TRIP 3

SELECTED MINERAL OCCURRENCES
IN ST. LAWRENCE AND JEFFERSON COUNTIES - NEW YORK

by

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Introduction

Probably no other region in the State of New York is better known for its wealth of mineral occurrences than St. Lawrence, Jefferson, and Lewis Counties. Indeed, many are among North America's most famous and classic localities (Beck, 1842; Dana, 1877; Kunz, 1892; Jensen, 1978; Robinson and Chamberlain, 1981). The vast majority of these occurrences are found within the Grenville metasediments, which are geologically complex and host a wide variety of mineral assemblages. It is the intent of this trip to acquaint the participant with a selection of localities that provide a variety of geological environments, are of minerological and historical interest, and will hopefully afford good collecting opportunities. For additional information, the reader may wish to consult some of the available collecting guides (Agar, 1921 & 1923; Robinson, 1971; Robinson and Alverson, 1971; Van Diver, 1976).

A brief account of each stop follows, and more detailed information is given under individual stop descriptions.

Stop 1: The Powers Farm at Pierrepont

Many of the most interesting localities in Northwestern New York and Southeastern Ontario are in contact zones between various Precambrian rocks and Grenville marble, and particularly in their associated calcite vein-dikes (Robinson, 1982; Moyd, 1972). Such contacts are often of a local nature, and host a wide variety of complex skarn-like mineral assemblages. The Powers Farm has one such occurrence where a quartz-tourmaline-biotite pegmatite (?) is in contact with coarsely crystallized calcite.

Stop 2: The McLear Mine at Dekalb Junction

The McLear pegmatite is a Precambrian quartz-microcline pegmatite that formed by replacement of crystalline limestone. The presence of large crystals of tremolite and diopside in the quartz core is unique.

Stop 3: The Gem Diopside Mine at Dekalb

This classic North American mineral locality is situated in a folded quartz-tremolite-diopside metasediment of the Grenville series. Diopside rich bands up to several feet in thickness are interlayered with quartz and tremolite schist. Small pockets containing diopside crystals occur locally within the diopside rich bands and along cross-cutting seams of coarsely crystallized tremolite.

Stop 4: The Coal Hill Vein at Rossie

The Rossie Lead Mines are one of the oldest and most famous North American mineral localities. The large crystals of calcite and galena these veins once produced are indeed classics. The Coal Hill Vein is perhaps the best known and is probably a relatively low temperature hydrothermal calcite-galena vein that intruded Precambrian granite in post-Ordovician time.

Stop 5: The Sterling Iron Mine at Antwerp

The Sterling Mine is probably a recrystallized Precambrian gossan. The original hematite body was likely formed in Precambrian time when iron-bearing solutions derived from underlying pyritic schist infiltered the enclosing gneiss and marble, altering these rocks and replacing them with hematite. Subsequent burial and recrystallization is suggested by field relationships and a unique mineralogy and paragenesis.

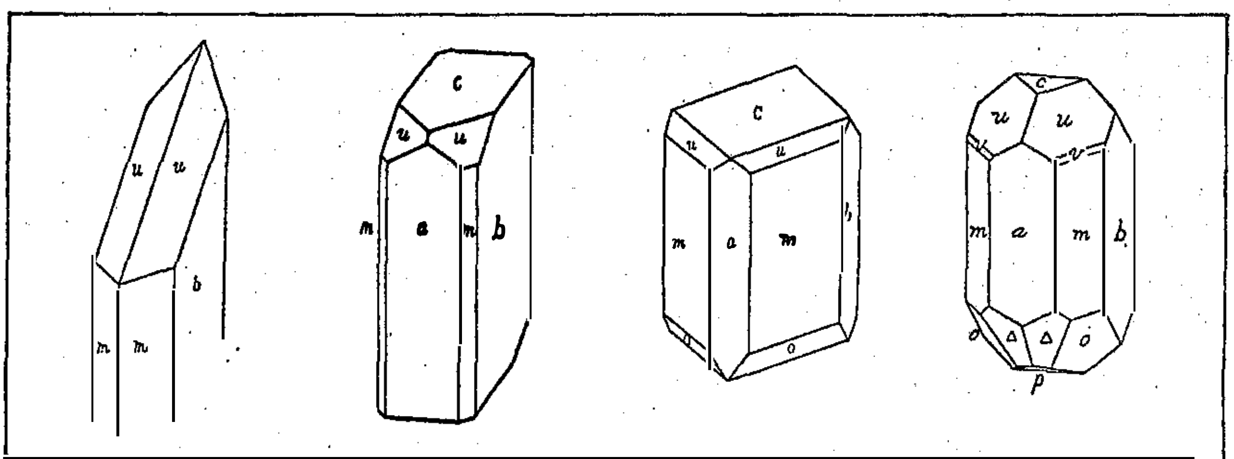

Figure 1. Diopside Crystals - Dekalb, N.Y. (after Ries, 1897)

