it became a sphere only after a longer heating. Nevertheless it became melted with more difficulty than the grass-green augite mixed with it and more easily than the typical bronzite from Kraubath. Therefore it is near to the hypersthenite.

p. 87. DIALLAG, HAÜY

Alsó-Rákos. According to TSCHERMAK the olivine-gabbro from this place half consists of olivine and besides this component diallag, bronzite and a little anorthite are the constituents of the rock. The diallags form small grains, which are in fresh state and are oil-onion-green, they can be completely splitted in the direction of transversal face and less in the direction of the longer face of minerals.

p. 95. GARNET, ALBERTUS MAGNUS

Hidegkút. On the hill named Gruju in the basalt-lapilli in a size of a fist volcanic bomb which consisted of the mixture of olivine + little bronzite + grass-green augite + + black conchoidal spinel there were 4—10 mm-s in diameter sized pell-mell cracked garnet balls with beautiful dark rose-red color and half transparent. With borax it gives the reaction of the chrome, that is why I had considered it earlier to heve been a pyrope, but it did not show the characteristical blood-red color of this mineral.

p. 137—138. OLIVINE, WERNER

The most olivines occur in the basalts of the Persányi Mountains (Alsó-Rákos, Bogáth, Hévíz, Hidegkút, Komána), there are far less in the basalts of Volkány and Detunata.

Hidegkút. On the hill named Gruju in the opened basalt-lapilli abundantly lie smaller-larger olivine-bombs. Besides of olivine they consist of black conchoidal and grass-green augite, little bronzite, black conchoidal spinel and rarely dark rose-red chromegarnet grains.

PYROXEN, HAÜY

p. 149—150. (a) AUGITE, WERNER

The augite versions occurring in the olivine-bombs of the basalts are very interesting.

(a) *Hidegkút and Hévíz.* Between the two villages on the La Gruju hill there are pitch-black, well conchoidal-breaking augites in nut sized thick pieces in the basalt-lapilli or in the massive basalt itself. (Spec. grav. = 3.25)

(b) Grass-green slightly splitting augite (non omphacite!) occurs as an important constituent of olivine-bombs but occurs in the basalt itself also as inclusion in nut-sized pieces to which the ashy-basalt is strongly stuck. (Spec. grav. = 3.5)

Hidegkút. In the olivine-bombs from the basalt-tuff and lapilli of the Gruju Hill, which turn up frequently, M. SCHUSTER has showed a formless black spinel which might have been a variant of the pleonaste and near to picotite. This spinel in the form of pea-size grains with pitch-black, very bright, conchoidal and splinter-like breaking, rigid and very hard characteristics, with olivine, green augite and very thin bronzite leaves constitutes the (above mentioned) olivine-bombs which are sometimes head sized in diameter.

CONCLUSIONS

The identification of peridotite and related mafic inclusions in the basalts of the Persányi Mountains from the 100 years old literature could became a recognition only on the basis of the achievements of mantle petrology in the last three decades. (KUSHIRO, KUNO, 1963; FORBES, KUNO, 1967; GREEN, RINGWOOD, 1967, 1970; EMBEY-ISZTIN, 1976, 1978). On the basis of this background and the shown description of mineral assemblages of inclusions in basalts of the Persányi Mountains the following characteristics can be summarized from the KOCH's book

(1) The amount of constituting minerals in the order of decreasing

$$Ol \gg Cpx > Opx > Sp > Ga$$

(2) Peridotites from different mantle regions may be expected on the basis of the anorthite, spinel and spinel+garnet accompanying phases of inclusions which characterize mantle composition at increasing depths.

On the basis of these descriptions of KOCH, numerous peridotite inclusions have been collected by the author on the La Grújú hill at Hidegkút (Fintina). Their detailed description will be given in the next volume of Acta Mineralogica-Petrographica.

NOTE ADDED IN PROOF

In the recent works (PATRULIUS *et al.*, 1968; MARINESCU *et al.*, 1981; POPESCU *et al.*, 1976; POPESCU *et al.*, 1970; RADULESCU *et al.*, 1981; VASILESCU *et al.*, 1968;) no references of the results of this book and the signs of investigations on inclusions from basalts of Persányi Mts. has been occured. In the light of the wide interest on the petrology of mantle rocks I felt it important to appreciate these almost forgotten data in order to activate research to explore this promising source region.

REFERENCES

EMBEY-ISZTIN, A. (1976): Felsőköpeny eredetű lherzolitzárványok a magyarországi alkáli olivin-bazaltos bazanitos vulkanizmus kőzeteiben (Lherzolite nodules of upper mantle origin in the alkali olivine basaltic, basanitic rocks of Hungary.) Földtani Közl. **106,** 42—51.

EMBEY-ISZTIN, A. (1978): On the petrology of spinel lherzolite nodules in basaltic rocks from Hungary and Auvergne, France. Annls. Hist.-nat. Mus. Nat. Hung. **70,** 27—44.

EMBEY-ISZTIN, A., PELTZ, S., PÓKA, T. (1985): Petrochemistry of the Neogene and Quaternary basaltic volcanism in the Carpathian Basin Fragmenta Mineralogica et Palaeontologica. **12,** 5—18.

FORBES, B., KUNO, H. (1967): Peridotite inclusions and basaltic host rocks. In: Ultramafic and related rocks (Ed. P. J. WYLLIE). Wiley, New York.

GREEN, D. H., RINGWOOD, A. E. (1967): The genesis of basaltic magmas. Contrib. Mineral. Petrol. 15, 103—190.
GREEN, D. H., RINGWOOD, A. E. (1970): Mineralogy of peridotitic compositions under upper mantle conditions. Phys. Earth Planet Interiors. 3, 359—371.
KOCH, A. (1885): Erdély ásványainak kritikai átnézete (Critical review of minerals from Transylvania). Kolozsvár.
KUSHIRO, I., KUNO, H. (1963): Origin of primary basalt magmas and classification of basaltic rocks. J. Petrology. 4, 75—89.
MARINESCU, F., GHENEA, C., PAPAIANOPOL, I. (1981): Stratigraphy of the Neogene and the Pleistocene boundary. Guide to Exc. A6. XIIth Congress of Carpatho-Baklan Geol. Ass. Bucharest.
PATRULIUS, D., DIMITRESCU, R., GHERASI, N. (1968): Geological Map of S. R. Romania scale 1:200 000, sheet and book Brasov (28). Institute of Geology, Bucharest.
POPESCU, I., MIHAILA, N., PELTZ, S., TICLEANU, N., ANDREESCU, I. (1976) Geological Map of S. R. Romania scale 1:50 000, sheet Racos (78/d). Institute of Geology, Bucharest.
POPESCU, I., PATRULIUS, D., POPA, E., CODARCEA-DESSILA, M., DRAGULESCU, A., BORCOS, M., VASILESCU, A. (1970): Geological Map of S. R. Romania scale 1:50 000, sheet Persani (94/b). Institute of Geology, Bucharest.
RADULESCU, D., BORCOS, M., PELTZ, S., ISTRATE, G. (1981): Subduction magmatism in Romanian Carpathians. Guide to Exc. A2. XIIth Congress of Carpatho-Balkan Geol. Ass. Bucharest.
VASILESCU, A., MURESAN, M., POPESCU, I., SANDULESCU, J., POPESCU, A., BANDRABUR, T. (1968): Geological Map of S. R. Romania scale 1:200 000. sheet and book Oderhei (20). Institute of Geology, Bucharest.

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