have recently been improved, and that further work on this reaction is in good agreement with the results presented here.

I am indebted to Prof. MacDonald for providing me with a copy of his manuscript in advance of its publication, and for several stimulating discussions of this work.

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FUCHSITE FROM A SILURIAN (?) QUARTZ CONGLOMERATE, ACWORTH TOWNSHIP, NEW HAMPSHIRE

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During the remapping of the New Hampshire portion of the Bellows Falls quadrangle a small pod of the emerald-green chromian muscovite *fuchsite* was discovered in the Clough quartz conglomerate (of Lower Silurian (?) age) within the staurolite zone of metamorphism. The occurrence was 10–20 feet above the base of the formation at a locality some 480 yards N.52° E. from the intersection of the Acworth-Langdon townline with State Highway 123.

The fuchsite is in flakes up to 1 mm. in diameter and, in the field, was disposed in a lenticular pod measuring 14×6×3.4 mms. (for the long, intermediate and short axes respectively) in the granular quartz matrix of a quartz-pebble conglomerate. Fine-grained chromite and quartz are the dominant associated impurities.

The properties of the mica are given below. 19.3 milligrams were analyzed by Mr. Jun Ito and his results are shown in Table 1 (*a*) together with the limits of analytical accuracy imposed by the small amount of material. The indices of refraction were determined, under sodium light, by the immersion method; the 2V was measured by use of the universal stage; and the specific gravity was found by suspension in bromoform. Except for the high value for titania in the chemical analysis, these

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properties are closely comparable with those given by Whitmore (1946) and Winchell (1951). The TiO_2 in previously described chromian muscovites has generally been discounted and the analyses recalculated on the basis that it occurs as rutile, or some other titanium mineral, in the analyzed specimen. Despite the fact that the TiO_2 in the Acworth fuchsite may be extraneous, such an impurity has not *actually* been isolated and the chemical analysis is therefore presented in unmodified form.

X-ray powder diffraction photographs were taken of the mica using Cu-radiation and Ni-filter. The powder diffraction data were kindly

TABLE 1. PROPERTIES OF THE ACWORTH FUCHSITE

(*a*) *Chemical Analysis**			(*b*) *Optical Properties*
SiO_2	44.4	(±0.8)	*Indices of refraction*
TiO_2	2.1†	(±0.1–0.15)	n_{Na}
Al_2O_3	31.7	(by subtraction)	$\alpha = 1.566$
Fe_2O_3	2.3	(±0.1–0.15)	$\beta = 1.597$ ±0.002
Cr_2O_3	2.1	(±0.1–0.15)	$\gamma = 1.602$
FeO	—		*Pleochroism*
MnO	0.05	(±0.02)	X = colorless to light emerald green
MgO	0.7	(±0.1)	Y = green
CaO	0.1	(±0.03)	Z = dark emerald green
Na_2O	1.1	(±0.05–0.1)	(all in thick section)
K_2O	10.7	(±0.1)	$2V = 38° \pm 1°$
H_2O+	4.7	(±0.05–0.1)	Optically negative
Total	99.95		(*c*) *Specific gravity* = 2.85

* Analyst, Jun Ito (April, 1956).
† See text for further details.

examined by Dr. H. S. Yoder, Jr., of the Geophysical Laboratory, Carnegie Institution of Washington. He states that in structural type the fuchsite compares favorably with the $2M_1$ muscovite (Yoder and Eugster, 1955, p. 247).

Chromian micas have been described from a variety of localities throughout the world and the status of knowledge of them has been summarized by Whitmore (*loc. cit.*) who has made a threefold classification of their mineral associations as follows: (*a*) ankerite-quartz-sulfide-gold; (*b*) biotite-actinolite; and (*c*) corundum-kyanite-biotite. Although he makes no mention of an association with quartzite or conglomerate, the Acworth occurrence is not unique, since fuchsite-bearing quartzites have been recorded by Eskola (1933) from Outokumpu, and green chrome muscovite has also been noted by Padget (1956, p. 80) in quartz-

ites and conglomerates in Norwegian Lapland. It is of interest to note that Dana (1892, p. 617) describes the mineral *avalite*, a green mica with a quoted Cr_2O_3 content of 14.59% in impure material, as occurring " . . . in earthy aggregates of thin crystalline scales in the quartzyte of Mt. Avala near Belgrade." However, the original reference of Losanitsch (1884, p. 1774) on that locality refers to a suite of accompanying mercuric minerals and the regional association of the quartz mass with serpentine, suggesting that the chromian mica is with vein quartz rather than quartzite.

In regard to the origin, the isolated nature of the Acworth fuchsite and the apparent absence of an appropriate igneous source for the chromium indicate that the mica is metamorphic in origin, possibly derived from the reaction of a pre-existing chromium mineral with potash, alumina and silica in the host quartzite. Rankama and Sahama (1950, p. 623) have briefly discussed fuchsites of metamorphic origin.

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