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CALCITE MINERALIZATION NEAR SVETOULKA VILLAGE, ARDINO REGION

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ABSTRACT

The authors visited and took samples from the Island spar mineralization near the village of Svetulka, Ardino region. The calcite mineralization is mainly in the form of irregular net of zones and elongated nests (stockwork type) among the marbles of the Chepelare pastra?? unit. The report represents the results from the selective sampling and the crystalomorphologic studies.

INTRODUCTION

Subject of the present paper is the calcite locality situated among the villages Byal Izvor and Svetulka, which is about 5 km to the west of the town of Ardino and about 32 km west of the town of Kurdzhali (Fig. 1).

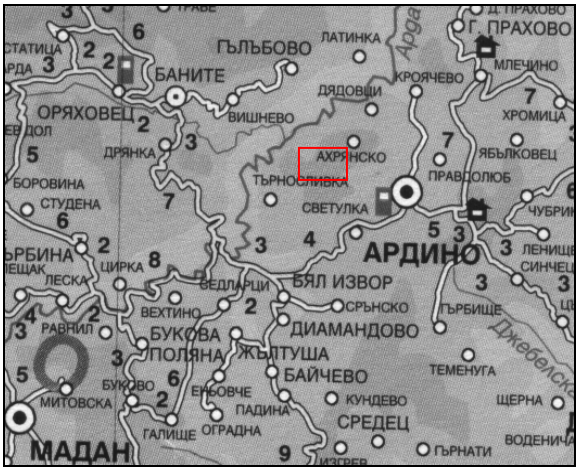

Figure 1. Map of the region, M 1:500 000

The geology of the region includes highly metamorphic rock complexes, referred to the Rhodopes nadgrupa by Kozhuharov et al. (1995), Roupchoska group (Kozhiharov, 1984). South of the locality is outcropped Chepelare mottled formation, consisting mainly of finely grained biotite gneisses as well as some amphibole-biotite gneisses, marbles, amphibolites, which alternate irregularly. The marbles are white, middle to finely grained. Serpentinized ultrabasites of dunite, peridotite and pyroxenite composition are outcropped in the region. They are characterized by a very high level of premetamorphic serpentinization (80-100%) up to serpentinites of antigorite and chrysotile composition. The serpentinite bodies have the form of boudine – concordant with the imbedding metamorphites.

The north border of the Chepelare unit in the region is presented by a detachment surface, which is discordant to the migmatized and granitized gneisses, gneiss-schists and amphibolites of the Vishnevska unit (Kozhuharov, 1984).
The hydrothermal activity led to the formation of listvenites, which form a body like a halo to the north of the outcropped ultrabasites. Listwaenites are of varying composition – from over 90% of SiO_2 to over 90% of carbonate minerals. Right next to the listwaenites are the marbles, among which is imbedded the calcite mineralization (Fig. 2).

Figure 2. General view of part of the zone with calcite mineralization

Morphology of the bodies with calcite mineralization

The calcite mineralization is presented in the form of elongated nests and irregular net of stockwork type zones among the marbles (Fig. 3).

Figure 3. The zone of calcite mineralization (two calcite crystals can be seen above the chisel)

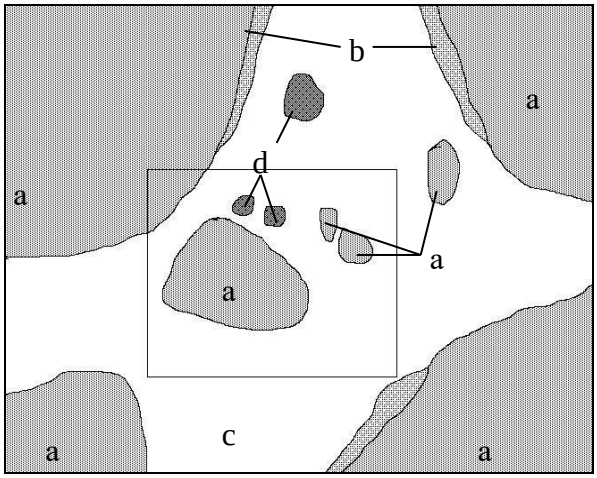

Figure 4. Sketch map of the calcite mineralization zone **(a –** blocks of unaltered marbles; **b** – zone of dense opaque calcite crystals; **c –** host rock of calcite crystals; **d -** calcite crystals) ▭ contour of the photo in Fig. 3.

