SOME MINERALS FROM THE OLD TUNGSTEN MINE AT LONG HILL IN TRUMBULL, CONNECTICUT.

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INTRODUCTION.

The locality of Long Hill in Trumbull, Connecticut, is situated on the Danbury branch of the New York, New Haven, & Hartford Railroad, about 9 miles north of Bridgeport. The place where tungsten mining has been carried on has been described by Hobbs,[1] whose report has been used freely in the preparation of the following notes. The tungsten minerals, scheelite and wolframite, have been known to occur here since an early date, and the locality became especially renowned because of the excellent pseudomorphs of wolframite after scheelite which were occasionally found. Desultory minings for materials for porcelain manufacture and for quartz for use as a wood filler have been carried on, and a short time before Hobbs's visit a corporation was formed to exploit the tungsten ores. This venture seems to have been exceedingly ill-advised, and large amounts of money were spent in opening great quarrylike mine pits, from which many tons of rock were mined and milled to secure a few tons of lean tungsten ore. An expensive mill was built, the design of which was wholly impractical. This mill has since been destroyed by fire. The persons in charge of the tungsten mine were seemingly quite unacquainted with modern mining practice, and, despite the large amount of work done, little is known regarding the extent or value of the tungsten deposits.

The present writer visited the now deserted mine in October, 1919, and collected a suite of representative specimens for the United States National Museum. Although a careful search failed to discover any tungsten ores, a number of interesting minerals were procured. Some of these have been further investigated in the laboratory and are described in detail below.

[1] Hobbs, William Herbert, The old tungsten mine in Trumbull, Conn., 22nd Ann., Rept., U. S. Geol. Survey, pt. 2, pp. 13–22 ,1902.

The low hill on which the tungsten mine is located consists of a flat lying bed of crystalline limestone, approximately 40 feet in thickness, between beds of hornblende schist. The scheelite and wolframite are reported to have occurred in a quartz layer at the lower contact of the limestone, and to have represented a contact metamorphic deposit. Hobbs regards the hornblende schist as being an altered diorite, but Hess[1] states that it may be altered volcanic tuff. It bears considerable resemblance to the amphibolite of Chester, Massachusetts. The limestone is thinly laminated white crystalline marble, containing bedded lines of metamorphic minerals throughout. These are the characteristic minerals of regionally metamorphosed limestones throughout the Taconic region rather than minerals of true contact origin. Recognizable contact metamorphism traceable to visible igneous masses is absent. The main opening of the mine is at the site of the burned mill near the railroad. This is a large quarry, exposing the whole width of the limestone bed. The lower contact of this bed is covered by water in the bottom of this pit, but is well exposed at the north end of the opening. The lowest bed of the limestone is here much stained by limonite, and is somewhat porous from leaching. Narrow quartz veins up to a foot in width penetrate this bed from below, and break up and die out soon after entering the limestone. This lowest rust stained limestone bed contains much marcasite in disseminated form and as veins up to 2 inches in width. The quartz veins contain mica of the margarodite variety, topaz, and a very black sphalerite. No scheelite or wolframite was found, although these minerals might be expected in this association. In the bottom of the main pit a dike of ordinary granite pegmatite rich in feldspar and biotite is exposed. An old tramway leads up around the north side of the hill for a thousand feet to the "Upper Mine," also located at the base of the limestone bed. Here little can be learned as to the geologic structure or the nature or occurrence of the ore, as the pit is filled with water. The walls are crumpled and cut by small faults, and the rock is much weathered and stained with limonite. Below the tramway, midway between the lower and upper openings, is the "Champion lode." This is a vein, apparently consisting of pure vitreous quartz which was mined for wood filler. The vein which was from 4 to 6 feet wide has perfectly smooth and almost vertical walls. About 800 feet due south of the upper mine opening is a small pit, from which marble has been quarried and burned to quicklime. The marble, like that of the main pit, is thin bedded and rather impure from the presence of metamorphic silicates. Some of it is distinctly pink, while other portions are

[1] Hess, Frank L., Tungsten minerals and deposits. Bull. U. S. Geol. Survey No. 652, p. 41. 1917.

gray, with large calcite grains in a finer ground mass, giving the rock a porphyritic appearance. About 150 feet southeast of the limekiln a trench has been dug some 75 feet on a quartz-topaz vein, which is referred to as the Limekiln Vein in the following descriptions. Numerous other shallow pits and trenches have been dug, but those examined by the writer showed no minerals of unusual interest. The minerals occurring in the vicinity of Long Hill are described below:

SCHEELITE.

