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# BASTNAESITE AFTER ALLANITE FROM ROUGH ROCK LAKE, ONTARIO

PETR ČERNÝ AND IVA ČERNÁ

*Dept. of Earth Sciences, University of Manitoba, Winnipeg*

The minerals described here come from Rough Rock Lake, located on the Winnipeg River 9 miles NNW of Minaki, in western Ontario. Geology of this Precambrian area was described by Derry (1930). The bedrock is mostly granitic with a few disseminated bands of amphibolite, biotite gneiss and derived migmatites.

The granitic rocks at the eastern end and on the southeastern shore of Rough Rock Lake contain numerous leucocratic, pegmatitic schlieren. Their rock-forming constituents are the same as those of the surrounding granites. Oligoclase ($An_{18}$-$An_{25}$, with both $\Gamma$ and $\Delta$ functions indicating low structural state) and microcline-perthite (obliquity 0.94-0.97, 4-6% $Ab_{ss}$ in potassic phase, 0-1% $Or_{ss}$ in perthitic albite) are usually most abundant but the K-feldspar may be almost absent. Quartz is mostly subordinate but prevails occasionally in central parts. Iron-rich biotite ($\beta$ = 1.655-1.660) is rather rare in the pegmatitic schlieren but is often concentrated around them. It is frequently chloritized. Magnetite ($a$ = $8.39_5$ Å) is the most common accessory mineral in irregular grains up to 15 mm in diameter;

rounded crystals of ilmenite ($a$ = 5.09, $c$ = 14.03 Å) were found only once.

Allanite is fairly common in the pegmatitic bands, attaining up to 10x30 mm in size. It is always amorphous to $x$-rays and isotropic, with refractive index varying between 1.680 - 1.720. Heating in air to 800°C for 3 hrs. restores slightly its original structure but only 3 to 5 major peaks can be measured on $x$-ray powder diffractograms. Heating in air at 1000°C produces a mixture of cubic $CeO_2$ and an unidentified phase, yielding the same $x$-ray pattern as that recorded for isotropic allanite after the same treatment by Lima de Faria (1964, Table 7, samples 1, 6). According to Khvostova (1962) and the former author, these properties and heating products are characteristic for allanites in a very advanced stage of metamict decay.

All allanite grains are altered, to some extent or completely, into a brownish grey or rusty brown dense material. This substance consists mainly of bastnaesite, ideally $CeCO_3F$; no reflections other than those from bastnaesite were found on $x$-ray patterns, but optical examination suggests the presence of subordinate iron oxides and clay-like phases. Bastnaesite is very fine-grained, its approximate refractive indices are $\varepsilon$ = 1.830, $\omega$ = 1.730, close to the values found in other occurrences. The somewhat diffuse powder pattern yields the unit cell dimensions $a$ = 7.08, $c$ = 9.74 Å. These values are appreciably lower than those of cerium bastnaesite but still much closer to them than to those of yttrium bastnaesite ($a$ = 7.16, $c$ = 9.79 Å and $a$ = 6.95, $c$ = 9.56 Å, respectively; Vlasov *et al.* 1964).

Alteration of allanite to bastnaesite has been recorded in many granitic rocks and pegmatites (*e.g.*, Vlasov *et al.* 1964). It is usually supposed to take place during low-temperature hydrothermal stages of these rocks, but a supergene origin was also claimed for this process. The specimens described here come from surfaces of glacier-abraded outcrops, well within the reach of atmospheric weathering. However, the character of the allanite alteration seems to be much the same as in numerous localities in south-eastern Manitoba, where it was observed in entirely fresh rocks (Černý & Turnock 1972). Thus the hydrothermal origin seems to be probable also for this bastnaesite.

The presence of allanite in granites may easily escape unnoticed even in areas relatively rich in this species, because it is generally inconspicuous in both fresh and altered state. The occurrence of allanite as such, and the presence or absence of its alteration to bastnaesite (and/or other rare-earth fluorocarbonates) might prove useful in regional studies of granitic massives and pegmatites in the Canadian Precambrian shield.

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# ELECTRICAL TRAVERSING ACCESSORY FOR VICKERS PROJECTION MICROSCOPE

S. KAIMAN * AND D. M. NORMAN **

## Introduction

In the mineralogical laboratory of the senior author when a detailed examination of a suite of polished or thin sections is required, a projection microscope (Vickers 55) is used to reduce eye strain. The microscopical field is observed in the viewing screen while the section is systematically traversed by means of the two micrometers which actuate the mechanical stage.

Because the stage-traverse micrometers are positioned high on the Vickers instrument, even short periods of manual traversing were found to cause arm fatigue and it was therefore considered desirable to employ motor power to drive the microscope stage. At first, the use of a flexible cable drive was attempted. By coupling a three-foot length of speedometer cable to one of the stage micrometers and to the recording unit of a Hurlbut electric counter (Hurlbut, 1939) placed at bench level, comfortable, digitally controlled traversing was made possible. This arrangement was satis-

* Head, Mineralogy Section, Extraction Metallurgy Division, and
** Mechanical Engineer, Technical Services Division, Mines Branch, Department of Energy, Mines and Resources, Ottawa, Canada.