

CONTRIBUTIONS FROM THE DEPARTMENT  
OF MINERALOGY AND PETROGRAPHY,  
HARVARD UNIVERSITY.  
AEGIRITE FROM LIBBY, MONTANA

ROY W. GORANSON.

The aegirite described in this paper was collected in the Rainy Creek area, near Libby, Montana, by E. S. Larsen, who kindly furnished the description of the field occurrence.

The Rainy Creek intrusive stock cuts the Precambrian Belt rocks and is about three miles across. The chief rock of the stock is a pyroxenite with about ten per cent of apatite. Locally this pyroxenite carries considerable biotite. The pyroxenite is cut by bodies of syenite and nephelite syenite. It is also cut by veins of quartz that carry some chalcopyrite and vanadiferous aegirite<sup>1</sup> near their border. The pyroxenite is uralitized for a few inches on both sides of these veins.

The aegirite described in this paper was collected from a dike of coarse syenite pegmatite, about twenty feet wide, near the contact of the Belt rocks and the pyroxenite in the northern part of the stock. The syenite is poorly exposed but a prospect tunnel follows the dike for seventy-five feet. The syenite is traversed by numerous zones of fracture and a layer of aegirite needles, mostly less than a millimeter thick, lines these fractures. The aegirite also extends for some distance from the fractures as well-formed needles penetrating and replacing the perthite. The unaltered syenite contains little or no aegirite.

The hand specimens consist of microcline and aegirite. The microcline forms tabular plates. It is coarse grained and some of the plates measure seven centimeters along the *c*-crystal axis and about one and a half centimeters along the *b*-axis. The aegirite occurs as needles, usually about a centimeter or less in length and less than a millimeter thick, which interlace to form a mat along cracks and cleavages in the microcline. The aegirite works into and replaces the microcline from these openings, leaving in places a penetrating net of aegirite needles in a microcline matrix and fingering out in the massive part of the microcline grains. In some places the aegirite works out on all sides as a radiating cluster resembling a spherulite in general appearance.

<sup>1</sup>Larsen, E. S. and Hunt, W. F.: Two vanadiferous aegirites from Libby Montana. *Am. Jour. Sc.*, XXXVI, 289-296, (1913).

There is, then, a time break between the formation of the microcline and the formation of the aegirite and a change in the composition of the solutions. The inference is that the aegirite represents a replacement formed by later hydrothermal solutions.

Two specimens came into the writer's hands which were replicas of the Libby aegirite in that they showed the same type of replacement. One came from Ice River, B. C., and the other from the Kola Peninsula, Finland.

PHYSICAL AND OPTICAL PROPERTIES. The aegirite is leaf green in color and powders into tiny fibers due to a very good prismatic cleavage. It fuses in the Bunsen flame to a reddish brown bead and has a fusibility of 2.

The specific gravity as determined is 3.52; as calculated from the Gladstone and Dale rule is 3.57.

The indices with a possible error of  $\pm .003$ , are  $\alpha=1.742$ ,  $\beta=1.768$ ,  $\gamma=1.787$ ;  $2V$ , calculated, is  $81^\circ$ ; the dispersion is moderate,  $\rho > \nu$ ;  $\beta = b$ ,  $\alpha \wedge c \cong 2^\circ$ . The pleochroism is faint, X=olive green, Y=lighter olive green, Z=yellowish green.

CHEMICAL ANALYSIS. A sample of material shown by microscopic examination to be homogeneous except for a few small dark stains between cleavage cracks, which may be of manganese, was analyzed by Helen E. Vassar. The results of the analysis are shown in column 1 and the analysis of the vanadiferous aegirite which also occurs in a vein in Rainy Creek, is shown in column 2. The optical properties of the two aegirites are much alike and the chemical differences are not great. The aegirite described in this paper carries more  $\text{SiO}_2$  and  $\text{TiO}_2$  and lacks  $\text{V}_2\text{O}_3$ .

ANALYSIS AND RATIOS OF AEGIRITE

Constituents	1		2	
	Per cent	Mol. proportions	1a	Per cent
$\text{SiO}_2$	53.11	885		51.91
$\text{Al}_2\text{O}_3$	1.25	12		0.38
$\text{Fe}_2\text{O}_3$	21.73	136		21.79
FeO	1.57	22		1.48
MgO	3.97	98		3.08
CaO	5.15	92		5.53
$\text{Na}_2\text{O}$	10.22	165		10.46
$\text{K}_2\text{O}$	.18	2		0.22
$\text{H}_2\text{O}$ (total)	.27			0.06
$\text{TiO}_2$	2.57	32		0.91
MnO	.44	6		0.58
$\text{V}_2\text{O}_3$	none			3.98
S	none			0.13
	100.46			100.51

A recalculation of the analysis gives (1) the following molecular composition.

		Per cent
Acmite	$\text{Na}_2\text{O} \cdot \text{Fe}_2\text{O}_3 \cdot 4\text{SiO}_2$	62.82
Jadeite	$\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2$	4.85
Wollastonite	$\text{CaSiO}_3$	10.67
Enstatite	$\text{MgSiO}_3$	9.80
Hypersthene	$(\text{Fe}, \text{Mn})\text{SiO}_3$	3.26
$(\text{Na}, \text{K})_2\text{O} \cdot \text{SiO}_2$		2.87
$\text{TiO}_2$		2.57
$\text{SiO}_2$		3.36
$\text{H}_2\text{O}$		.27
		<hr/> 100.47

On the basis of this recalculation the mineral is made up chiefly of acmite and diopside with some jadeite.

Some of the material contains minute patterns which have the appearance and structure of sagenite when examined under a high power objective. This pattern looks like a breakdown, representing a separation of rutile similar to that sometimes found in altered biotite. The  $\text{TiO}_2$  may then represent one component of a solid solution which is unstable not far below its temperature of formation. The action of later hydrothermal solutions, perhaps acting in a manner analogous to a catalytic agent, may have brought about the separation.

## LÖLLINGITE FROM FRANKLIN, NEW JERSEY

L. H. BAUER, *Franklin, New Jersey*,

AND

H. BERMAN, *Harvard University*.

Measureable crystals of the mineral löllingite have been so rarely found that a new occurrence seems worthy of record. The observations here presented are based on specimens found during 1926 in the orebody of the mine at Franklin in a drift of the 750 foot level north. The crystals are sparsely embedded in a white limestone of medium grain together with grains of a gray pyroxene and occasional dots of franklinite. The löllingite crystals are complete individuals, brilliant tin-white in color, ranging in size