EUXENITE-POLYCRASE FROM MATTAWAN TOWNSHIP, NIPISSING DISTRICT, ONTARIO

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The mineral here described occurs on lot 29, conc. 3, Mattawan township, about five miles west of the village of Mattawa, in a pegmatite dike which was opened up for feldspar during the winter of 1926 by M. J. O'Brien, Limited. The writer had seen the dike before mining began and is indebted to N. B. Davis of M. J. O'Brien, Limited, for specimens of the mineral and for the description of its occurrence.

The dike is 18 to 25 feet wide and is exposed for a length of about 300 feet, following a straight course a little west of north up a high hill which faces south to Lac Plein Chant, an expansion of the Mattawa river. The dike dips about 80° to the west, cutting syenite gneiss. The hanging wall is closely frozen to the gneiss while the foot wall is free from the country rock, being separated completely from it by about one-half inch of gouge consisting of rusty, scaly, decomposed micaceous material. In composition the dike is of the coarsely crystallized, segregated type. The middle portion is composed of crystals of microcline and massive white quartz; the quartz masses occurring sometimes in the middle with microcline on both sides, sometimes mostly on one side or the other. Along the sides next the wall rock there is a varying width of soda feldspar, up to two feet wide along the hanging wall, less along the foot wall. This is a common, typical arrangement in Ontario pegmatites and would probably be interpreted by most observers as indicating that the soda feldspar crystallized first, the microcline next and finally the quartz.

The chief euxenite occurrence is on the top of the hill 500–600 feet above the lake. It was first encountered within 6 feet of the surface. The euxenite is found in masses varying from pea size up to a diameter of 4-5 inches, principally in the microcline about 2 feet from the hanging wall, but now and than a mass may be found in the middle of the dike. While no definite crystals have been seen so far, the masses of euxenite have a tendency toward a tabular form tapering to sharp edges and may have some roughly formed crystal faces. The feldspar around the euxenite masses

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is colored red and is radially fractured, a characteristic effect of radioactive minerals in Canadian Precambrian rocks, as described by the writer in earlier publications[1] and more recently discussed in some detail by Walker and Parsons.[2]

The pegmatite is compact and fresh looking with no evidence of weathering on the hanging wall side but there are slight indi-

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	Per cent	Mol. Wt.	Bases	Acids
PbO	1.06	222	0.0048	
(Pb=0.98)				
UO_2	6.42	270.2	0.0234	
UO_3	0.43	286.2	0.0015	
($U=6.01=7.09\ U_3O_8$)				
ThO_2	0.97	264	0.0037	
(Th=0.85×0.38=0.32, U equivalent)				
$(Ce, La, Di)_2O_3$	0.20	330	0.0006	
$(Yt, Er)_2O_3$	28.07	258	0.1088	
(Atomic weight=105)				
FeO	0.29	72	0.0040	
Fe_2O_3	1.40	159.7	0.0088	
MnO	0.03	70.9	0.0004	
Al_2O_3	0.28	102.2	0.0027	
BeO		25.1		
CaO	1.08	56	0.0193	
MgO	0.05	40.3	0.0012	
ZrO_2	0.03	122.6		
SnO_2	0.09	150.7		
TiO_2	26.17	80.1		0.3267
Ta_2O_3	12.12	443		0.0273
Cb_2O_5	18.49	266.2		0.0694
SiO_2	0.03	60.3		
F	Not detected		0.1792	0.4234
$H_2O-110°$	0.04			
$H_2O+110°$	2.83	18	0.1572	
He	present—not determined			
Loss on ign.	(2.99)			
	100.08			

Sp. Gr.=4.918 at 21.10°

$Cb_2O_5+Ta_2O_5 : TiO_2=1:3.3$

Pb/U+0.38 Th=0.155=1180 million years.

[1] Geol. Survey, Summary Report, **1921,** Part D, pp. 57–58 D, 68D.
Geol. Survey, Summary Report, **1923,** Part C, p. 14C.
Am. J. Sci., Feb., **1925,** p. 139.

[2] Contributions to Canadian Mineralogy. **1923,** p. 25.

cations on the foot wall side near the seam of gouge. Minerals other than those mentioned are not prominent. No tourmaline and only a little black mica has been encountered.

The euxenite is black, unusually brilliant and fresh looking and seems to be quite unaltered by the normal weathering agencies. Hardness 6.5, cleavage none, fracture subconchoidal. Powder yellowish brown. Under the microscope brown and isotropic. It appeared to be exceptionally good material for Pb/U age determination. The pieces selected for analysis were examined under the microscope and appeared to be perfectly homogeneous and absolutely free from included impurities. An analysis yielded the results indicated above:

According to Lacroix[3] euxenite has $Nb_2O_5 : TiO_2 = 1 : 3$ or less while polycrase has $Nb_2O_5 : TiO_2 = 1 : 4$ to 6. This mineral with $Nb_2O_5 + Ta_2O_5 : TiO_2 = 1 : 3.3$ is on the border line between euxenite and polycrase. This euxenite is noteworthy in that it yields age results in entire accord with those derived from the Ontario uraninites[4] while other complex U minerals of Ontario commonly give much lower figures. The very small amount of SiO_2 present, is, in the writer's opinion highly significant as indicating that this particular mineral has not suffered appreciable leaching, alteration or replacement by circulating waters, whereas those complex Ontario minerals which give low age figures invariably contain very appreciable amounts of silica, sometimes two percent or more. It is not likely that silica is an original constituent of such minerals and it seems probable that in cases where a mineral contains considerable silica (not due to inclusions of quartz, feldspar, etc.) it is present as a result of secondary replacement of some of the normal constituents, notably lead. Thus, if this theory is correct we have a method for judging the probable value of age results from the complex titano-tantalo-columbate minerals. If the mineral contains little or no silica we may attach considerable weight to the age result, if an appreciable amount of silica is present we can be almost certain that the age result is lower—often very much lower—than the true value. The writer hopes to present a more comprehensive discussion of this matter in a future paper.

[3] MINÉRALOGIE DE MADAGASCAR, Vol. I, p. 386.

[4] Ellsworth: Radioactive Minerals as Geological Age Indicators, *Am. J. Sci.*, Feb., 1925, p. 143.