Previous writers have described the scheelite as nearly white in color and occurring in quartz with epidote, hornblende, and marcasite, in the form of well-defined tetragonal pyramidal crystals an inch or more in diameter, and as masses sometimes several pounds in weight, loosely imbedded in the matrix. No scheelite was found by the present writer.

WOLFRAMITE.

Wolframite at this locality occurred under the same conditions as scheelite, being in all cases pseudomorphous after the lime tungstate and preserving its crystal form. These specimens are no longer obtainable at the locality. The pseudomorphs are said to have been found only in portions of the ledge which were weathered and iron stained. An excellent suite of these pseudomorphs is preserved in the Brush collection of Yale University.

TUNGSTITE.

Tungstic ocher occurred rarely as a thin yellow coating on quartz. It was not abundant and is not now obtainable.

MARCASITE.

Marcasite, more or less weathered, is abundant in the upper mine opening and in the north end of the lower opening. Here it occurs in granular masses and also as internally fibrous mammillary crusts a half inch in thickness on the walls of narrow open cracks in the lower limestone bed. It is very prone to oxidize under the action of the weather, and most of the abundant ocherous limonite stains present have come from its alteration.

SPHALERITE.

A brilliant coarse granular and very black sphalerite occurs in aggregates up to 3 inches in diameter in the narrow quartz-topaz veins in the main pit, especially where these veins cut the marcasite layer at the north end of the pit. The sphalerite, which upon weathering assumes an iridescent tarnish, occurs in vitreous grayish quartz associated with margarodite, margarite, and topaz. The sphalerite was not seen in contact with the topaz, although occurring in the same hand specimen with it. The sphalerite is easily confounded with wolframite, which it greatly resembles. Its streak is dark brown, and when the powder is examined under the microscope it is seen to be very dark brown in color, transparent, and wholly isotropic.

GARNET.

Brownish red granular garnet occurs both in the main pit and in the limekiln opening in nodular or lenticular masses in marble which may reach a foot in greatest diameter. Where such masses have had the surrounding calcite dissolved away small dodecahedral crystals are revealed.

PYROXENE.

The green granular pyroxene, coccolite, occurs in the main pit and especially in the limekiln pit in grayish green grains distributed in lines parallel to the bedding. It is to this mineral that the marble owes much of its banded appearance. White malacolite occurs sparingly in the marble. These minerals are of the types common throughout the Berkshires and warrant no special description.

PHLOGOPITE.

Phlogopite occurs sparingly as small copper-red scales in the marble of the limekiln opening.

TOURMALINE.

Some large blocks on the dump of the main pit are composed of fine acicular black tourmaline embedded in vitreous grayish quartz.

HORNBLENDE.

A common green hornblende occurs with coccolite and under the same conditions in the limestone.

FLUORITE.

Fluorite, varying abruptly from rose pink to deep purple in color, occurs at the upper mine opening intimately intergrown with fibrous scapolite. At the Limekiln Vein fluroite of a purple color occurs in granular masses of considerable size. Veinlets of coarse foliated margarodite, made up of interlocking crystals, have the crystals separated by thin layers of fluorite, and deep purple fluorite forms thin plates between the plates of mica. Rather broad cleavable masses of colorless to pale salmon or brown fluorite occur associated with fibrous margarite. In the breaking down of the abundant topaz to form muscovite the liberated fluorine has recombined with the available lime to form fluorite.

CRONSTEDTITE.

