the examined sections, helvite occurs only in or near the rhodonite veinlets with which sulphides are associated and it was, therefore, one of the last minerals to be deposited.

The paragenetic relations of the minerals in this specimen conform in a broad way with those recorded by Burbank in the material from the Sunnyside mine. This specimen does not show the manganese silicates friedelite, alleghanyite, and tephroite found in the Sunnyside material, but shows the repeated succession of rhodonite-rhodochrosite recorded by Burbank. It seems probable that closer examination of the manganiferous veins at Butte will reveal more of the uncommon manganese minerals.

CRISTOBALITE AT CRATER LAKE, OREGON

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The discussion by Diller and Patton of accessory minerals in the andesites of Crater Lake National Park[1] mentions two occurrences of quartz and one of tridymite. Another mineral, cristobalite, should be added to the list.

The rocks exposed in Crater Lake National Park are in order of abundance andesites, basalts, and dacites. Mt. Mazama, the volcanic ancestor of the present crater, was composed principally of andesites with some later accumulations of dacite. The basalt occurs in adnate cones on the slopes of the former volcano.

In the southwestern corner of the Park, there is a very prominent conical land form known as Union Peak. Diller[2] considers the peak to be composed of andesite lava which solidified in the vent of a tuff cone. The plug was subsequently stripped of its tuff until only remnants now remain.

During a reconnaissance examination of the Union Peak area, an unusual specimen was discovered along the trail on the south side of the Peak. Although it was only a talus fragment, its composition and texture indicated that the mass which contributed the fragment was obviously the rock constituting the Peak. One surface of the talus fragment had dimensions of approximately one by two feet. The designated surface was made conspicuously irregular by the presence of pits or cup-like depressions with diameters from $\frac{1}{8}$ to $\frac{1}{2}$ inch and depths of approximately $\frac{1}{8}$ to $\frac{1}{4}$ inch.

The surfaces of these pits were covered with small white crystals (Fig. 1) which had the external form of octahedrons and a hardness greater than that of a knife blade. The unfamiliar association of this

[1] Diller, J. S., and Patton, H. H., *U.S.G.S. Prof. Paper* **3**, p. 83, 1902.
[2] *Ibid.*, p. 20.

form and hardness resulted in the collection of specimens and later examination by immersion methods. The diagnostic characters of the crystals are general index of refraction of approximately 1.485, pseudo isometric form, and very low interference colors. The mineral was determined as cristobalite, whose occurrence in Crater Lake National Park has not been previously reported. Specimens from the Union Peak locality are now in the museum collections of the Park and of the University of Minnesota.

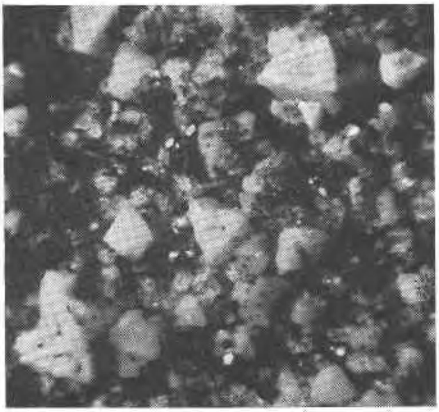

FIG. 1—Photomicrograph of cristobalite crystals (×12) from Crater Lake National Park, Oregon. Note the skeletal and octahedral forms.

The crystals vary in size from microscopic dimensions to slightly greater than one millimeter. The larger crystals are of sufficient size to permit observation concerning the character of their faces. Most of the faces exhibit a distinct concave form and a few crystals have quadrants so incompletely filled that they are "skeletal" in nature. These characters were also noted in the descriptions of other occurrences.[3] In addition to the skeletal and octahedral habits, aggregates of small crystals are also present.

Associated with the cristobalite crystals are abundant crystals of transparent feldspar (sanidine) and a few crystals of augite. Only very slight amounts of orthoclase were observed in the thin sections of the andesite, and although augite is rather common in the thin sections, it lacks the euhedral forms of the mineral in the cavities. The thin sections of andesite revealed no cristobalite nor other forms of silica.

[3] Rogers, A. F., *Am. Jour. Sci.* (4), vol. **45**, pp. 222–226, 1918.
Rogers, A. F., *Am. Mineral.*, vol. **6**, pp. 4–6, 1921.

The ridges between the cups are devoid of these crystals and are apparently normal rock surfaces. These conditions imply that the cups are remnants of cavities in which the cristobalite and associated minerals were deposited. This implication is substantiated by the presence of small cavities which lie below the cups but are connected with them by means of constricted openings whose surfaces are covered with small cristobalite crystals. The rock on which these crystals occur is rather dense and shows no evidence of conduits to the cavities. It is possible that such conduits were present in the rock mass containing the other portion of the cavities but no specific evidence as to the method of introduction was observed.

Rogers[4] states that cristobalite is a characteristic mineral of spherulites and that it occurs frequently in cavities. Emmons and Larsen[5] also mention these same conditions of occurrence at Creede, Colorado. In both instances, the cristobalite is considered to have formed in volcanic rocks during the last stages of crystallization, but some occurrences are also possibly the result of conversion by high temperatures. The formation of cristobalite is generally accepted as associated with an abundance of mineralizers and the presence of gas cavities.

As a result of recent studies on the volcanoes of the Cascade Mountains, cristobalite is known to occur abundantly in this area but, except at Crater Lake, only spherulitic forms have been recognized.[6]

[4] Rogers, A. F., *Am. Mineral.*, vol. **13,** p. 82, 1928.
[5] Emmons, W. H., and Larsen, E. S., *U.S.G.S. Bulletin* **718,** pp. 47–48, 1923.
[6] Williams, Howell, Personal communication. (August 1936).

PROCEEDINGS OF THE SOCIETIES

NEW YORK MINERALOGICAL CLUB

The exhibition of the New York Mineralogical Club, celebrating the club's fiftieth year, took place in the Maxwell Hall of the American Museum of Natural History on Saturday afternoon and evening, March 13th. The display was well attended, with over 1100 visitors during the two sessions.

There were several notable exhibits, both among the commercial exhibitors and those of the club members. The Ward exhibit with the new G.E. No. H3 fluorescent lamp and a large number of showy specimens attracted much attention. Bausch and Lomb, and Spencer exhibited the latest models of petrographic apparatus, and Leitz showed photomicrographic equipment. Books were shown by several publishers. An exhibit of changing lights shining up through a specimen of rock crystal, shown by H. T. Strong, served as a center of attraction in the hall. The demonstration by John Vlismas of cutting and polishing objects composed of onyx and fluorite was very instructive for the amateur lapidaries. Microchemical test demonstrations by R. P. Cargille showed the practicability of the technique to many who had never before seen these tests actually made. A new refractometer giving accurate results, used in conjunction with an ordinary microscope, was demonstrated by Lyman Nichols. The instrument is simple, practical and inexpensive, and