The monolithic blocks of tectonically unaltered marbles are in the size of tens of centimetres to several cubic meters (Fig. 4). They are of rounded irregular shape and consist of finely grained to middle grained white to grayish-white marbles.

Druse-shaped crust of thickly crowded white opaque calcite crystals is formed at some places in the rim of the blocks. The crust is from 1-2 up to 8-10 cm wide.

The host rock (media) presents a loose, slightly bonded sand-like rock consisting mainly of calcite – fine to coarse grained.

The calcite crystals are unevenly distributed as single pieces of irregular shape, elongated as a rule. Their size is from several centimetres up to 30 centimetres .

The collected calcite differs noticeably in its size, colour, and morphology, including twins, poly-twins, various primary or secondary defects.

The calcite is colourless or tinted in different intensity of yellow to brown. Some crystals are evenly coloured or colourless all over, while others, usually the big ones, reveal clear zonality (in the rim or in the whole volume) with yellowish to brown and reddish-brown to red due to iron oxides and hydroxides. This led to phantom crystal formations (fig. 5).

The pigmentation differs in the different zones of growth and is concentrated mainly in the rim. The transparency could be from opaque to transparent.

As a rule the crystals are cracked along the cleavage planes. On the periphery they are often covered by an opaque carbonate crust (Fig 6).

Figure 5. Zonality of colouring leading to phantom crystal formation. The specimen is a part of a twin crystal.

Large number of crystal individuals and aggregates has been studied macroscopically. Because of the dull and uneven surfaces of the crystal faces and the relatively large size of the crystals reflective and photogoniometry were not used. Most of them are characterized by clearly defined crystalomorphology. All the studied samples show polar development of the form. Half of the crystal has well developed crystal faces, while the other half is by rule with no morphology. Besides, the faces belonging to the one and the same simple form are asymmetric and differ in size. They are not smooth and “shiny”, but rough and with complex microsculpture, the type of surface that would be formed if growing was not in a free space.

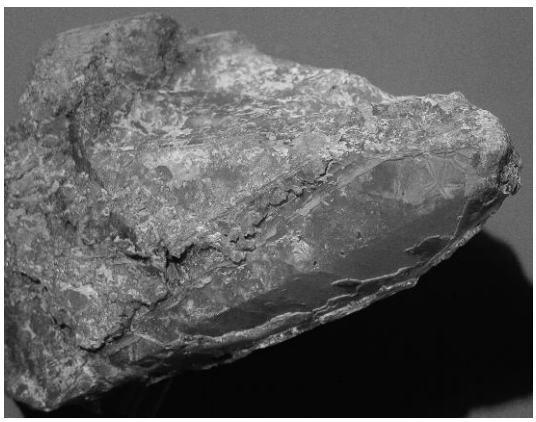

Figure 6. Calcite crust in the rim of the crystal faces, coloured by iron oxides and hydroxides

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Several types combination forms were established depending on the development and the prevalence of a certain simple form.