Cronstedtite has been reported from here,[1] but none was seen by the writer. No data as to its mode or place of occurrence are given, and until the mineral has been examined chemically or optically its identity with cronstedtite must remain in doubt.

DIASPORE.

Diaspore is mentioned as coming from here in Dana's Mineralogy, and it is to be expected in the topaz veins, although none was seen by the writer.

PROCHLORITE.

A careful search was made of all the openings in the hope of finding cronstedtite, which has been reported from here. Nothing comparable with this ferric chlorite was found, but there were noted, in joints in marble in the bottom of the main pit, some narrow veins filled with a greenish black chlorite, which formed fine granular friable aggregates of small variously oriented crystals. Where free surfaces are present the chlorite exhibits the vermiform curved prismatic crystals commonly called helminthe forms. These free surfaces are usually coated with manganese oxide. The granular aggregates look entirely like the prochlorite from the District of Columbia.[2]

Upon analysis the mineral was found to have the composition given in Column I below. In Column II are given the results obtained by Clarke upon the chlorite from the District of Columbia described by Merrill.

Analyses of prochlorite from Trumbull and Washington.

Constituent.	I.	II.
SiO_2	23.69	25.45
Al_2O_3	21.26	17.88
FeO	26.52	24.98
MgO	17.60	15.04
CaO	3.32	....
MnO	.43	....
Na_2O	....	.67
H_2O	7.63	14.43
	100.45	98.45

Aside from the water content, which is a little low, the composition of the Trumbull chlorite approaches the average of available

[1] Hoadley, Chas. W., An American Occurrence of Cronstedtite. Amer. Min., vol. 3, p. 6, 1918.

[2] Merrill, G. P., Proc. U. S. Nat. Mus., vol. 7, p. 67, 1884.

analyses of prochlorite. Computing the molecular ratios from the above analysis, however, leads to the following significant results:

Ratios of prochlorite from Trumbull, Connecticut.

SiO_2	.3929	.3929	1.88	2× .94
Al_2O_3	.2080	.2080	1.00	1×1.00
FeO	.3691			
MgO	.4365			
CaO	.0591	.8707	4.18	4×1.04
MnO	.0060			
H_2O	.4235	.4235	2.04	2×1.02

The present mineral then approximates the simple formula:

$$4(Fe,Mg)O.Al_2O_3.2SiO_2.2H_2O$$

or,

$$H_4 (Mg, Fe)_4 Al_2 Si_2O_{13}.$$

A comparison of the univalent oxides yields further suggestive relationships, for instance:

Ratios of univalent oxides of prochlorite from Trumbull.

FeO	.3691		
CaO	.0591	.4342	1×1.00
MnO	.0060		
MgO	.4365	.4365	1×1.01

Thus the prochlorite from Trumbull approximates the composition expressed by the formula:

$$2FeO.\ 2MgO.\ Al_2O_3.\ 2SiO_2.\ 2H_2O$$

with the ferrous oxide in small measure replaced by lime and manganous oxide. The calculated values to satisfy the above formula are given with the analytical figures opposite for comparison in the next table:

	1	2
SiO_2	23.69	24.96
Al_2O_3	21.26	21.16
FeO (+CaO+MnO)	30.27	29.74
MgO	17.60	16.68
H_2O	7.63	7.46
	100.45	100.00

1. Analysis of prochlorite from Trumbull, CaO and MnO united with FeO without recalculation.
2. Values to satisfy formula $2FeO.\ 2MgO.\ Al_2O_3.\ 2SiO_2.\ 2H_2O$.

It is noteworthy that a large majority of the best analyses of prochlorite agree quite as well with this composition as they do with each other. In the present instance the amount of lime is unusual and suggests contamination by calcite, but this was definitely not the case the homogeneity and purity of the analyzed sample being thoroughly proven both chemically and optically. While there is danger of overdoing the simplification of formulas, especially those of complex minerals like the chlorites, the tendency heretofore has been quite in the opposite direction, complex molecules containing hundreds of atoms being assumed to explain analyses too often inaccurate or made upon material of doubtful purity. The writer has recently critically examined several species of the chlorite group without finding it necessary to call upon a complicated or irrational formula to explain any analysis made upon homogeneous and optically distinct material. Results at present are wholly tentative, but the investigations will be continued as opportunity offers, and it is hoped that a plausible and thorough revision of this group of minerals can be advanced when sufficient work has been completed.

