

A NEW ANALYSIS OF THE MABERLY,
ONTARIO, EUXENITEH. V. ELLSWORTH¹.

One of the older known occurrences of euxenite in Ontario is that on lot 13, con. V, South Sherbrooke township, Lanark County, near the village of Maberly. This was first described by Willet G. Miller and Cyril W. Knight² with an analysis by the Imperial Institute, London. This analysis gave only a very small Pb/U+0.38 Th ratio and consequently indicated a very late age, perhaps Carboniferous for the pegmatite in which it occurs, a conclusion not in accord with the geological evidence as the dike appears to be no different in any way from many other middle Precambrian pegmatites of Ontario now known to be between 1100 and 1200 million years old. It should be noted, however, that Miller and Knight considered that there is evidence for the existence of a younger Precambrian granite³ in the ancient complex of central Ontario. The samples analyzed by the Imperial Institute came from the first superficial workings and quite likely were considerably leached and altered. As the writer subsequently obtained large quantities of very fine apparently fresh material from a depth of 30 to 40 feet, it was thought to be worth while to analyze a large average sample with a view to check the age of the pegmatite.

The sample for analysis consisted of 200 grams of the finest, pure, brilliant fragments picked at random from an average sample of the coarse concentrate⁴—in all 14 lbs.—derived from 1593 lbs. of euxenite-bearing feldspar which was tabled by the Ore Testing Division. The 200 grams selected represented an average sample of the total euxenite concentrate of 58.12 lbs. obtained from 1593 lbs. of ore. It appeared that there might be some variation in different euxenite individuals, as some grains were darker in color than others and possibly would be found to carry more iron or uranium, or both, if they were to be analyzed separately, but no detailed study was made of the differently colored specimens, the intention being simply to secure an average sample of the whole concentrate. The 200 gram lot was reduced to 100 mesh, mixed and resampled, a smaller lot being finally ground fine for analysis.

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² *26th Ann. Rept. Ont. Bureau of Mines* (1917).

³ *Report of the Bureau of Mines, Ont.*, Vol. XXII, Second Part (1914).

⁴ *G. S. C. Sum. Rept.* (1921), part D, p. 69D.

Several determinations of Pb, U and Th were made in the course of the investigations on analytical methods, in some instances quantities of 5, 10, and even 20 grams being used, so that the results for these elements are believed to be accurate to two or three hundredths of one per cent. The analysis gave the following results:

EUXENITE, LOT 13, CON. V, SOUTH SHERBROOKE TOWNSHIP, LANARK COUNTY, NEAR THE VILLAGE OF MABERLY, ONTARIO

	Per Cent	Mol. Wt.	Bases	Acids
PbO.....	1.01	222	0.0046	
(Pb=0.94)				
UO ₂	7.25	270.2	0.0268	
UO ₃	1.51	286.2	0.0053	
(U=7.56=8.92 U ₃ O ₈)				
ThO ₂	2.64	264	0.0100	
(Th=2.32x0.38=0.88 U equiv.)				
(Ce, La, Di) ₂ O ₃	0.87	330	0.0026	
(Yt, Er) ₂ O ₃ (Average At. Wt.=108.1)...	24.95	264	0.0945	
FeO.....	0.14	72	0.0019	
Fe ₂ O ₃	2.16	159.7	0.0135	
MnO.....	0.19	70.8	0.0027	
Al ₂ O ₃	0.45	102.2	0.0044	
BeO.....	0.05	25.1	0.0019	
CaO.....	2.03	56	0.0362	
MgO.....	0.07	40.3	0.0019	
ZrO ₂	Not detected.	0.00	122.6	
SnO ₂	0.14	150.7		0.0009
TiO ₂	25.04	80.1		0.3126
Ta ₂ O ₅	5.32	443		0.0120
Cb ₂ O ₅	22.28	266.2		0.0837
SiO ₂	1.08	60.3		0.0179
H ₂ O-110°.....	0.08			
H ₂ O+110°.....	2.29			
	99.55		0.2063	0.4271

Sp. Gr.=4.983 at 22.94°

Pb/U+0.38 Th=0.11=870 million years

Although this analysis indicates a much greater age than the earlier one, it is still less than the general average (1100-1200 million years) for the Ontario Precambrian. The writer at one time considered this result as evidence for the later age of some of the Ontario Precambrian but now after more experience with these

complex minerals is inclined to believe that the low age result is simply an indication of a certain amount of leaching or replacement of the lead, possibly by silica. In a number of analyses of euxenites and similar minerals of Ontario only those with no silica, or very little, have indicated ages in accord with those of uraninites. In some instances complex Ti, Ta, Cb minerals occurring in close association with uraninite have yielded ratios which are only a small fraction of the uraninite ratio. Such complex minerals may contain from 1 to 2 per cent of silica. Microscopic examination of thin sections with arc light illumination shows that these minerals are invariably completely shattered, just as are the uraninites, by the internal strains set up by autoxidation, the sections being traversed in every direction by innumerable fractures of varying intensity. Many of these fractures are, even microscopically, very short and minute and apparently entirely internal. Others are much more strongly developed, extend to the exterior of the mass and connect with many smaller tributary fractures, the whole much resembling a river with its tributary streams. Normal alteration, probably involving silication is made evident along the edges of the stronger fractures by a bleaching of the usual reddish brown color. Thus it is easily understood how these minerals can be penetrated and acted on by natural waters containing silica in solution. While there may be no direct connection between the presence of silica and a too low lead content, a silica content seems to indicate quite definitely that a certain type of alteration involving loss of lead has occurred.

The reliability of uraninite as an age indicator is now too well established to be seriously questioned and discrepancies in results from the complex Ti, Ta, Cb minerals seem to be best explained by assuming that some of the lead has been lost by leaching or replacement.