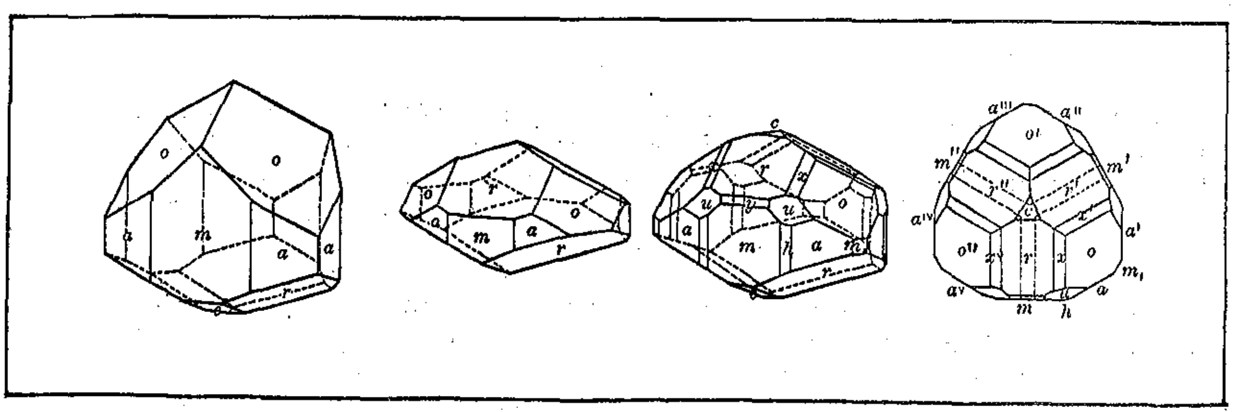

Figure 2. Uvite Crystals - Pierrepont, N.Y. (after Dana, 1877)

Road Log

Total Mileage	Mileage From Last Stop	
0.0	0.0	From Satterlee Hall, SUNY Potsdam, proceed south on N.Y. 56, through Hannawa Falls, to Brown's Bridge Road.
6.3	6.3	Turn right on Brown's Bridge Road and go to the four corners in Pierrepont.
9.7	3.4	Turn right in Pierrepont on N.Y. 68 and continue to Powers Road.
10.5	0.8	Turn right on Powers Road and proceed to the first farm on the left.
10.7	0.2	Stop at the Powers Farm to secure permission to enter the property. A small collecting fee is usually charged. Continue to the end of Powers Road.
11.0	0.3	At the end of Powers Road turn right, following the gravel road across the bridge.
11.1	0.1	Park after crossing the bridge. Take the trail to the left through the wooded meadow to the collecting site, approximately 250 yards from the bridge.

This famous locality has produced literally thousands of lustrous, doubly terminated crystals of black tourmaline (Figure 2). Although no actual mining has ever been done, many hand dug trenches have been made by mineral collectors over the last hundred years, and excellent specimens continue to be found. Although the tourmaline is often called schorl, due to its dark color, Dunn and Appleman (1977) have shown that it is actually a ferroan uvite.

The origin of the deposit appears complex, and the local geology is well obscured by copious glacial overburden. Well formed crystals of uvite, diopside, quartz, biotite, and other species occur in veins and contacts between a quartz-tourmaline-biotite pegmatite (?) and the Grenville marble. The marble is typically recrystallized into coarse, cleavable masses of calcite within these veins and contacts. Occasionally the calcite weathers away, freeing perfectly formed crystals of the silicate minerals that can be found loose in the soil.

Good specimens of the following minerals can be found: amphibole, apatite, biotite-phlogopite, calcite, diopside, pyrite, quartz, scapolite, titanite and a variety of interesting pseudomorphs, including amphibole after pyroxene (uralite), talc (?) after scapolite, pyroxene and quartz, quartz after pyroxene, and goethite after pyrite and mica (?).

11.7	0.6	Take Powers Road back to N.Y. 68 and turn right, following N.Y. 68 to Canton.
18.8	7.1	At the junction of N.Y. 68 and U.S. 11, turn left on U.S. 11 and continue through Canton.
20.2	1.4	After crossing the bridge in Canton, keep left, following U.S. 11 through Dekalb Junction to the Trout Lake Road (County Highway 33).
31.0	10.8	Turn left on the road to Trout Lake.
32.3	1.3	Continue along the Trout Lake Road to the first road to the right and park. The McLear Mine is immediately to the southeast of this intersection.

