ART. XXVI.—*Topaz and associated Minerals at Stoneham, Me.*; by GEORGE F. KUNZ.

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THE topaz locality of Stoneham is situated on Harndon Hill, within one quarter of a mile of the Stow line, one and a half miles from Deer Hill, and two miles from the New Hampshire State line and the village of North Chatham. My attention was first drawn to Stoneham, Me., by an exhibition of minerals at the sale of the Mt. Mica Mining Company, September, 1882, where Mr. N. H. Perry had some minerals on exhibition, and for sale. Among these I observed a crystal that I recognized at once as topaz. Mr. Perry, on being informed what it was, instituted further search, resulting in the finding of the finest crystals, and about sixty kilograms of fragments of topaz, with other interesting minerals. A personal visit to the locality and some work there brought the rest to light. To Mr. Perry much credit is due for his keen perception in finding and his care in preserving the mineral specimens.

The minerals to be described in this paper were all found within a radius of fifty square feet in a coarse granite on the summit of Harndon Hill, which is 100 feet wide by about 250 feet long. For a brief mention of the locality, reference may be made to the Proceedings of the New York Academy of Sciences, November and December, 1882, and this Journal, February, 1883.

Topaz.—This locality is the first in New England that has furnished good, clear and distinct crystals of topaz, and thus far it has produced the best crystals found in the United States. Of these crystals, nearly all the finest were found in one pocket in cleavelandite (lamellar albite) at its junction with a vein of margarodite, and one was entirely surrounded by cleavelandite. The finest crystals vary in size from 10^{mm} to the largest which measures transversely 60^{mm} by 65^{mm} and vertically 56^{mm}. They are transparent in parts, and contain cavities of fluids, the nature of which has not yet been determined. A few small perfect gems (see Mining Statistics, 1883, p. 486) have been cut from the fragments of a large crystal that was broken.

The finest crystals are colorless or faintly tinted with green or blue. Some opaque crystals are as much as 300^{mm} across the largest part, and weigh from 10 to 20 kilograms each; they are not perfect in form, the faces are rough, and generally they were broken before they were taken from the rock. The color in these rough crystals is more decided than in the finer ones and is a light shade of either green, yellow or blue. The specific gravity of the transparent material is 3.54, and the hardness the same as that of the yellow topaz from Oura Preto (formerly Villa Rica), Brazil.

The following forms have been observed:

O, $i\bar{1}$; prisms I , $i\bar{2}$, $i\bar{3}$, $i\bar{4}$; macrodomes $\frac{2}{3}\bar{1}$, $2\bar{1}$; brachydomes $2\bar{1}$, $4\bar{1}$; pyramids $\frac{1}{2}$, $\frac{3}{8}$, 1, 2; $\frac{1}{2}\bar{2}$, $2\bar{2}$.

Many of the crystals exhibit a pearly and at times an opalescent luster when viewed in the direction of the plane *O*, apart from the iridescence produced by fracture and cleavage.

A specimen of this topaz was sent to Professor J. W. Mallet for examination. In a letter to the writer, dated July 27, 1883, he says:

“Mr. C. M. Bradbury, of Petersburg, Va., has made what he himself believes to be a good and accurate analysis, and has obtained the following remarkable results:

Aluminum	27.14
Silicon	14.64
Fluorine	29.21
Oxygen	28.56
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	99.55

counting the oxygen as the sum of that equivalent to the aluminum and silicon less one atom of oxygen for two of fluorine found. These figures lead to the usual formula for topaz, Al_2SiO_5 , with oxygen partly replaced by fluorine, but presents the remarkable anomaly that, instead of *one-half* of the oxygen

equivalent to silicon being thus replaced, we have *three-fourths* replaced. . . .

I send you the results for what they are worth. This may be a new and interesting variety of topaz as regards chemical composition, but such a conclusion needs to be confirmed. The specific gravity of the mineral was found =3.54. . . ."

Triplite.^{*}—This mineral occurs scattered through the rock in masses that weigh from one gram to one kilogram, staining the topaz, quartz, cleavelandite and associated minerals. One mass that may have been a large rough crystal, that was broken to pieces in the blasting, furnished over 50 kilograms of the mineral of a very pure character, in color a light chocolate-brown and clove-brown, and usually with a black coating of oxide of manganese. The interior is streaked with a lighter colored variety of this same mineral that is translucent, but at times transparent in very small fragments. The quartz at its junction with it is often stained black as if the mineral had partly decomposed.

Triphylite.—Only one very imperfect crystal of this mineral was found.

Montmorillonite.—Occurs in masses that vary in color from a very delicate pink to a dark pink closely approximating red, filling the cavities and interstices in the cleavelandite. When the latter is broken, it falls out, and it so far retains the impressions of the spaces it has occupied as to lead one to infer that it has a crystalline form. It also occurs in botryoidal masses resembling rhodocrosite on crystals of cleavelandite. This mineral is evidently identical with that described by Professors Brush and Dana from the Branchville, Conn., locality.[†]

Columbite is scattered all through the cleavelandite, either on crystals of the latter in cavities, or else between the plates of this mineral. These crystals vary in length from 1 to 10^{mm}, and are not very perfect. In one curious occurrence a number of acicular crystals of this mineral are so bunched together as to have a fibrous appearance, yet each crystal is distinct. One pocket afforded 20 kilograms of pure material, and one mass, or rather a part of a large crystal weighing 8.5 kilograms, appear to have been originally one crystal or one group of crystals. [One very fine brilliant columbite crystal 6^{cm} long was found associated with the herderite.]

