constituent, through the heating incidental to the passage of the stone through our atmosphere.

In his description of the St. Mark's, South African stone, Klein gives the mineral composition as enstatite, olivine, nickel-iron, troilite and "*vielleicht noch Quarz in geringer Menge.*" In examining a thin section cut from a fragment of this stone in the Museum collection I was pleased to more than verify this determination—to be able to write *gewiss* instead of *vielleicht*. Fig. 1, from a photomicrograph of the section shows an aggregate of quartz granules, one (about 0.3 mm in diameter), a crystal cut at right angles to the vertical axis and with good hexagonal outlines. The mineral it will be observed is imbedded in the metal and not in the

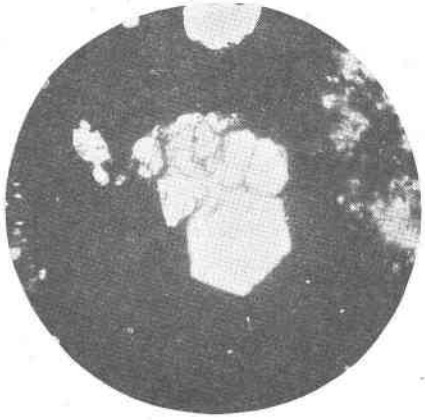

Fig. 1. Quartz crystals in St. Mark's meteorite.

silicate portion. I can see no reason for not supposing it to be original rather than secondary, but it should be remarked that the stone is what is known as a black chondrite and presumably owes its color to secondary heating. Whether this heating was due to its passage through our atmosphere or to earlier conditions remains to be shown.

TITANIUM BEARING JEFFERISITE FROM WESTCLIFFE, CUSTER COUNTY, COLORADO

W. A. WALDSCHMIDT, *Colorado School of Mines*

Several specimens of jefferisite, and jefferisite bearing rock, recently sent to the Colorado School of Mines for examination and

experimental work, proved to be of considerable interest and the results of the examination are given in this paper.

Jefferisite is grouped with the vermiculites which are considered as decomposition products of the magnesium rich micas, especially biotite and phlogopite, in which the alteration results in a decrease of the magnesium content and a replacement of the alkalis by hydrogen. These alteration products form a series intermediate between the micas and chlorites. F. W. Clarke and E. A. Schneider[1] reached the conclusion that jefferisite was a mixture of hydro-biotite and hydro-clintonite in a ratio of one to one.

Jeffersite was first discovered in commercial quantities by W B. Thomas in 1913, in the Turrett mining district, 14 miles north of Salida, Colorado. About eight carloads of jefferisite were mined from a twenty inch vein at this locality but the property was abandoned on account of high mining costs. Later another deposit was discovered nine miles from Iola, Gunnison County, Colorado, but this deposit has not yet been sufficiently opened for an examination. The jefferisite described in this article is from an extensive deposit seven miles from Westcliffe, Custer County, Colorado. Several shafts and small open cuts on the property of the Jefferisite Products Company, of Denver, Colorado, all show jefferisite in large quantities.

The jefferisite from the deposit near Westcliffe occurs in plates from four to five inches in diameter, and as small plates in a friable, dark green peridotite consisting of jefferisite, hornblende and small amounts of plagioclase feldspar. It also occurs in a granitic gneiss with abundant white quartz. Although the peridotite appears to be greatly weathered, the individual grains of hornblende and jefferisite, when examined under the microscope, show very little alteration.

The properties of the jefferisite from Westcliffe are: color, dark brown; color by transmitted light, yellowish brown; hardness, 1.5; specific gravity, 2.38; luster, pearly; cleavage, perfect basal; flexible; some plates slightly elastic. Before the blowpipe the jefferisite exfoliates rapidly, the leaves parting to such an extent that the thickness, perpendicular to leaves, after heating is nearly 14 times the original thickness. The force of expansion of the leaves is very great. Upon further heating the leaves fuse to a brownish black slag. In a closed tube the jefferisite exfoliates with

[1] *Z. Kryst.*, **19**, 465, (1891).

sufficient force to bend the heated sides of the tube. It gives off considerable water and turns to a silver color. In an open tube the reaction is nearly the same as in a closed tube except that the leaves turn to a gold color. The silver color obtained in the closed tube changes to a gold color when the mineral is reheated in an oxidizing atmosphere. Optically the mineral is biaxial and negative but the optic angle is small. The index of refraction of β and γ is greater than 1.58. Compared with a specimen of jefferisite from Chester County, Pennsylvania, the jefferisite from Westcliffe is darker in color, has a smaller optic angle—about the same as biotite—and shows a higher index of refraction.

