chalcopyrite, bornite, chalcocite, covellite, sphalerite and galena; native tin. The actual age relation of the tin to other metallics is indeterminate as it occurs in and completely surrounded by late calcite. Study of this peculiar occurrence is continuing.

ON THE OCCURRENCE AND ORIGIN OF XONOTLITE[1]

CHARLES H. SMITH,[2] *Geological Survey of Canada, Ottawa, Canada.*

The recently reported occurrence of xonotlite ($5CaO \cdot 5SiO_2 \cdot H_2O$) in Puerto Rico by Kaye (1953, p. 860) resembles similar occurrences associated with the ultrabasic rocks of the Bay of Islands Igneous Complex, western Newfoundland. The latter are believed to be the first reported Canadian occurrences. The mineral has similar optical properties to those described by Larsen (1923) and others, and gives an *x*-ray pattern similar to xonotlite from Isle Royale, Michigan (McMurdie & Flint, 1943) but variations in the modes of occurrence have a bearing on the origins of xonotlite suggested by Kaye. The specimens studied are now deposited in the Brush Mineral collection at Yale University (Specimen Nos. 6776 and 6777).

The Puerto Rican occurrence is located at the fault contact of serpentinite and a metavolcanic rock. Kaye concludes that conditions at the contact were critical to its formation, and suggests that either heat generated during shearing caused a calcite vein to alter to xonotlite in the presence of siliceous emanations from the serpentinite, or that the xonotlite formed prior to movement but later movements caused recrystallization of the "massive" xonotlite into "parallel-fibrous" xonotlite.

Both massive, i.e. unoriented xonotlite aggregates, and fibrous forms of xonotlite are found in the Bay of Islands area. Fibrous xonotlite occurs in veins up to 3 inches in width and several feet long, cutting altered sedimentary rocks near faulted contacts with serpentinite at Winter House Brook and Shoal Brook, Bonne Bay, and near First Trout River Pond. Fibrous and massive xonotlite are found with other lime-bearing minerals filling joints in serpentinite near the basal contact of the North Arm Mountain pluton. Four separate bodies, composed of prehnite, pectolite, phlogophite and xonotlite, are exposed in the valley walls of a stream draining into North Arm, Bay of Islands. The largest body is 55 feet long and 10 feet wide. Xonotlite also occurs as a secondary alteration mineral formed from the metamorphic minerals related to the ultrabasic

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[2] Geologist, Geological Survey of Canada.

contacts. In one place, a calcic hornfels was altered to a mass of prehnite, xonotlite, calcite and clinozoisite, with only ragged relicts of the original diopsite remaining. About thirty miles further south, in the Lewis Hills intrusion, fragments of xonotlite were found in the alluvium, suggesting that xonotlite has formed in other parts of the ultrabasic masses as well.

The xonotlite occurs as a vein-forming mineral, formed after the solidification, serpentinization and faulting of the ultrabasic plutons. It is found in joints near the faulted contacts of the ultrabasic rocks, and may occur in either the ultrabasic or metamorphic rocks. Bleaching along the vein margins suggests the solutions were fairly hot. Xonotlite is found in limestone near igneous contacts at Tetela de Xonotla, Mexico (Winchell & Winchell, 1951) and at Goose Creek, Virginia (Shannon, 1925). No source of lime exists in the ultrabasic rocks now exposed at the contacts in the Bay of Islands area, and it is believed that the lime to form xonotlite was derived from the calcium-rich rocks of the contact metamorphic aureole, by heated solutions circulating along the fault contacts. Whether the solutions represent very late emanations from the serpentine, or hydrothermal solutions related to some later igenous activity, is not known. However, there is no evidence to support the suggestions of Kaye that the xonotlite formed by the alteration of vein calcite or that the action of stress was necessary to cause its crystallization in well-developed fibers.

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