Scalenohedral-prismatic **–** This type of calcite crystals usually form scalenohedrons in combination with a hexagonal prism. In most of the cases the scalenohedron predominates, as a result of which every other face of the prism is presented and only three of them are observed in the morphologically developed part of the crystals. (Fig. 6 and Fig. 7)

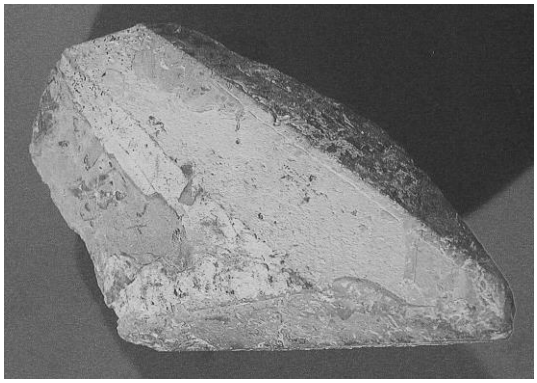

Figure 7. A calcite crystal with a scalenohedron and a hexagonal prism.

Generally no sharp tip is formed or the tip is frayed, dull with rudiments of a pinacoid and/or rhombohedron. In some of the studied crystals, besides the faces of the prism and the positive scalenohedron , there are scarcely revealed faces of a negative scalenohedron and a negative rhombohedron. In this case the crystals are frayed (in direction perpendicular to "c" axis) (Fig. 8)

Figure 8. Calcite crystal, combination of scalenohedron (+) and (-), hexagonal prism and rhombohedron.

Rhombohedral – Crystals of this type reveal exlusive combinations of one main sharp rhombohedron and one or two derivative rhombohedrons (fig. 9). Crystals of this type grow in a free space – opened cracks. The cracks have no specific orientation and vary from sub-horizontal to sub-vertical. The maximum width of the cracks is up to 10 cm. They can be observed in a vertical slope of the old quarry, 200 m east of the zone described above.

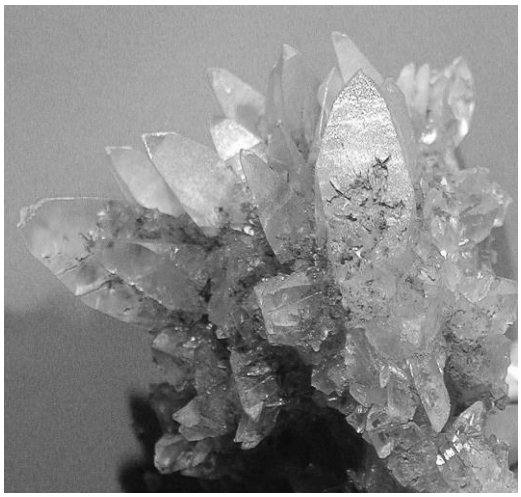

Figure 9. Druse-like aggregate of rhombohedral crystals

Aggregates and twins

Many of the studied samples are presented by various aggregates and twins. Thick druse-like aggregates predominate along the rims of the marble pieces in the zones of calcite mineralization. Aggregates as well as parallel twins and triplets are common (Fig. 10).

Twins are characteristic for the bigger part of the samples. Mainly these are twins of a simultaneous growth or mechanical twins. There are some twins by basic pinacoid (Fig. 11) and by a hexagonal prism.

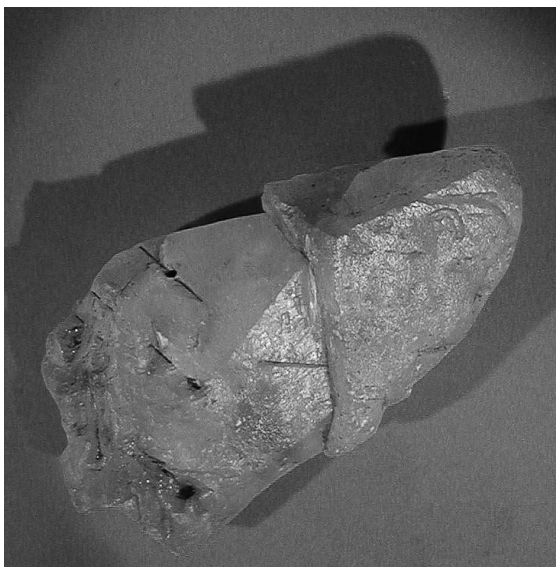

Figure 11. Paralel twin (scalenohedron)