The McLear pegmatite was discovered in 1907 by J.H. McLear, on the Kilburn Farm, 3.9 miles southwest of Dekalb Junction (Cushing and Newland, 1925; Shaub, 1929). The ore consisted of pure, white microcline perthite, which was hand cobbed and shipped to Rochester and Trenton for use in the pottery industry. By 1929 the Green Hill Mining Company had developed both open cut and underground workings, and shipped over 120,000 tons of pottery grade feldspar (Shaub, 1929). By 1938 mining ceased (Tan, 1966).

The main pegmatite is a lens shaped body 850x115x60 feet with a spacial orientation generally paralleling the regional NE-SW structural trend of the enclosing Grenville metasediments. Radiometric age determination from uraninite indicates the pegmatite was emplaced in the middle Precambrian at 1094 m.y. (Shaub, 1940). The mineralogy of the pegmatite is unique, and suggests a complex origin by successive replacement of the host crystalline limestone by magmatic solutions probably emanating from nearby granites (Shaub, 1929). Based on mineralogic and textural zonation the apparent paragenetic sequence is diopside → tremolite → quartz → feldspar + quartz, giving rise to a gradational contact between the pegmatite and wall rock. Later hydrothermal alteration caused slight sericitization of the feldspars and serpentinization of the diopside and tremolite.

Minerals that may be collected relatively easily include: diopside, microcline, mica, quartz, titanite and tremolite. Allanite, apatite, calcite, chlorite, goethite, hematite, kaolinite, magnetite, molybdenite, pyrite, pyrrhotite, rutile, serpentine, talc, thorite, thucholite, tourmaline, uraninite, and zircon occur more sparingly.

33.3 1.0 From the McLear Mine proceed south (right) on the road to Bigelow for 1 mile and park. The locality for gem diopside is on the ridge across the field, east (left) of the road. This locality is on private land, and is <u>NOT</u> regularly open for collecting!

This locality has produced some of the finest crystals of gem diopside known. Early specimen labels may give the locality as the Mitchell Farm, as Calvin Mitchell was probably the first person to find and distribute specimens in the 1880's. By 1889 the famous mineral dealer George L. English acquired the mining rights, and by 1892 George F. Kunz had described crystals over 3 inches long that would yield gems up to 30 carats. For unknown reasons the deposit was not worked again until 1967 (Szenics, 1968), and intermittently thereafter (Robinson, 1973).

The mine is situated in a northeasterly trending ridge of diopside-tremolite-quartz schist, approximately 4 miles northeast of the Village of Richville. The relative proportions of diopside, quartz and tremolite vary considerably, and the quartz locally forms tightly folded bands. The gem pockets tend to form within the diopside rich layers and along tremolite veins which follow joints perpendicular to the strike. The pockets are often filled with a compact gray talc and acicular tremolite. The apparent paragenetic sequence is diopside $\rightarrow$ tremolite $\rightarrow$ talc + quartz $\pm$ calcite. Other species that occur less commonly are pyrite, plagioclase, and datolite (reported but unconfirmed). The diopside invariably occurs as euhedral prismatic crystals with well developed forms {100}, {110}, {001}, {101}, and several {0kl} and {hkl} prisms (Figure 1).

36.0 2.7 Continue south to the four corners in Bigelow, and turn right on the road to Richville.

37.7 1.7 In Richville, turn left on old U.S. 11, following it through the village to its intersection with U.S. 11.

38.4 0.7 Turn left (south) on U.S. 11 and continue to Gouverneur.

44.7 6.3 In Gouverneur, turn right on N.Y. 58 (Clinton St.) just before crossing the bridge.

44.9 0.2 Keep to the left, continuing west on N.Y. 58 to Brasie Corners.

54.7 9.8 At the general store in Brasie Corners, turn left on County Highway 2, to Rossie.

59.0	4.3	Just after crossing the bridge in Rossie, turn left on County Highway 30, toward Oxbow.
60.6	1.6	Turn right on Mine Road.
61.1	0.5	Proceed straight ahead (right), following the old road to the mine.
61.7	0.6	Park in the field to the right at the Coal Hill Vein.