The mineral under discussion has the following properties: Color, greenish black; luster, somewhat pearly; powder, pale green. Before the blowpipe exfoliates somewhat and fuses with difficulty to a black magnetic slag. It is slightly attacked by hot nitric or hydrochloric acid. After long digestion in hot sulphuric acid colorless scales remain. Yields neutral water at a high temperature in the closed tube.

Optically the mineral is biaxial, with the axial angle, 2V, approaching zero. Optically positive (+); acute bisectrix perpendicular to the perfect cleavage. Under the microscope is seen to be made up of plates of hexagonal outline, transparent and of a deep green color. The pleochroism is distinct:

α=bright brownish grass green.
β=bright brownish grass green.
γ=pale greenish brown.

Refractive indices:

$\alpha=1.621\pm.003$.
$\beta=1.618\pm.003$.
$\gamma=1.618\pm.003$.
$\alpha-\gamma=\ .005\pm.003$.

For comparison the similar prochlorite from the District of Columbia described by Merrill (Cat. U.S.N.M. No. 45,875) was examined and found to have the following optical properties: Biaxial; 2V, very small; optically positive; acute bisectrix perpendicular to the perfect cleavage. Scales wholly irregular.

Refractive indices:

$\alpha=1.606\pm.003.$
$\beta=1.606\pm.003.$
$\gamma=1.610\pm.003.$
$\alpha-\gamma=.006\pm.003.$

Pleochroism distinct:

α= deep blue green.
β= deep blue green.
γ= pale brownish green.

These two chlorites, while essentially identical in all properties except refractive index, differ sharply in this respect. It is regretable that additional analyzed prochlorites were not available for comparison. Until the properties, both chemical and optical, of this group are more fully known, the Trumbull material must be included with prochlorite, despite the difference in refractive indices.

EPIDOTE.

A block of material in the dump of the upper mine consisted in large part of a columnar ash gray to brownish gray or nearly white mineral in prismatic crystals imbedded in glassy quartz. There is a small amount of green hornblende in the quartz and patches of calcite occur as the last deposit in cavities.[1] By dissolving out the calcite, clear brown to gray crystals of the prismatic mineral are obtained. These resemble zoisite, but when measured were found to have the angles of epidote. The prisms are formed by elongation of the dome zone parallel to the b axis, which is the characteristic habit of epidote. Terminations are rare, and when they occur they are very simple with imperfect faces. Upon analysis the following results were obtained:

Analysis of epidote from Trumbull.

	Per cent.
SiO_2	36.89
Al_2O_3	28.50
Fe_2O_3	5.92
FeO	.52
CaO	27.26
MgO	.21
MnO	.02
H_2O	1.29
F	.60
Total	101.21

[1] Specimens entirely similar to this preserved in the United States National Museum contain a nearly white scheelite in grains and masses and are labeled "ore, Trumbull, Conn." (Cat. 73696.)

Although the total iron is low, the angles agree very well with those of normal epidote, showing but little approach to the clinozoisite ratios. The forms positively identified on several crystals measured are given below:

a (100)	Ω (105)	*f* ($\bar{3}$01)
c (001)	*s* ($\bar{2}$03)	*N* ($\bar{3}$04)
o (011)	*i* ($\bar{1}$02)	*ω* ($\bar{1}$04)
n ($\bar{1}$11)	*r* ($\bar{1}$01)	*κ* (302)
e (101)	*l* ($\bar{2}$01)	*σ* ($\bar{1}$03)

Several forms were noted on single crystals which could not be identified, but unless the readings are unusually dependable the orientation of unterminated crystals is very difficult. The best terminated crystal is shown in figure 1. The angles obtained upon this crystal are compared with those given for epidote by Dana in the following table:

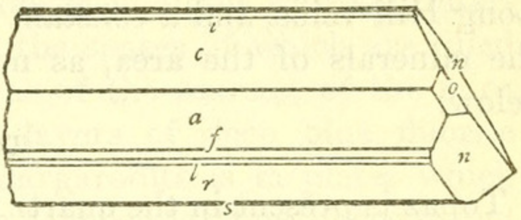

Fig. 1.—Clinographic projection of a crystal of epidote.

