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NOTES AND NEWS

MINERALS AT MANTON, RHODE ISLAND*

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INTRODUCTION. There is a small glaciated area in the vicinity of the town of Manton, Rhode Island, three miles to the west of the City of Providence, that is, geologically speaking, of a very complex nature. At Manton a quarry is located the rock of which is used for road material. Inasmuch as quarrying operations have produced a pit the geological and mineralogical problems can therefore be studied in considerable detail.

The general area is one of greatly metamorphosed igneous and sedimentary rocks. A pre-Cambrian quartzite is intruded by fine-textured greenstones, also of pre-Cambrian age. The greenstones are considered to be metamorphosed dikes and sills of either basalt or some other basic rock of similar nature. Intruded into the quartzite and the greenstones are dikes and stocks of granite of probably Devonian age. There are lenticular masses of marble and steatite in the greenstones. In the vicinity are also to be noted veins of quartz, quartz-tourmaline, quartz-epidote, calcite-epidote, talc-calcite, chlorite-calcite, and chlorite.

MINERALS RECORDED PREVIOUSLY IN THE AREA. In 1926 Messrs. L. W. Fisher and E. K. Gedney[1] listed the following twenty-eight minerals from Manton: actinolite, ankerite, apatite, asbestos, boltonite, calcite, chalcopyrite, chlorite, clinochlore, dolomite, enstatite, epidote, hematite, hornblende, limonite, magnetite, malachite, orthoclase, pyrite, pyroxene, pyrrhotite, quartz, rhodochrosite, rhodonite, serpentine, steatite, talc, and tremolite.

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[1] L. W. Fisher and E. K. Gedney, Notes on the Mineral Localities of Rhode Island. 1. Providence County: *American Mineralogist,* **11,** 1926, pp. 339, 340.

Three of the above minerals were not found by the writer, namely: boltonite, rhodochrosite, and rhodonite. This can be accounted for by the fact that quarrying operations have been carried on in the vicinity and the exposures containing these minerals have been removed. With the continuance of the operations minerals new to the area have been uncovered.

DESCRIPTIONS OF RECENT ADDITIONS TO THE LIST OF MINERALS. Eleven additional minerals may be added to the above list, namely:

MINERAL	OCCURRENCE
Antigorite.	Main constituent of the serpentine rocks.
Biotite.	Common constituent of practically all of the greenstones. Also, in granite.
Fluorite.	A very rare constituent occurring as minute octahedra in the steatite.
Ilmenite.	As tabular crystals in the talcose surface of the serpentine. Microscopically it is seen to be a common constituent of the greenstones, and is closely associated with the titanite. Also, found as minute needles in some sections of the quartzite.
Pargasite.	Typical mineral in contact zones of granite and greenstones.
Plagioclase.	Sparingly in thin sections of greenstones.
Rutile.	Sparingly as striated prismatic crystals with calcite.
Titanite.	Golden yellow to light brown twinned crystals in veins and lenses of chlorite, and sparingly in chlorite-calcite veins in the greenstones. (See discussion of titanite.)
Tourmaline.	Uncommon. In stringer-like black tourmaline-quartz veins in the quartzite.
Zircon.	Microscopically in the quartzite.
Zoisite.	In contact zones of granite with greenstones. Associated with actinolite, clinochlore, and pargasite.

As stated above, the titanite at Manton is found in veins and lenses of chlorite in the greenstones, and sparingly in chlorite-calcite veins. The titanite crystals are golden yellow to light brown in color; large, and commonly twinned. Fish tail twins are numerous. An average specific gravity of the Manton titanite is 3.666, which is slightly higher than that of the normal titanite, 3.54, as recorded by F. W. Clarke.[2] Inasmuch as the element titanium is isomorphous with the elements zirconium, cerium, yttrium, and thorium, it is suggested that the greater specific gravity of the Manton titanite may be due to the replacement of some of the titanium molecules by one or more of the above elements. A chemical analysis for these elements is to be made.

The country rock, the greenstones, contain the elements that make up the constituents of the veins and lenses which contain the titanite crystals. This naturally leads to the assumption that the rocks in which the crevices have been formed have themselves furnished the material for the filling. Mr. I. Campbell[3] in his article

[2] F. W. Clarke, The Data of Geochemistry: *U.S.G.S. Bul.*, **770**, 1924, p. 353.

[3] I. Campbell, Alpine Mineral Deposits: *American Mineralogist*, **12**, 1927, p. 161.

on Alpine mineral deposits noted a distinct similarity between the chemical composition of several rocks of the Alps and certain "vein" fillings.

SUMMARY. At Manton, Rhode Island, are to be found greatly metamorphosed igneous and sedimentary rocks. Quartzite is intruded by metamorphosed basic greenstones, and granite intrudes both the quartzite and the greenstones. Lenticular masses of marble and steatite are found in the greenstones. A total of 39 minerals have been identified up to the present time. Of these, 11 minerals may be added to the list compiled in 1926. An interesting occurrence of titanite is mentioned. The titanite crystals occur in veins and lenses of chlorite in the greenstones, and sparingly in chlorite-calcite veins.

BOOK REVIEW

HANDBOOK OF CHEMICAL MICROSCOPY. ÉMILE MONNIN CHAMOT AND CLYDE WALTER MASON. Volume I. Principles and Use of Microscopes and Accessories; Physical Methods for the Study of Chemical Problems. XIII+474 pages with 162 figures. John Wiley and Sons, New York. **1930**. Price $4.50 net.

Although this edition is based on Chamot's "*Elementary Chemical Microscopy*" it may properly be considered a new book because of the large amount of new material that has been added and the broader scope of the work. It should be of considerable interest to mineralogists and petrographers because of the emphasis placed on petrographic methods as an important aid to the chemist.

In Chapter IX the authors have devoted 64 pages to the theories underlying the use of the petrographic microscope. The treatment of optical theories in this chapter is somewhat novel because of the simplified presentation of the subject matter. This attempt to avoid the rigorous and formal development of optical principles so common to textbooks on petrography may develop a few misconceptions, for example, the production of polarized light by the nicol prism (page 269). If a few photographs of interference figures, or even drawings, had been included in this chapter it would have added considerable clarity to the text especially for those not very familiar with optical methods.

In Chapter XI "Determination of Refractive Indices of Liquids and Solids" the authors recommend that α and γ be determined upon the particles showing lowest and highest indices of refraction. While for most crystals this method will give representative values, it is always best to check the orientation of these particles, whenever it is possible to do so, by obtaining interference figures from them.

The microscopist in any field will find in this book a handy reference work which discusses the microscope and its accessories in a semi-technical and readily understandable fashion. The petrographer, who is called upon to teach optical methods to chemists, will be especially interested in the list of easily crystallized chemical substances (showing characteristic orientations) tabulated on pages 311–315.

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