Mining first commenced at the Coal Hill Vein in the winter of 1836, and continued throughout the Civil War. The vein was excavated over a length of 600 feet and to a depth of 200 feet. By 1868 operations ceased, after producing over 1625 tons of lead (Cushing and Newland, 1925). During this period many fine, large crystals of galena and calcite were recovered, and soon became the object of much discussion (Beck, 1842; Emmons, 1842; Dana 1877). Fortunately a number of excellent specimens found their way into prominent collections and may still be seen today at the American Museum of Natural History, Harvard University, Hamilton College, and the New York State Museum. The complexity of forms on some of the calcite, pyrite, and fluorite crystals is nearly unrivalled (Figures 3-5).

The vein consists primarily of calcite with disseminated galena, and occupies a nearly vertical, east-west fault in the enclosing Precambrian granite. Inclusions of partially altered wall rock form a brecciated zone near the contact. By comparison to nearby veins and similar deposits in Ontario, emplacement is thought to be post-Ordovician (Beck, 1842; Smyth 1903; Wilson, 1924). Whether the mineralizing solutions originated from below as relatively cool, chemically inactive fluids, descended from above through meteoric concentration from the overlying Paleozoic rocks, or were perhaps derived from both meteoric and magmatic waters remains an unanswered dilemma (Smyth, 1903; Buddington, 1934; Wilson, 1924; Uglow, 1916). Recent SEM studies have unveiled the presence of an unusual assemblage of anatase, albite, synchysite, and cerian epidote occurring in micro cavities and fissures in both the vein material and altered wall rock. Hopefully, a continuing investigation will help clarify the origin and paragenesis of these veins (Robinson and Chamberlain, in prep.).

Nearly all the following species may still be collected from the dumps, but not in the quality that was produced when the mine was operating: albite, anatase, anglesite (?), calcite, celestine, cerussite, chalcopyrite, fluorite, galena, microcline, quartz, sphalerite, stilbite (?), and synchysite.

62.8	1.1	Return to the Rossie-Oxbow Road (County Highway 30) and turn right toward Oxbow.
66.9	4.1	At the intersection with County Highway 113, bear to the right (straight) and continue through Oxbow.
68.6	1.7	Just after passing through Oxbow, turn right on the road to Antwerp.
71.4	2.8	Proceed straight ahead.
74.5	3.1	Turn left (north) on U.S. 11.
76.1	1.6	Stop at the Villeneuve Farm on the right side of U.S. 11 to obtain permission to enter the Sterling Mine property.
76.7	0.6	Continue north on U.S. 11 to the Sterling Rock Shop and mine road entrance on the right. Park here and walk down the old mine lane approximately 350 yards to the mine.

The Sterling Mine was the first U.S. locality for millerite, and is often regarded as having produced some of the world's best specimens of that species. The mine lies near the middle of a group of hematite deposits known as the Antwerp-Keene belt (Buddington, 1934). Mining first began in 1836 and continued until 1910, creating an open pit 500 feet long, 175 feet wide and 115 feet deep, that produced hundreds of thousands of tons of ore (Smock, 1889).

The geology of this deposit is complex, and a detailed mineralogical study is currently in progress (Robinson and Chamberlain, in press). The mine is situated along a marble-gneiss contact, and the ore is intimately associated with a heavily slickensided quartz-chlorite rock which is thought to have formed by the replacement of the gneiss by corrosive, iron-rich solutions derived from the decomposition of underlying pyritic schist (Smyth, 1894; Buddington, 1934; Prucha, 1957). Both the chloritic rock and marble appear to have been replaced by hematite resulting in a gossan-like structure which was then preserved by a capping of Potsdam sandstone. Open spaces were filled with hematite and quartz, and possibly other species not preserved. Subsequent recrystallization of the quartz and hematite at relatively low pressure and temperature is suggested by the presence of Fe-talc and stilpnomelane, and is supported by fluid inclusion studies (Robinson and Chamberlain, in press). Further changes in the composition, eH and probably pH of the mineralizing solutions are evident from the presence of magnetite pseudomorphs after hematite, both Fe(II) and Fe(III) rich stilpnomelanes, Fe-talc and various sulfide and carbonate phases.

Minerals that can readily be collected are hematite, magnetite pseudomorphs after hematite, quartz, stilpnomelane ("chalcodite"), Fe-talc, siderite, goethite, calcite, ferroan dolomite, and more rarely millerite and jamborite (?), all of which occur as well formed crystals in vugs in the crystalline hematite-quartz ore. Early reports of cacoxenite and ankerite can not be confirmed, and likely resulted from the misidentification of stilpnomelane and siderite (Robinson and Chamberlain, in press).

END OF TRIP

Return to Potsdam is best made by following U.S. 11 north, approximately 44 miles.

