SAPONITE

$(Ca/2,Na)_{0.3}(Mg,Fe^{2+})_3(Si,Al)_4O_{10}(OH)_2 \bullet 4\ H_2O$

A member of the smectite group of clay minerals with interlayered exchangeable cations. In Michigan, it is identified almost entirely from the copper deposits as vesicle fillings, replacements of other minerals, or crusts on other minerals. In the basaltic flows of the copper district, olivine is characteristically altered to serpentine or "bowlingite" and hematite (Butler and Burbank, 1929). "Bowlingite" is an ill-defined name that doubtless covers a number of species or mixtures, if assigned on the basis of appearance alone. X-ray determination shows that some material called "bowlingite" is a fibrous form of saponite. Probably other "bowlingites" are actually chlorites, kaolinite-serpentine group minerals, or other species. Northern Peninsula.

Houghton County: 1. South Kearsarge mine and the *Kearsarge lode* generally: Fills amygdules in the copper lodes. Saponite is one of the last minerals to form and may contain suspended crystals of copper and quartz. It is also found with copper and epidote crystals in cavities as minute stalactites up to 12 mm long and 2 mm in diameter. These are built up of spherulitic groups of fibers or plates. The colors are white, blue, green, gray, yellow, and red (Palache and Vassar, 1925; Butler and Burbank, 1929; Klein, 1939; Stoiber and Davidson, 1959). **2.** *Isle Royale*, *Laurium*, and LaSalle mines: similar occurrence.

Figure 123: A 0.4 mm spherule of white saponite crystals on epidote and quartz from the Laurium mine, Calumet, Houghton County. Dan Behnke specimen and photograph.

Keweenaw County: 1. Ahmeek mine: Occurrence as in South Kearsarge mine (above). **2.** Iroquois mine (Moore and Beger, 1963). **3.** Northwestern mine: With "adularia" and analcime (Whitney, 1859). **4.** Medora mine: (Morris, 1983).

Ontonagon County: 1. Near Bergland: Variety "bowlingite" is pseudomorphous after olivine in basalt (Leonardson, 1966). **2.** Algomah mine: Aluminian saponite occurs as lime green crystalline aggregates (D. Behnke, written communication, 1994). **3.** Near Mass: As granular, brownish-green pseudomorphs after analcime with "adularia" (specimen RTC 399, A. E. Seaman Mineral Museum, Michigan Technological University). Somewhat similar specimens (e.g., DM 7422) are labelled as coming from the Michigan mine. **4.** Adventure mine: As waxy, yellow-gray, botryoidal aggregates of microscopic spheres associated with epidote, "adularia," pumpellyite, copper, and quartz in cavities in basalt (A. Blaske, personal communication, 2001). Identification confirmed by X-ray diffraction.

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