Measured and calculated angles of epidote.

	Measured.		Calculated.		
	°	′	°	′	″
c ∧ *a* =(001) ∧ (100)	64	36	64	36	50
c ∧ *i* =(001) ∧ (102)	34	20	34	21	00
c ∧ *s* =(001) ∧ (203)	45	2	45	37	00
c ∧ *r* =(001) ∧ (101)	63	49	63	42	00
c ∧ *l* =(001) ∧ (201)	89	4	89	26	00
c ∧ *f* =(001) ∧ (301)	99	19	98	37	00
a ∧ *o* =(100) ∧ (011)	77	15	77	2	30
a′ ∧ *n* =(100) ∧ (111)	69	20	69	2	00
n ∧ *n‴* =(111) ∧ (111)	70	13	70	29	00

Before the blowpipe the mineral turns dark brown and fuses to a dark-brown bead which is not magnetic; yields strongly acid water in the closed tube; under the microscope is transparent fragments having a faintly brown color which is not pleochroic and is probably due to dispersion by submicroscopic inclusions. The fragments under the microscope show a very well-defined cleavage, probably parallel to the basal pinacoid, *c*(001). The indices of refraction as determined by immersion claim no great accuracy, as the series of immersion media had rather wide intervals in this range and the values given are approximated by interpolation. The figures arrived at are:

$$\alpha = 1.706 \pm .003$$
$$\beta = 1.710 \pm .003$$
$$\gamma = 1.720 \pm .003$$
$$\alpha - \gamma = .014 \pm .003$$

A portion of the analyzed powder has been preserved in the type materials series as is the practice here and is available should it be desirable to recheck these values. The values given above for mean refractive index and birefringence approach those of zoisite, as is to be expected in material of such low iron content. The fluorine, which occurs in small amount, is of interest, since fluorine has not heretofore been noted as a constituent of epidote,[1] although it is to be expected that fluorine would replace the basic hydroxyl of epidote as readily as that of other similarly constituted minerals. Fluorine seems to have been abundantly present in the emanations forming the Long Hill veins, and a constant content of fluorine runs through all the minerals of the area, as noted under scapolite and margarite below.

TOPAZ.

Topaz is present in the quartz veins in quite unusual amount. The best locality is that described as the Limekiln Vein. This vein, which has been opened for a distance of some 75 feet, is from 1 to 5 feet wide. The vein originally consisted almost entirely of quartz and topaz, the quartz being considerably more abundant than the topaz. An extensive alteration, probably under deep-seated conditions not dissociated from a stage in the regional metamorphism of the area, has resulted in the partial conversion of the topaz to secondary minerals. The alumina of the topaz has gone to form muscovite of the variety known as margarodite with less margarite. The fluorine has combined with lime probably derived from the marble of the walls to form fluorite.

The topaz occurs in coarse crystalline masses of gray to pale yellow or white color, with well-defined cleavage, some of the cleavage surfaces being a foot in diameter. Most of the topaz contains veins and disseminated scales of margarodite, and large masses of margarodite contain cores of corroded and embayed topaz. Where the topaz abuts against small open cavities in the center of the vein it is bounded by rough crystal planes. Many of these cavities have been filled with coarse foliated margarodite not derived from the adjacent topaz crystals, as the surfaces of these crystals are not corroded.

In the main pit topaz occurs in greenish nodular masses with poorly defined cleavage, now in part altered to margarodite, in the narrow quartz veins which contain black sphalerite. Topaz of the same type occurs in several other smaller veins. The foliated mica margarodite occurs everywhere in the quartz veins, and this type of mica seems in all cases to have been derived from the alteration of topaz even where no topaz now remains.