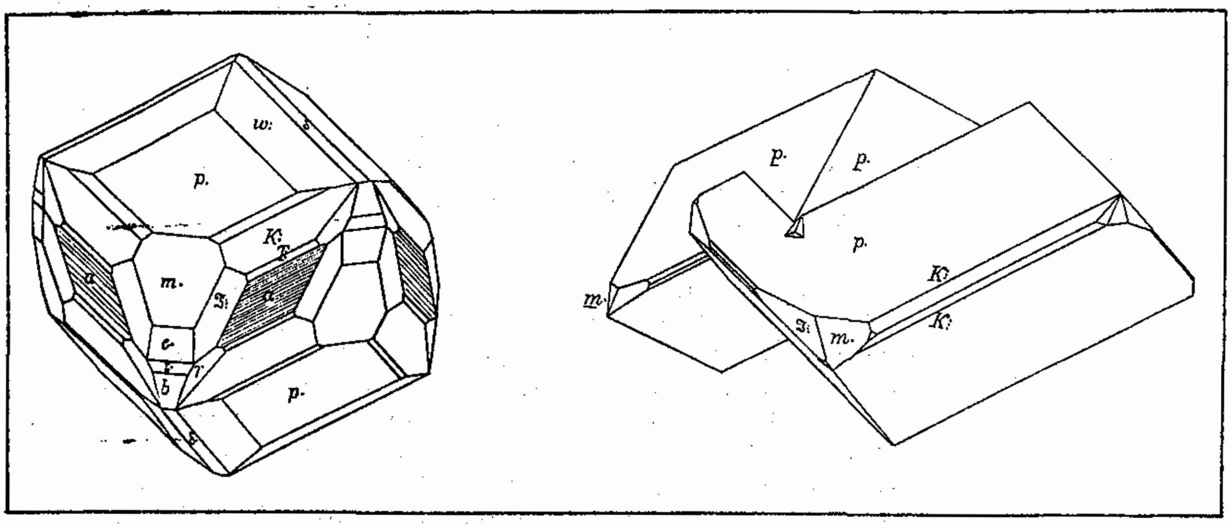

Figure 3. Calcite Crystals - Rossie, N.Y. (after Whitlock, 1910b)

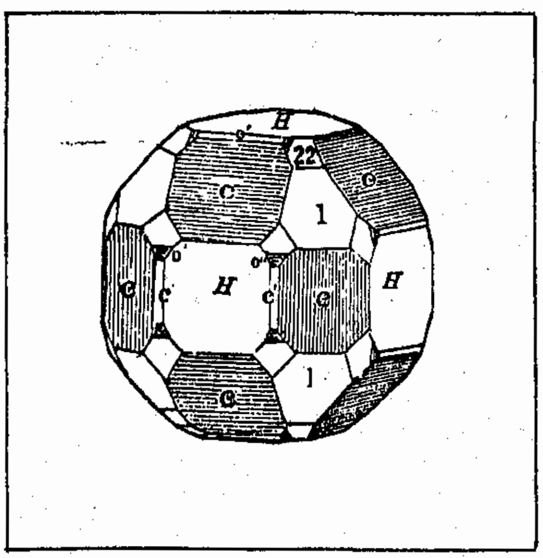

Figure 4. Pyrite - Rossie, N.Y. (after Dana, 1877)

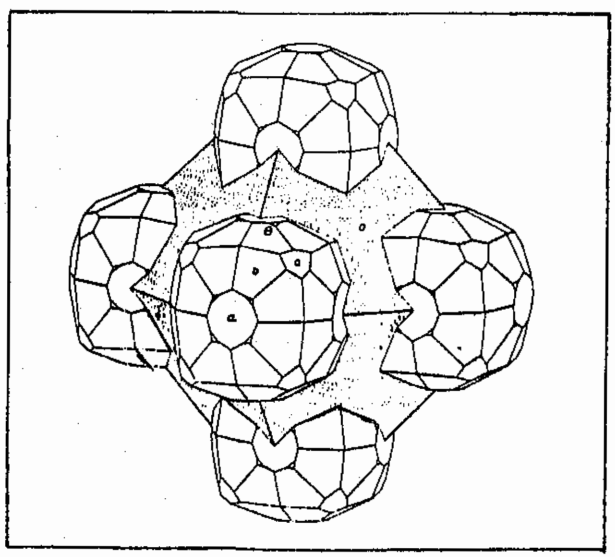

Figure 5. Fluorite - Rossie, N.Y. (after Whitlock, 1910a)

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