MANGANIFEROUS PROCHLORITE FROM HAWLEYVILLE, CONN.

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ABSTRACT.

Deep green, lustrous chlorite, occurring with pink albite in granitized metasediments near Hawleyville, Connecticut, showed a reddish-brown to brownish-purple interference color instead of the expectable low gray or ultra blue.

Chemical analysis revealed a high content of ferrous iron and some manganese. The peculiarities of the chlorite and feldspar are related to this and a possible source of the manganese-rich iron ores of Connecticut suggested.

About one third of a mile due west from Hawleyville, near the northwest border of the town of Newtown, Connecticut, the New York and New England Railroad tracks pass through a deep cut which is crossed by a dirt road over a small bridge. The granitized metasediments exposed in this cut are penetrated by granite pegmatites that grade into nearly pure alkali feldspar dikes containing bunches of lustrous, deep-green chlorite, some muscovite, and leucoxenized titanite.[1] The pink alkali feldspar penetrates the other minerals which are probably the last remnants of greatly altered schist inclusions.

Small boulders of the same aggregate of pink feldspar and green chlorite were found in a stone wall bounding the small field just north of the top of the cut and adjoining the road on the east. These furnished considerable quantities of the chlorite whose weathered surfaces were covered with a thin black film.

Microscopic examination of the chlorite revealed a reddish-brown to brownish-purple interference color instead of the expectable low grey or ultra blue.

The senior author first noted a chlorite in Connecticut with this interference tint in the schists of Mt. Riga—the southern extension of the Taconic Range in Salisbury, northwest Connecticut,[2] though he made no particular mention of its character. It occurs there as flakes in a chlorite-chloritoid-muscovite schist, though relatively few of those flakes show the purple interference color. The color suggested manganese and therefore a possible source for the manganese in the iron ores that were formerly mined along the schist-limestone con-

[1] Agar, W. M.: "Thermally Metamorphosed Diorite near Brookfield, Conn." This Journal, p. 410, 1934.

[2] Agar, W. M.: "The Petrology and Structure of the Salisbury-Canaan District of Connecticut." This Journal, pp. 31-48, 1932.

tact in the valley to the east[3] some of which were exceptionally rich in that element. The quantity of this same chlorite available in the Hawleyville locality made possible the chemical and microscopic study whose results are given below.

Fig. 1. Prochlorite (dark gray), Muscovite (light gray flakes with cleavage) both bent, optically strained, and penetrated irregularly by Albite (mottled gray). Plain Light, X55.

Figure 1 shows the chlorite (dark gray), and muscovite (light gray flakes with cleavage) penetrated by the mottled gray mineral which is albite. Chlorite and muscovite are both strained and bend, and extinguish irregularly. The optical properties of the chlorite which were determined are as follows:

$Z = \beta$ x α, 2V is very small.

Elongation of cleavage flakes along X and Y. Cleavage—001, good.

Pleochroism moderately strong. X—light grass green } indistinguishable
Y—light grass green }
Z—pale straw yellow, nearly colorless

[3] Hobbs, W. H.: "Iron Ores of the Salisbury District of Conn., N. Y., and Mass." Eco. Geol., Vol. 2, p. 176, 1907.

The indices of refraction are difficult to determine because of the color of the mineral and its low birefringence. That is, they all fall within the limits of error of the immersion method.

Nm 1.626 ± .003 = α and β
$\gamma - \alpha$ = approximately 0.003

Interference colors; reddish-brown to brownish-purple. Absorption irregular within one flake. The difference between α and γ is barely appreciable but is suggested by the difference in the intensity of the red and blue lines that show when the index of the oil is essentially the same as that of the mineral.

The specific gravity is 2.98.

The chemical composition of the chlorite is as follows:

Silica	25.1%
Alumina	21.7%
Ferric Iron	3.4%
Ferrous Iron	24.7%
Magnesia	14.6%
Lime	0.1%
Soda	0.1%
Potash	0.1%
H_2O-	0.1%
H_2O+	10.2%
Titania	0.1%
Manganese Oxide	0.4%
	100.6%

Comparison of the analysis and specific gravity with those listed in Dana's "System of Mineralogy," 6th Edition, p. 642, under the Orthochlorite group shows that this mineral falls well within the range of composition and specific gravity given for the prochlorites. Contrary to what was expected, even the manganese is not excessive. Unfortunately no optical properties are listed with those analyses and it is therefore impossible to say whether or not the interference color that first attracted attention to the mineral is characteristic of those high in manganese. It is known, however, that a chlorite with that birefringence is not rare and it is here suggested that further analytical and microscopic studies be made of all such instances.

The pink feldspar accompanying and replacing the prochlorite occurs as a granular aggregate full of muddy looking inclusions which are white by reflected light. It is optically positive with $X \wedge 001$ cl. $= 16°$. Very little poorly developed albite twinning was observed but it was possible to determine the extinction angle as within the upper limit of the range for

albite. The indices of refraction are $\alpha = 1.527 \pm .003$; $\gamma = 1.537 \pm .003 : \gamma - \alpha = 0010$. This corresponds to a feldspar with the composition Ab93—An7.

The light pink color and the slightly darker weathering are unusual in a feldspar of this composition, especially one which does not contain included flakes of hematite. A partial analysis was made and it was found to contain no barium, 0.03 per cent MnO, and 0.43 per cent Fe_2O_3. CaO, in keeping with the optical properties, was 0.9 per cent, and SiO_2 65.45 per cent. It is an albite which apparently owes its unusual characters to ferric iron and manganese oxide.

It is probable that the pink color of the albite and the peculiarity birefringence of the prochlorite are related in origin.

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