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CONTRIBUTION TO THE STUDY OF THE FLUORITE DEPOSIT "MINA BERTA" IN SAN CUGAT DEL VALLES (BARCELONA, SPAIN)

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ABSTRACT

As a contribution to the mineralogical study of the fluorite deposit "Mina Berta," spectrographical analyses of some samples of fluorite of this deposit are given. No correlation exists between the different colors of fluorite and the presence of certain cations. Mg, Si, Al and Cu appear clearly in all the specimens; Fe appears also in all of them but with notable differences in the quantity.

The fluorite deposit called "Mina Berta" lies about 25 km north northwest of Barcelona (Fig. 1). Formerly, galena and sphalerite as well as fluorite were mined there, but at present only fluorite is mined and, from time to time, small quantities of galena. However, the deposit has a very rich paragenesis, and 25 different mineral species have been identified up to now. The fluorite appears as discontinuous lenses with a predominately vertical attitude included in an aplitic granite.

The samples used in this work were personally collected at the deposit or selected from the mineralogical collections of the Town Museum of Geology of Barcelona and Sabadell or from the private collection of Mr. Folch Girona.

Of the white, green and violet color varieties of the fluorite, only the white and green are abundant and well defined in this deposit. The violet fluorite is very rare and the few specimens having this color offer only a slight pinkish shade. Some fluorite is in nearly perfect octahedrons with a green exterior and a white, slightly violet interior. In crystals like this, the surface separating the two colors is approximately the cleavage plane (111).

Microscopical observation shows that in some fluorite specimens there are inclusions of a biaxial, low birefringent mineral, that seems to be a feldspar. In other specimens, although not very abundant in the deposit, small inclusions of galena give the fluorite a gray color. For the spectrographical study specimens were chosen that, by microscopical observation, are free of inclusions.

A Hilger spectrograph using a direct current carbon arc was employed. The film used was Mafe positive, sensitive only to the ultraviolet region of the spectrum.

Of the many samples studied, the results of 25 which show the greatest variations, are selected for presentation. Figure 2 shows the results of the spectrographical analysis. Mg, Si, Al and Cu appear

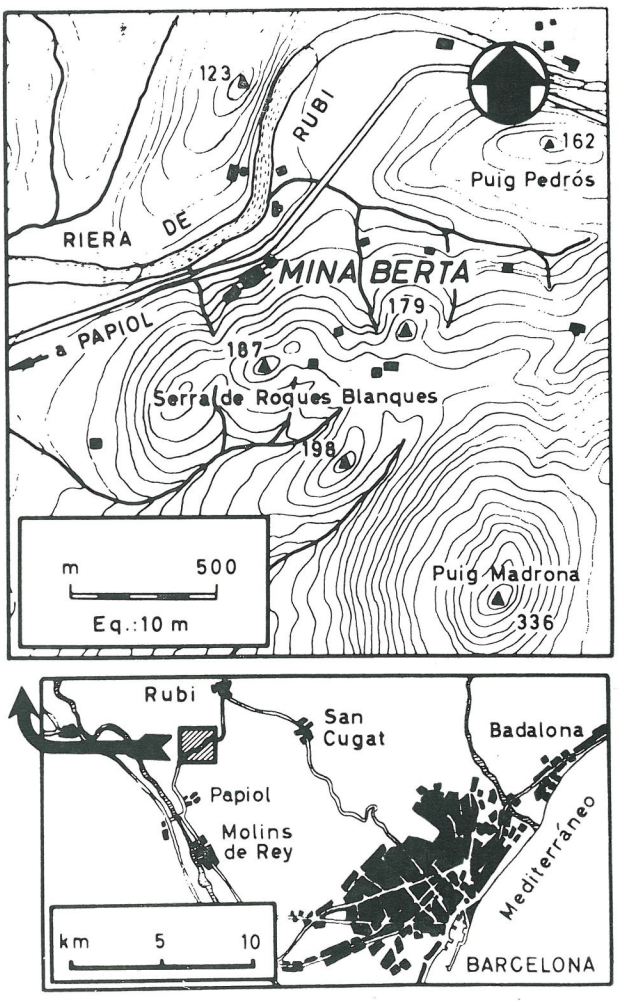

FIG. 1. Map showing the location of "Mina Berta."

