

## TOURMALINE GROUP



The tourmaline group comprises a dozen or more chemically complex species. The formula given above is representative for only those species known from Michigan. Schorl is probably the most common and widespread member of the group, and the one most commonly found in the state. Schorl occurs in granitic pegmatites and quartz veins in relatively large crystals, and as a microscopic accessory mineral in some granites, schists, and gneisses. It is also widespread as a minor accessory detrital mineral in sands and sandstones. Stewart (1937) discusses an occurrence in glaciofluvial sand and Denning (1949), one in the Jacobsville sandstone. Likewise, Kelly and Beutner (1930) report that detrital tourmaline is the most common heavy mineral of the Parma sandstone (Pennsylvanian) in various localities in South-central Michigan.

Schorl, which is commonly black, forms solid solution series with several other species, including foitite, dravite, and uvite. Some of these may occur in Michigan, but without complete chemical and/or crystal structure data, positive identification is impossible. Northern and Southern Peninsulas.

**Dickinson County:** 1. Post-Animikie pegmatites of central Dickinson County: Common accessory with quartz, feldspar, muscovite, biotite, and beryl (James et al., 1961). 2. Chapin mine area, Millie pit, near Iron Mountain: Veins of quartz, muscovite, and tourmaline cut the iron-bearing Curry member of the Vulcan Iron Formation (Dutton, 1958). 3. Menominee River: Tourmaline and rutile are accessory species in a gneissic phase of a "granite porphyry" just below Horseshoe Rapids on the Menominee River (Bayley, 1904). Accessory tourmaline also occurs in the Sturgeon Quartzite on the north side of the Menominee trough (Bayley, 1904). 4. Groveland mine: As small (1 to 3 mm), subhedral greenish-brown crystals with pyrite in a vein on the northwest wall of the pit. The energy dispersion X-ray spectrum of this tourmaline suggests it is probably in the uvite-dravite series. 5. Vulcan mine: As radial aggregates of black, prismatic crystals.

**Houghton County:** In conglomerate as a microscopic accessory in felsite fragments (Butler and Burbank, 1929).

**Iron County:** 1. Crystal Falls area: Microscopic bluish accessory in various schists formed by hydrothermal alteration related to emplacement of Huronian granite (Tyler et al., 1940). 2. In Stambaugh Formation: 0.05 to 0.10 mm long grains (James et al., 1968).

**Marquette County:** 1. Michigan gold mine: Black acicular crystals and clots in quartz (Broderick, 1945). 2. Ropes gold mine: In quartz-tetrahedrite veins (Broderick, 1945). 3. *Beacon mine*: In quartz veins as brown and black crystals as much as 10 cm long (Spiroff, 1940; Mandarino, 1950). 4. *Champion mine*: As slender black crystals and crystal sprays up to 15 cm long in quartz veins cutting iron formation (Slawson, 1936; Spiroff, 1940). It is also found on the 36th level in quartz veins with chalcopyrite, bornite, molybdenite, and muscovite cutting massive granular magnetite ore (Babcock, 1966a, b). 5. Greenwood mine: In quartz veins cutting magnetite ore (Slawson, 1936). 6. Palmer area: In Kona Dolomite (marble) near its contact with the Republic granite (Lamey, 1935). 7. South-central and southwestern parts of the Sands Quadrangle: Several quartz-tourmaline veins (Gair and Thaden, 1968). 8. Magnetic mine, section 20, T47N, R30W: In veins 5 cm thick (Snelgrove et al., 1944). 9. New Richmond iron pit, 3.6 km east of Palmer: Quartz-specularite-tourmaline-halloysite veins (Ayles, 1940). 10. Small island at the south end of Lake Michigamme, section 4, T47N, R30W: Crystals 1 to 2 cm across in a slate-metagraywacke contact in the Michigamme Formation (Lamey, 1931). 11. Mouth of Dead River: "Beautiful specimens in small quantities" (Brooks, 1873). 12. NW ¼ section 25, T47N, R27W: An accessory mineral in silicified Palmer Gneiss (Gair and Simmons, 1968). 13. *Humboldt mine*: 2- to 3-cm black crystals in a granitic dike cutting Goodrich Formation. "Best crystals found in Michigan" (K. Spiroff, personal communication). 14. Negaunee quadrangle: In quartz veins in Enchantment Lake Formation (Puffet, 1974). 15. Section 13, T47N, R27W and adjacent section 18, T47N, R26W: In an autoclastic breccia in amygdaloidal schist with chlorite, calcite, and siderite (Rominger, 1881). 16. Section 10, T47N, R27W: Slender tourmaline prisms, pleochroic from pink to dark blue-green,

occur in pre-Clarksburg intrusive greenstones (Van Hise and Bayley, 1897). **17.** Davis mine, Negaunee: Black, prismatic crystals in quartz. Specimens resemble those from the Champion mine.

**Monroe County:** France Stone Company quarry. Authigenic colorless overgrowths on antilogous ends of black rounded detrital tourmaline crystals. An unusual occurrence (Alty, 1933).

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#### UPDATE



*A 10 cm long schorl crystal from near Felch, Dickinson County. Shawn M. Carlson specimen, George Robinson photograph.*

**Dickinson County:** The finest schorl crystals yet found in Michigan have been recently collected from the "Shotgun" pegmatite near Sixmile Lake, approximately 4 km northwest of Felch. Sharp, singly-

terminated prismatic crystals over 10 cm in length have been found. Species verified by electron microprobe analysis.