Autunite was observed in minute scales on the cleavelandite.

Beryl occurs in large crystals all through the rock, and at times in contact with the larger topaz which it strikingly re-

^{*} Resembling zwieselite of Fuchs. See Dana's System of Mineralogy, 5th ed., p. 544.

[†] This Journal, III, xx, 283, 1880.

sembles. One vein in quartz with crystals nearly a meter long and one-third of a meter across, was traced for nearly forty feet, without, however, finding any fine crystals.

Zircon occurs in crystals from 1 to 15^{mm} in length scattered through the cleavelandite. The faces are all dull and the crystals are occasionally altered to malacon; those observed were *I*, *i-i* and 1.

Garnet occurs sparingly in poor crystals and is evidently a manganesian variety of the species; it resembles triplite in color.

Cleavelandite occurs by the ton in fine large masses of plates, in color snowy-white, or fading to this color from a dark brown after a short exposure to the sun. Beautiful crystals line the cavities or pockets, in which, as elsewhere, so many interesting minerals are found. The dark brown color is evidently a staining produced by the alteration of the triplite.

Quartz occurs in abundance, usually of a milky color. Masses weighing over 75 kilograms can be easily broken by dropping them, causing them to break asunder as if assisted by some internal force, at which they show an apparent cleavage. The bursting of the fluid cavities with which they are filled may assist the breaking. Some few irregular crystals and some small perfect ones were observed in the cavities. One smoky quartz crystal, or rather group of crystals, measured 80^{mm} by 75^{mm}.

Apatite, in small doubly terminated crystals, occurs in the cavities, often white in the center and blue or green at each end of the pyramid. In one fine group the crystals were white at the center and at the terminations almost sapphire-colored. The plane *O* is largely developed, also *I*, *i-2* and 1. A massive variety also occurs, compact, vitreous green, the masses weighing 1 kilogram.

Fluorite fills small cavities in the cleavelandite; these masses were rarely over 10^{mm} across, and the color was a very deep purple. A number of very minute octahedrons, resembling blue topaz, were found.

Biotite in slender crystals occurs in the muscovite crystals. Very thin cleavages are dark brown by transmitted light. One crystal was found enclosed in muscovite.

Margarodite occurs here in abundance, of a light yellowish oil-green color. The form of this mineral is nearly radiated.

Muscovite occurs in large masses and hexagonal crystals that are from 2 to 6 inches across, also transparent through the prism, and in masses with a fibrous cleavage, in color brown, yellow and light green.

Damourite.—A curved mica occurs in large shells 4 inches across, saucer-like in shape.

In addition to the topaz and other minerals from Stoneham, Maine, the finding of two beryls, of exceptional beauty for this country, may be mentioned; they were found several miles apart and some distance from the topaz locality. They were discovered by chance, within the last two years, by farmers, in pastures in this township. The first is only one-half of the original crystal and has been roughly used by some one who possibly discarded it as worthless after breaking it, or may have broken it in taking it from the rock. It is 120^{mm} long and 54^{mm} wide, and was evidently at least 190^{mm} long and 75^{mm} wide. The color is a rich sea-green as viewed in the direction of the longer axis, and sea-blue of a very deep tint through the side of the crystal. The color and material in the crystal are the finest that have been found at any American locality, and if not broken, would be equal to the finest foreign specimens known. If cut, it will still furnish the finest colored large gem of this mineral found in the United States, (see United States Geological Mining Statistics, p. 487, 1883), weighing at least 20 carats, and a number of small ones weighing from one to six carats.

The other crystal referred to is doubly terminated, being 41^{mm} long and 15^{mm} in diameter. Over one half of it is transparent with a faint green color; the remainder is milky green and only translucent. At the junction of the two colors in the crystal there is the appearance of a flocculent precipitate, looking as if it had almost completely settled, leaving the upper half perfectly clear. The observed planes are: *O* largely developed, *I*, *i*-2, 1, 2-2, 3- $\frac{3}{2}$. The finding of these two crystals in such a manner can but lead one to think that rich material must be stored in the vicinity and would warrant further search.

[Since the above paper was read the locality has been worked to some extent, and a number of very fine crystals have been found by several parties; among these are several transparent pieces, yielding nearly as fine gems as the ones described, and also some remarkable translucent crystals; one of these measures 910^{mm} long and 110^{mm} in diameter and is of a very fair color. One fragment weighing 660 grams (now in the possession of Mr. Perry) that had originally been entirely transparent but was cracked by weathering, still has a very large clear space, and apparently is a part of the crystal described before. There have been found also some very curious penetrating and enclosed beryls. In one case, a crystal about three inches long and one and one-half inches wide, was penetrated by another crystal, which, as broken out, fits perfectly in the socket. One crystal six inches long had another running through the side, and still another entirely enveloped a smaller one.]