BARYTOCELESTITE FROM THE KINGDEN LEAD MINES, GALETTA, ONTARIO

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Galena and sphalerite occur in many places in eastern Ontario. A common type of occurrence is in well defined veins which cut vertically through beds as late as Ordovican. The veins show a decided banding with many vuggy openings along the central part. The greater part of the vein-filling is calcite in which the galena commonly occurs in crystals arranged more or less continuously along certain planes, but the planes are not themselves continuous. Sphalerite is intergrown with galena in varying proportions. The vuggy openings in the central part of some of the veins show a variety of minerals of the later vein stages. At the old Frontenac lead mine at Perth Road, Frontenac County, the openings in the vein contain well formed crystals of sky-blue celestite up to two inches in length. Marcasite is one of the late minerals to crystallize.

At Galetta, west of the City of Ottawa, a vein of this type has been worked for some years for its lead content. At places the well banded calcite vein is open along the medial line. At other places the central part is filled with very transparent selenite which forms crystals as much as a foot in length. The galena is well crystallized. It carries some brown sphalerite distributed as fine grains through the galena crystals. In the open spaces barite of a light brownish color covers the surface of the calcite. Later than the barite and distributed as rosettes on its surface is marcasite and later again are small nests or tufts of needle shaped crystals of a sulphate that contains both barium and strontium. The relation of the water, and a later period of clear selenite, that in places occupies the central part of the vein, to the barytocelestite is not definitely known as the two have not yet been seen together. The deposition of the vein minerals, therefore, took place in an early ore stage in which calcite and galena were deposited in alternating zones deposition of sulphates and marcasite in the vein cavities. The order of crystallization in this last stage was barite, marcasite, barytocelestite, and selenite with the period of the last two not definitely known.

The barytocelestite is in needle-like crystals with the shorter measurements from 0.08 mm. to 0.1 mm. The length is approximately ten times as great. A chemical analysis of as pure material as could be obtained gave the following result.

$BaSO_4$	81.5 per cent
$SrSO_4$	18.5
	100.00

Qualitative tests for calcium gave negative results and in the above analysis only barium was determined and the strontium sulphate was assumed to make up the remainder. From this the formula appears to be approximately $5BaSO_4 \cdot SrSO_4$.

Optical examination shows that the value of the index of refraction for vibrations parallel to the longer direction of the crystal is 1.63 and that this is greater than the index for the shorter direction. The interference color is ordinarily slate gray and assuming a thickness of 0.1 mm. the birefringence is 0.001 and the value for the index of refraction in the shorter direction is 1.629. It is likely that in the refractive index liquids the crystals are lying on the base and hence these two values are the least and mean indices with the mean index that for the direction parallel to the elongation of the crystal. By analogy with barite and celestite this would be the *b* crystallographic axis.

Walker[1] has described a stalactitic barite from Madoc which carries 13.95 per cent SrO. This mineral he states is later than the flurite and incrusts it.

The succession of minerals at Galetta shows an interesting variation in the vein forming solutions. During the main ore stage the solutions deposited sulphides and carbonates. Then came the sulphates with barium sulphate as the first to form followed by either the strontium or the calcium sulphates. Celestite occurs in nodules in the Palaeozoic limestones in the vicinity of Kingston. These are neither in nor near veins but apparently formed by segregation of the celestite during the formation of the limestone. If the celestite nodules are contemporaneous with the limestone it seems possible that the presence of strontium in the vein forming solutions during the later stages of formation of the Galetta and Perth Road lead veins may be due to admixture of the original

[1] *Am. Mineral.*, Volume 4, page 79 (1919).

galena-bearing solutions, possibly from deep seated sources, with shallow water solutions which had dissolved from the limestones some of their strontium content. This is in agreement with the hypothesis suggested by Uglow for the calcite-barite-fluorite-galena veins of this district. He[2] assigns these deposites to solutions in part of meteoric, in part of magmatic origin.

THE FLORENCE METEORITE OF WILLIAMSON COUNTY, TEXAS

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The Florence Meteorite, the history of which is given below,[1] is of interest because of its excellent state of preservation and petrographic characters. The stone was a small one, measuring 11.5×14×11 cm. and weighed 3640 grams before cutting. The shape was roughly rectangular with four faces approximately plane the other two being rounded. All faces except the rounded ones show the characteristic pitted surfaces, the largest pits being 2 cm. in greatest dimensions. The unbroken surface of the stone is black while the interior is light gray. The black surface material is present as an exceedingly thin skin of oxidation. Plate I, figure 2 shows the external features of the meteorite.

[2] *Ontario Bureau of Mines*, Volume **XXV**, Part No. 2, page 40.

[1] The meteorite fell on the night of January 21, 1922 on the farm of T. H. Lindsey, five miles northeast of Florence, Williamson County, Texas. The stone subsequently came into the possession of Dr. F. W. Simonds of the University of Texas to whom the writer is indebted for details concerning the history of the fall and for the opportunity of studying the specimen. Through the kindly offices of Dr. G. P. Merrill of the U. S. National Museum the stone was cut, sectioned, and analyzed. One half of the meteorite and a cast are deposited in the U. S. National Museum while the other half and a second cast remain in the collections of the University of Texas.

Details concerning the fall of the stone show that it fell at about 8 P. M. after darkness had come on. The direction was from the southwest and the fall was accompanied by a noise "almost like thunder and a great light streak toward the west." The stone fell on the edge of a dry water-course covered with cobbles and "did not knock much of a hole in the ground." The stone was found the next morning ten or twelve hours after the fall. The latitude and longitude of the locality as nearly as can be stated are 30° 52′ north and 97° 43′ west.