[1] An epidote from Italian Mountain, Gunnison County, Colo., analyzed by Eakins, contained 0.35 per cent of fluorine, U. S. Geol. Survey, Bull. 591, p. 316, 1915.

MARGARODITE.

A foliated and radiated pearly mica from this locality has been widely distributed in old collections, labeled margarodite. This mica is very abundant in the limekiln vein, where it occurs as an alteration product of the topaz as aggregates of scales often grouped in spherical or fan-shaped bunches. In color the margarodite ranges from pale yellow to smoky brownish gray. The yellowish variety occurs replacing the large crystals of topaz. The grayish type is coarser and occurs in open spaces lined by topaz crystals and as narrow veins in which the crystals grow from either wall and interlock loosely in the center of the vein, the spaces of which are filled with colorless to purple fluorite. Some of the coarsest of the mica is deep blue, apparently from thin layers of deep blue fluorite inserted between the laminae. The margarodite is in plates which uniformily show the structure found in commercial mica deposits and known as feathering evidently due to twinning. In appearance this material is more pearly than ordinary muscovite and laminae are more brittle.

Upon analysis of selected cleaned plates the results, given in column I below, were obtained. In columns II and III are given the results obtained upon analysis of margarodite from this locality by J. Lawrence Smith.[1]

Analyses of margarodite from Trumbull.

	I.	II.	III.
	Per cent.	*Per cent.*	*Per cent.*
SiO_2	46.88	46.50	45.70
Al_2O_3	36.42	33.91	33.76
Fe_2O_3	1.98	....	....
FeO	.82	2.69	3.11
CaO	1.77	....	....
MgO	1.36	.90	1.15
MnO	Trace.	....	....
Na_2O	.38	2.70	2.85
K_2O	6.24	7.32	7.49
F	(a)	.82	.82
H_2O	4.03	4.63	4.90
Total	99.88	99.47	99.78

a Not determined.

Fluorine was present in sufficient quantity to give a distinct reaction, but was not estimated. Chemically this differs from normal muscovite only in the amount of water which replaces the potash, and this difference is not great. That the water is basic is established by the high temperature required to liberate it. When the mineral was heated over a blast flame until the hard glass tube

[1] Smith, J. Lawrence, Amer. Journ. Sci., ser. 2, vol. 16, pp. 46, 47.

softened completely only 0.93 per cent of water was obtained. The amount of water given above was obtained by using a fire brick and charcoal oven, with the blast as recommended by Penfield.

Optically this mica differs sharply from muscovite in indices of refraction. The following optical data were obtained: Biaxial, negative; axial angle, 2V; moderately large.

Indices of refraction:

$\alpha=1.549\pm.003.$

$\beta=1.579\pm.003.$

$\gamma=1.590\pm.003.$

$\alpha-\gamma=.041\pm.003.$

The variation in mean index of refraction doubtless accompanies reciprocal variation of potash and hydroxyl.

Mica of this foliated type occurs in practically all of the quartz veins of this vicinity, as seen especially in the main pit and in small openings along the tramway. It is probably in all cases derived from topaz.

MARGARITE.

Associated with the margarodite and topaz of the limekiln vein were blocks of a micaceous fibrous mineral which in the field was supposed to represent a fibrous phase of the margarodite. This material which apparently came from the wall of the vein, next the marble, forms veinlets from 2 to 4 inches thick. The mineral extends out from either side of the veinlet for an inch or more as a compact layer of straight or very slightly curved fibers perpendicular to the wall. These fibers do not meet in the centers of the veinlets which contain a confused granular aggregate of the same substance in which masses of colorless to pale salmon fluorite and clear large plates of margarodite are scattered. There is interposed between the layers of this fibrous material and the adjacent limestone a band from 2 to 10 inches thick, largely composed of granular fluorite which varies in color from brownish salmon adjacent to the fibrous vein to purple next the marble. The mass of fibers is compact and tough in the aggregate but is readily pulverized in a mortar wherein it differs from margarodite. In color the fibrous mineral is snowy white and the luster is pearly. Upon analysis the results in column 1 of the following table were obtained. In column 2 is given, for comparison, the analysis by J. Lawrence Smith of margarite from Chester, Massachusetts,[1] and in column 3 are given the values calculated to satisfy the formula $CaO.2Al_2O_3.2SiO_2.H_2O$.