A partial analysis of the jefferisite from Westcliffe, made by Albert H. Low, Professor of Chemistry at the Colorado School of Mines, is given below with other analyses for comparison.

	1	2	3	4	5	6
SiO_2	36.28	37.10	33.35	34.40	34.20	33.03
Al_2O_3	15.92	17.57	17.78	16.63	16.58	17.38
Fe_2O_3	6.35	10.54	7.32	8.00	7.41	7.41
FeO	8.61	1.26	2.11	2.11	1.13	1.44
MgO	15.99	19.65	19.26	19.30	20.41	20.16
H_2O	10.98	13.76	19.87	19.03	21.14	20.90
CaO	1.19	0.56	.....	.....	.....	.....
K_2O	.....	0.43	.....	.....	.....	.....
TiO_2	1.74	.....	.....	.....	.....	.....
Undetermined	2.94	.....	.....	.....	.....	.....
	100.00	100.87	99.69	99.47	100.87	100.32

1. Westcliffe, Colo. Albert H. Low.
2. West Chester, Penn. G. J. Brush, *Am. Jour. Sci.*, **34**, 133, (1861).
3. " " " A. Konig, quoted by Genth, *Am. Phil. Soc.*, Sept. 1873.
4. " " " T. M. Chatard, quoted by Genth, *ibid.*
5. " " " F. W. Clarke and E. A. Schneider. *Am. Jour. Sci.*, **42**, 242, (1891). *U. S. G. S. Bull.*, **419**, 291, (1910).
6. " " " A. Konig, quoted by Genth, *ibid.*

The most noticeable differences between the analyses of the jefferisite from Westcliffe and that from West Chester are the smaller amounts of Fe_2O_3 and MgO, and the titanium content of 1.74 per cent.

The Jefferisite Products Company contemplates the erection of a concentrating plant on the property, from which it will ship the concentrate to its Denver plant for final treatment. The

final treatment consists of grinding; roasting at 1200 degrees in inclined, revolving, internally heated cylinders; air cleaning; pulverizing; and sizing. The uses of the roasted jefferisite are similar to the uses of micas in the manufacture of fire proof roofing, pigments, lubricants and various other products.

A more extensive article on jefferisite has been published as a Circular of Information by the Colorado School of Mines. Those who contributed to the Circular of Information are Victor C. Alderson, President; Albert H. Low, of the Chemistry Department; H. Power Warren, of the Experimental Plant; and W. A. Waldschmidt of the Geology Department.

PROCEEDINGS OF SOCIETIES

NEW YORK MINERALOGICAL CLUB

Regular Monthly Meeting of February 13, 1924

A regular monthly meeting of the New York Mineralogical Club was held in the East Assembly Room of the American Museum of Natural History on the evening of Wednesday, February 13, 1924. The president, Dr. George F. Kunz, presided. There was an attendance of 19 members. The minutes of the last meeting were read and approved. The chairman of the committee on membership reported favorably on the following names submitted at the December meeting:—Albert F. Karlsson, 826 Penfield Street, N. Y. City; A. R. Green, 31-63 Tiffany Place, Brooklyn, N. Y.; and J. F. Schairer, 150 Grove Street, New Haven, Conn. It was moved that the recording secretary cast one ballot for these candidates who were thus declared elected.

Captain Miller discussed the "*Fluorescence of Hyalite from Bedford*," which he found to fluoresce more intensely than the Mexican hyalite. He suggested the presence of autunite as a possible cause. The recording secretary called attention to the proposed meeting of the Section of Geology and Mineralogy of the New York Academy of Sciences in April, and suggested that, inasmuch as Dr. T. A. Jagger Jr. was expected to address this meeting, the Club attend it as a joint session.

Mr. Hoadley moved that Dr. S. G. Gordon of the Philadelphia Academy of Natural Sciences be invited to address the Club at its May meeting. Motion carried. The president read a letter from Madame Curie in reply to a congratulatory telegram sent by the Club on the 35th anniversary of the discovery of radium. Letters were read from Professor Lacroix and Dr. Goldschmidt accepting honorary membership in the Club. The president then introduced Professor J. F. Kemp of Columbia University who delivered an address on "*The Minerals of the Contact Zones.*"

Dr. Kemp described the origin of contact zones and dwelt upon the action between an igneous intrusive and a sedimentary rock as a most prolific source of minerals. He discussed the action of a granitic intrusive on sandstones and shales and mentioned the following minerals: sillimanite, andalusite, tourmaline and