

PREHNITE



Mainly a hydrothermal mineral in cavities and veins in basaltic and andesitic rocks. In the copper deposits of Michigan, it was formed mainly as an intermediate mineral of the ore stage. It is present in most amygdaloids, filling vesicles or replacing rock or earlier minerals. It occurs abundantly in veins and rarely in the conglomerates. In veins, it is very commonly associated with copper, which may be disseminated through the mineral. It may also be associated with silver. Prehnite commonly occurs as radial crystal aggregates but may be massive in veins. Much prehnite is pale apple-green, but can be highly variable in color. In some specimens it is nearly black (Butler and Burbank, 1929). Pink to reddish varieties also are found. An intergrowth of pink prehnite, chlorite, and specks of native copper was named “patricianite” by Rosendahl (1966) after his daughter, Patricia Ann. “Patricianite” is relatively common as beach pebbles in the Copper Harbor-Fort Wilkins area, and is often mistaken for thomsonite (q.v.).

Prehnite occurs in amygdaloidal flow tops in the upper and middle parts of the Portage Lake Volcanics, from the top of the formation down to the Copper City flow near Calumet, and down to the Baltic Lode near Painesdale. However, vein prehnite is found throughout the entire section (Livnat, 1983). Associated minerals recorded by Livnat include laumontite, thomsonite, natrolite, quartz, calcite, datolite, pumpellyite, titanite, chlorite, epidote, bornite, and chalcocite. Others (including both copper and silver) are known. Compositionally, Keweenaw prehnites have been found to contain up to 8.78 wt% Fe_2O_3 , with more ferrian varieties dominating lower horizons. Low-Fe prehnites found at deeper levels are invariably armored and replaced by ferrian prehnites (Livnat, 1983). Northern Peninsula.



Figure 108: Prehnite with quartz from the Tamarack Jr. mine, Calumet, Houghton County. Field of view approximately 4 × 5 cm. A. E. Seaman Mineral Museum specimen No. JTR 1707, Jeffrey Scovil photograph.

Gogebic County: Geneva mine, near Bessemer: Pale green granular prehnite associated with stilpnomelane (q.v.) occurs in a dike.

Gratiot County: Near Ithaca, T10N, R2W in Michigan Basin Deep Drill Hole: Identified by Stakes (1978) as an accessory in altered basalt (albite-epidote-actinolite-chlorite-relict augite) of the lower unit.

Houghton County: 1. Atlantic mine (Spiroff, 1938). 2. Isle Royale Numbers 4, 5, and 6 mines (Spiroff, 1938). Lane (1911) reports prehnite in two habits: 1) greenish, barrel-shaped crystals and 2) radial fibers. 3. *Osceola mine*: Green, botryoidal with datolite and feldspar crystals. 4. Calumet and Hecla, South Hecla mine, Number 12 shaft. 5. *Tamarack and Tamarack Jr. mines*: fine, pale yellow to rich green botryoidal aggregates with quartz and epidote. 6. South Range near Houghton: Much of the “thomsonite” reported from here (Mihelcic, 1954) is actually pink prehnite. 7. Franklin and Franklin Jr. mines, Hancock: Pale green botryoidal with quartz. 8. Hancock mine, Hancock. 9. Wolverine mine, Kearsarge (7-9, Morris, 1983). 10. Huron Creek. 11. Mesnard mine. 12. *Quincy mine*.

Keweenaw County: **1.** *Phoenix mine* (Spiroff, 1938): Excellent specimens of prehnite were originally found in vein Number 5 (Jackson, 1845). Some is coated by quartz and calcite; also pseudomorphs after calcite. Colors range from white to yellow, various shades of green, and rarely, pinkish-orange. **2.** Iroquois mine: Green botryoidal with copper and quartz (Mihelcic, 1954). **3.** Allouez Number 3 mine: With Al:Fe³⁺ ratio of 4:1 (Stoiber and Davidson, 1959). **4.** Lake Superior beaches in the Fort Wilkins-Copper Harbor area: As beach pebbles showing fine-grained, fibrous-to-compact radial aggregates. Some have eye-like, concentrically banded fibers radiating from a common center, resembling thomsonite. They are generally green and may be mottled with pink, tan, or faint lilac (“patricianite”) (Dobell, 1966a; Rosendahl, 1966). **5.** Isle Royale: Found as beach pebbles, with flecks of copper. Huber (1969, 1983) has demonstrated that nearly all of the Isle Royale “thomsonite” is actually a radially fibrous variety of prehnite, colored pink by minutely disseminated flecks of native copper. The copper content of the pink prehnite is 15%. Some of the green “thomsonite” has also been determined to be fibrous prehnite (verified by X-ray diffraction). **6.** Cliff and South Cliff mines: Pale green and brown aggregates. One of the most abundant gangue species. Measurable crystals are rare and minute. One showed the forms {001}, {100}, {110} and {218}, with striations on {001} parallel with {010} (Williams, 1966). **7.** Clark mine: White-to-green, 3.5 cm wide veinlets showing comb structure, with minute disseminated copper scales. **8.** *Central mine*: Green botryoidal aggregates. **9.** *Copper Falls mines*. Also found as an amygdale filling in the bed of Owl Creek just below the Owl Creek fissure, and with analcime, datolite, copper, and silver at the “Silver Pit,” just north of the Petherick vein. **10.** Delaware mine. **11.** Five and Seven Mile Points, Eagle River area. **12.** Lookout Point, Eagle Harbor. **13.** Medora (Mandan) mine. **14.** Northwestern mine. **15.** Seneca (Gratiot) mine: Small microcrystals colored pink by copper inclusions were found on the 17th level, Number 2 shaft. **16.** Star mine, near Copper Harbor (8-16, Morris, 1983). **17.** In drill cores south of Eagle Harbor (Jolly and Smith, 1972).

Ontonagon County: **1.** Lake Superior beaches near Ontonagon: Beach pebbles (Mihelcic, 1954). **2.** Mass mine. **3.** *Aztec mine*: Coarsely crystallized

green botryoidal aggregates with native copper. **4.** *Michigan mine*: Coarsely crystallized apple green specimens similar to those from the Aztec mine (S. M. Carlson, personal communication, 2000). **5.** Caledonia mine: Small, bladed, gray-green, aggregates.

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