[1] Dana, J. D., Syst. Min., ed. 6, p. 637.

Analyses of margarite.

Constituents.	1. Trumbull.	2. Chester.	3. Theory.
	Per cent.	*Per cent.*	*Per cent.*
SiO_2	33.72	32.21	30.20
Al_2O_3	50.27	48.87	51.30
Fe_2O_3	.66	2.50	....
FeO	Trace.	....	....
CaO	10.48	10.02	14.00
MgO	.47	.32	....
MnO	Trace.	.20	....
H_2O	1.90	4.61	4.50
F	.14	....	....
Li_2O	....	.32	....
K_2O	1.64	1.91 (with Na_2O)	....
Na_2O	.74		....
Total	100.02	100.96	100.00

This composition approaches that of margarite, and although the analysis differs from those of normal margarites in several respects, chiefly in the lower water content, it is evidently a variety of that mineral.

Optical determinations upon the analyzed material were not entirely satisfactory, the indices of refraction varying from grain to grain. Under the microscope the material is in flat shreds of rectangular outline. Most of these are optically negative, but some appear to be optically positive. The final accepted figures for the indices of refraction are as follows:

$$\alpha=1.620\pm003$$
$$\beta=1.629\pm003$$
$$\gamma=1.630\pm003$$
$$\alpha-\gamma=.010\pm003$$

The analyzed material showed no margarodite under the microscope, the latter mineral being readily distinguishable by its lower index of refraction.

Similar fibrous material occurs elsewhere in the quartz veins, typical though iron stained blocks of some size being seen along the borders of the quartz veins in the main pit.

SCAPOLITE.

Radiated scapolite occurs in quartz, intimately associated with rose pink to purple fluorite, in blocks of material in the dump of the upper mine. The scapolite is faintly brownish white in color and has a somewhat wax-like luster. The aggregates are coarse to fine columnar and are made up of elongated prismatic crystals from 1 to 5 millimeters in diameter, which sometimes reach 6 centimeters in length. These prisms only rarely exhibit well-defined prismatic planes and are never terminated in the specimens collected. The fluorite, which is intimately intergrown with the scapolite, is in part rose pink and in part deep purple, the colors varying abruptly. A large specimen of the scapolite was crushed and fluorite free fragments carefully selected and ground for analysis. Upon this powder the following results were obtained:

Analysis of scapolite from Trumbull.

	Per cent.
SiO_2	51.38
Al_2O_3	25.22
Fe_2O_3	trace.
CaO	15.16
MgO	.73
MnO	trace.
Na_2O	2.86
K_2O	1.20
H_2O	.55
F	2.74
Cl	1.98
Total	101.82
Deduct O=Cl, F.	

Under the microscope the material is transparent and colorless with excellent prismatic cleavage. The indices of refraction as determined by immersion are:

$$\omega=1.553\pm.003$$
$$\epsilon=1.540\pm.003$$
$$\omega-\epsilon=.013\pm.003$$

While obviously belonging with the scapolite group this mineral is somewhat unusual in composition. The fluorine content was thought to represent fluorite included in the analyzed powder despite precautions. Careful microscopic examination of the powder, however, failed to detect appreciable amounts of fluorite or other extraneous substance. If the fluorine be considered as replacing the chlorine of the marialite molecule, the alkalies become deficient. It seems quite possible that there is here represented a fluorine member of this group, the composition being capable of explanation by assuming the presence of a fluor-meionite in isomorphous mixture. Despite the low soda content the present mineral approaches marialite in refractive indices. It resembles marialite also in being unattacked by boiling concentrated hydrochloric acid.