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ECHELLITE, A NEW MINERAL

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In some specimens of a basic intrusive shown me by Dr. M. Y. Williams, of the Geological Survey of Canada, small spheroidal masses of a radiating fibrous mineral were observed, having the appearance of a zeolite. The association is that to be expected of a zeolite, but optical examination brought out the fact that the properties of this mineral did not correspond with those listed for any of the minerals of that large group. In fact, no mineral with corresponding optical properties could be found, and accordingly as complete an examination as the material at hand permitted was undertaken.

The specimens were obtained at the Sextant Portage, Abitibi River, Northern Ontario, by W. R. Maher, Locating Engineer, T. & N. O. Ry. The mineral was apparently noted some years ago by O. E. Leroy, at least in thin sections, as he speaks of basic intrusives from this locality as containing a fibrous zeolite.[1]

The rounded masses of the mineral are at times as much as 1 cm. in diameter, tho usually much smaller. It has a white color, porcelain-like where the fibers are very fine and more nearly glassy where the fibers are coarser and might better, perhaps, be termed needles. The hardness of the needles is about 5. The masses are sometimes embedded in patches of calcite, and sometimes in the basic rock itself. The crystallization is probably orthorhombic but the forms and angles are unknown.

The optical properties, measured in immersion liquids under the microscope, are:

$\alpha = 1.530$; $\beta = 1.533$; $\gamma = 1.545$; ± 0.001; $+$; $2V = 50° \pm 5°$

[1] Geol. Survey Can., *Summary Rep't.*, 1902–3, 237A.

The elongation of the fibers is Y and there is perfect cleavage parallel to the plane YZ. In crushed material as used in immersion liquids most of the grains show, therefore, the indices β and γ and have negative elongation. Fairly frequently the flattened needles are turned sufficiently to show a somewhat oblique emergence of an optic axis. Only very rarely do they show positive elongation (β and α) in which case α can be determined, and an interference figure showing emergence of the acute bisectrix Z observed. It will be noted that the indices are somewhat higher than those of any of the other zeolites; and that the birefringence is rather strong.

A chemical analysis was made on carefully selected material. There was not a sufficient amount for duplicate analysis, but the mineral is decomposable directly by HCl and the constituents are few, the manipulations consequently simple, and I have confidence in the result:

TABLE 1

ANALYSIS OF ECHELLITE

		Mols.	Ratios
$H_2O\pm$	14.4	.800	4.15
SiO_2	34.5	.573	2.97
Al_2O_3	40.0	.391	2.02
CaO	7.2	.128	
BaO	none	—	1.00
Na_2O	4.1	.065	
K_2O	slight trace	—	
Sum	100.2		

The water determination, which gives a ratio 0.15 more than a whole number, includes both hygroscopic and combined water; and the excess no doubt represents the former. It may safely be stated, therefore, that the composition of the mineral is:

$$(Ca, Na_2)O.2\ Al_2O_3.3SiO_2.4H_2O.$$

This result confirms the conclusion based on the optical properties, that the mineral is one not hitherto described and the name echellite is proposed for it from the French *échelle* = ladder, in allusion to the fact that the ratios come out stepped, as 1, 2, 3, 4.

It is noteworthy that the ratio $CaO: Na_2O = 2 : 1$, but whether this ratio is essential cannot be determined from a single example; and in writing the formula it has been assumed that it is variable, as is the case in most related minerals. For the ratio $Al_2O_3 : (Ca, Na_2)O = 2 : 1$, found in this mineral, there is no parallel among the zeolites, where this ratio is practically always 1 : 1. The formula can be written in a manner suggesting a hydrated zoisite, tho not corresponding entirely. There is no particular reason for so writing it, except that a compound suggesting a hydrated zoisite is a not unlikely alteration product of a basic igneous rock. The correspondence is mentioned for what it may be worth and is shown in the following:

Echellite . . $(Ca, Na_2)\ (Al\ OH)_2\ Al_2\ (SiO_4)_3.3H_2O$

Zoisite . . . $Ca_2\ \ (Al\ OH)\ Al_2\ (SiO_4)_3$

THE CALCITE CAVE IN THE NEW YORK STATE MUSEUM

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New York State Museum

A reproduction of the famous Sterlingbush cavern has recently been completed in the New York State Museum at Albany. The size of the crystals, their unusual color and the ingenious method of construction of the exhibit make a short description of it worth while.

The Sterlingbush calcite crystals are well known to mineralogists. The cave from which they came was discovered during the process of quarry operations, after a blast had exposed a small opening 6 meters above the floor in the open face of a limestone quarry at Sterlingbush, Lewis County, northern New York, in 1906; it was first brought to the attention of scientists by Dr. D. H. Newland. The entrance consisted of a horizontal fissure that gradually widened to about one meter and extended a distance of 15 meters, leading into a chamber about 4 meters wide and $2\frac{1}{2}$ meters high. Beyond this room the cave contracted, took a downward course, and came gradually to an end, as developed from further quarry work. The floor and lower sides of this chamber were covered with large calcite crys-