

MICROCLINE



Figure 102: Microcline (variety "adularia") crystals coating wire copper from the Osceola mine, Calumet, Houghton County. 2 x 5 cm. A. E. Seaman Mineral Museum specimen No. JTR 957, Jeffrey Scovil photograph.

A low-temperature, triclinic potassium feldspar commonly found in granitic rocks. Semi-regular intergrowths of quartz rods in microcline from pegmatites constitute graphic granite. "Perthite" consists of minute rods or lenses of exsolved albite in generally parallel orientation in microcline. The variety "adularia" occurs in medium- to low-temperature veins and other hydrothermal deposits. Most of the "adularia" in the Lake Superior copper district is presumed to be microcline, although some samples from the Phoenix mine have been shown to be high sanidine (P. Černý, written communication, 1985). Species of potassium feldspars are determined by the degree of ordering of aluminum atoms into one (of four) preferred tetrahedral sites in their crystal structures, which progresses with time. Thus, geologically "old" (e.g., Precambrian) potassium feldspars are often microcline, which is best differentiated from orthoclase (its monoclinic dimorph) by X-ray diffraction. Chiefly Northern Peninsula.

Dickinson County: 1. Near Foster City: In pegmatite (Poindexter et al., 1939). 2. Near Felch: In pegmatite (Poindexter et al., 1939). 3. Metronite quarry, 4 km east-northeast of Felch: Found in an aplite-pegmatite dike cutting marble (Heinrich, 1962b). 4. *East of Randville*, approximately a kilometer east of Groveland mine: As graphic granite adjacent to the quartz core of a pegmatite (Pratt, 1954). 5. Pegmatite quarry, SE ¼ section 19, T42N, R29W: Perthitic pink microcline in a post-Animikie pegmatite occurs with quartz, albite, muscovite, biotite, beryl, ferrocolumbite, tourmaline, and garnet (James et al., 1961). 6. In a pegmatite dike, "6.4 km northeast of Randville near Tom Kings Creek, a tributary of the West Branch, Sturgeon River" (Hawke, 1976). 7. Road cut on Highway 69, on west end of the village of Felch: Small crystals of pale, orange-pink "adularia" line cavities in brecciated ferruginous sandstone.

Gogebic County: 1. Near Lake Gogebic: In pegmatite (Poindexter et al., 1939). 2. *Section 2, T46N, R41W*: Pink crystals 12 to 15 cm long and sometimes as large as 35 cm are found (Allen, 1920). 3. *Peterson mine*, between Ironwood and Bessemer: Pinkish twinned crystals of "adularia" up to 3 mm occur in cavities in soft hematite ore.

Gratiot County: Near Ithaca, T10N, R2W in Michigan Basin Deep Drill Hole in the lower altered basalt unit. Accessory potash feldspar (probably microcline) has been analyzed by McCallister et al. (1978).

Houghton County: 1. General Occurrence: As "adularia" in the native copper lodes. It is a prominent gangue mineral in the mineralized lava flows, where it occurs as well-terminated pink-to-red crystals in vesicles. It is also present, but not abundantly, in the Calumet and Hecla Conglomerate. Associated minerals are pumpellyite, epidote, calcite, prehnite, muscovite ("sericite"), quartz, datolite, copper, albite, analcime, and saponite. 2. Wolverine mine: Light reddish brown columnar crusts on calcite are reported. 3. *Laurium mine*, Osceola: Bladed, white crystals to 5 mm (Morris, 1983). 4. Osceola mine, Osceola (Falster, 1978; Morris, 1983). 5. Isle Royale mine: In veins with copper sulfides (chalcocite), natrolite, and analcime (Lane, 1911).

Iron County: East bank of the Paint River. Quartz-adularia veins in iron formation (stilpnomelane).

Keweenaw County: 1. General Occurrence: As “adularia” in amygdaloid flows, similar to Houghton County. 2. Mohawk mine (Stoiber and Davidson, 1959; Spiroff, 1964). 3. *Copper Falls mine*: Bright red crystals lining vugs. 4. Northwestern mine: Occurs with analcime on saponite (3, 4, Whitney, 1859). 5. *Phoenix mine*: As small pinkish crystals of “adularia,” some of which has been shown to be high sanidine (P. Černý, written communication, 1985). 6. Ashbed mine. 7. Delaware mine. 8. Iroquois mine. 9. Isle Royale National Park. 10. Ojibway mine. 11. Seneca (Gratiot) mines (7-11, Morris, 1983). 12. Allouez mine: Microcrystals in conglomerate (Yedlin, 1974). 13. Owl Creek: Corroded white crystals of “adularia” to 2 cm long occur in vesicles in basalt exposed in the bed of Owl Creek, just below the Owl Creek fissure mine. Associated species are fluorapophyllite, prehnite, quartz, and calcite.

Marquette County: *Republic area*: 1. Section 22, T47N, R29W: In the Crockley pegmatite (Allen, 1920). Meter-sized pink-to-red crystals are associated with quartz, micas, and beryl (Snelgrove et al., 1944). The microcline occurs in the intermediate zone adjacent to the quartz core (Heinrich, 1962a). 2. SE ¼ NW ¼ section 21, T47N, R29W: Found in a pegmatite with biotite (Snelgrove et al., 1944). 3. SE ¼ SE ¼ section 23, T46N, R30W: In pegmatite (Snelgrove et al., 1944). 4. Cleveland Iron Mining Company, Ishpeming: Found on Number 10 hematite ore as small, single, white or reddish crystals, mainly twinned and united in bundles. It has been called orthoclase (Claassen, 1882), but is most likely microcline. 5. *Pegmatite dike* exposed in roadcut, SE ¼ section 20, T47N, R29W: As pinkish-white cleavages of perthitic microcline with muscovite, quartz, minor fluorite, and rare britholite-(Y) and xenotime-(Y). 6. Holmes mine, Ishpeming: As pink microcrystals of “adularia” to 1 mm lining cavities in brecciated iron formation. 7. Volunteer mine, Palmer: Microcrystals of pink “adularia” coat fracture surfaces in iron formation. 8. *Foster mine*, Negaunee: As twinned, pink crystals of “adularia” to 5 mm in length lining cavities in limonitic iron formation. Except for their matrix, these crystals are equal in quality, and resemble those from a

number of the “Copper Country” localities. 9. Section 22, T47N, R26W, approximately 1.6 km SW of Goose Lake: Flesh-pink crystals to 5 mm with quartz (specimen DM 23006, A. E. Seaman Mineral Museum, Michigan Technological University).

Ontonagon County: 1. General Occurrence: As well-formed pink and red crystals of the “adularia” habit, similar to those from Houghton and Keweenaw Counties. 2. *Mass mine*, 3rd level, C Shaft: Pinkish crystals to 5 mm. 3. *Adventure mine*: “Adularia” pseudomorphs after terminated quartz crystals up to 2.5 cm long (T. M. Bee, written communication, 1985). 4. Superior lode. 5. *Michigan mine*: Complexly twinned crystals. Earliest crystals show dominant forms $\{110\}$, $\{1\bar{1}\bar{0}\}$ and $\{1\bar{1}\bar{0}\}$. As crystallization proceeded, $\{001\}$ and $\{010\}$ became conspicuous. The earliest crystals display an orthorhombic aspect with $\{001\}$ and $\{1\bar{1}\bar{0}\}$ equally developed (Klein, 1939). 6. *Caledonia mine*: High-quality specimens of reddish adularia associated with green epidote and quartz.

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