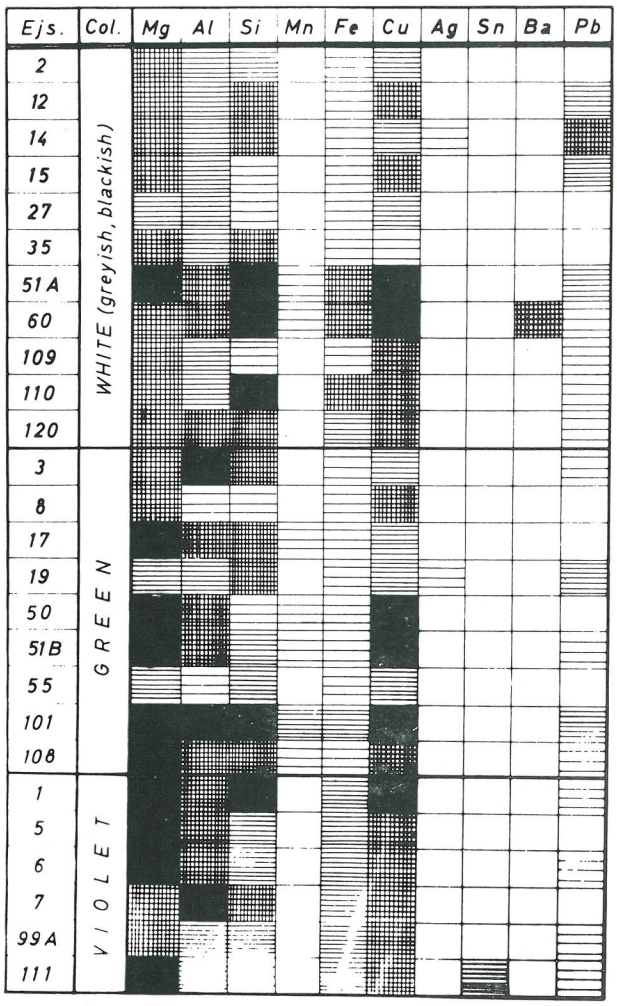

FIG. 2. Minor elements existing in the fluorite. The intensity of the shading is proportional to the intensity of the spectrographic lines of the element.

clearly in all the specimens; Fe appears also in all of them but with notable differences in the quantity.

The spectrographic analysis of the fluorite from Mina Berta was carried out chiefly to see the correlations between the fluorite, associated minerals and the wall rock, with the hope that the results would shed light on the genesis of the deposit. But on doing so, we can see also whether there exists any correlation between the different colors of fluorite and the presence of certain cations.

At the beginning it appeared that there was not such a correlation, since Fe and Cu, elements that could have a certain influence over the coloring, appear indistinctly in the white, violet and green varieties. Further, it has been observed that the intensities of the spectral lines of Cu and Fe are variable in different samples of the same coloring and on the other hand, the same intensities appear in samples of different color.

The work in quantitative aspects is going on now in order to get a complete confirmation of the above as well as to compare the quantity of the trace elements contained in the fluorite and in the rock wall. It can be seen that Ba, Pb, Sn are random and in very small quantities.

As a curiosity it was observed that the white and violet fluorite of this deposit never contain any quantity of Mn, whereas the green samples always contain this element. However, at the present time it is not possible to establish any definite correlation between the green color and Mn.

Of particular interest is the fact that Mg, Al, Fe and Si have been detected systematically in all samples. In no bibliography is any information given about the existence of these elements as impurities in fluorite but at Mina Berta they have even been found in perfect octahedrons of fluorite. Mg is also found in samples of calcite from this deposit, that means that Ca is here always accompanied by Mg.

In all the samples studied Cu is present as a minor element in constant quantity. A great variety of copper minerals is present at "Mina Berta," both primary (chalcopyrite) and secondary (chalcocite, bornite, covellite, azurite, malachite). Although these minerals are included in the mass of fluorite, they are found chiefly near the contacts with the granite walls.

A concentration of azurite and malachite was observed wherever the granite is fractured and slightly altered, even if there are no other copper minerals nearby. This seems to indicate that the water circulating about the deposit has a high copper content. However, this alone does not explain the existence of copper as a minor element in a perfect crystallized fluorite.

In all samples of calcite spectrographically analysed the presence of Cu has been detected. It is believed at the present state of investigation that the presence of Cu in fluorite and calcite shows that the formation of minerals in the deposit was carried out in a single stage, in which the fluorite and the other primary minerals were precipitated simultaneously, and that the original material that formed this deposit was contaminated by Cu.

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