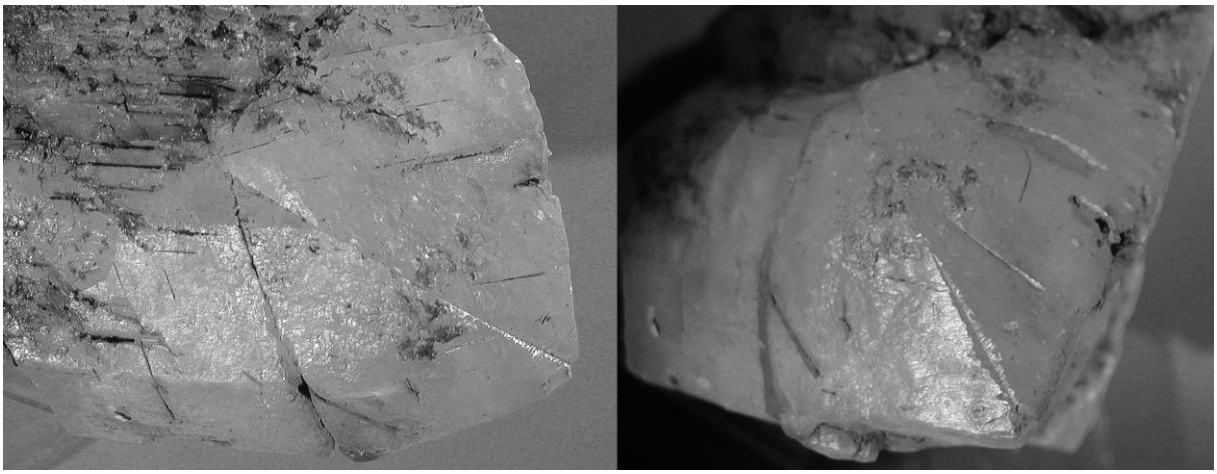

Figure 10. Twin crystal, shown in two views

Forms of superficial dissolution - As the samples are taken from the superficial weathered part of the zone, the sculptures of dissolution are common. There are two main types: single negative strokes parallel to the cleavage planes and a series of fine parallel grooves. In the second case the direction of the negative strokes is not parallel to the cleavage planes. They are along the edge of a rhombohedron (10–12) in the direction, which coincides with the direction of translation, while forming dynamogenic twins (Fig. 12).

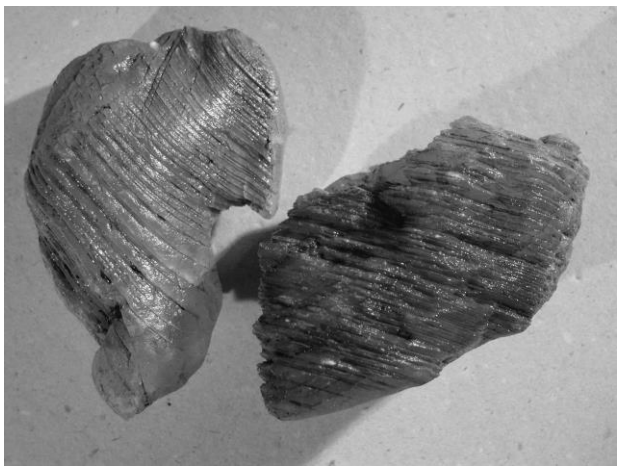

Figure 12. Superficial forms of dissolving along the planes of translation with dinamogenic twins

CONCLUSION

The presented results from macroscopic studies of calcites from Svetoulka region are preliminary. Field investigations have been conducted and the morphology of bodies with calcite mineralization near the surface has been studied. Several morphologic types of crystals and aggregates have been established. The collected data and the research completed so far do not provide enough evidence to formulate a reliable hypothesis for the genesis of the mineralization.

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