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Selected Mineral Collecting Sites in Northeastern Rhode Island

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by

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Introduction

The township of Cumberland at the northeast corner of Rhode Island is not so famous mineralogically as Cumberland in England; however there is enough of interest in this town and in Lincoln - the adjacent town to the south - to warrant a field trip. Four sites, all of which can be visited in the same day, are pinpointed herein. Some aspects of the geology of the area, plus minerals and rocks - including both the State Mineral and State Rock of Rhode Island - which can be found, are mentioned.

Much of this area matches the Pawtucket Quadrangle, for which a good geological map (Quinn et al., 1948) is also available. For the whole state, there is a more up-to-date map which can be obtained (Quinn, 1971).

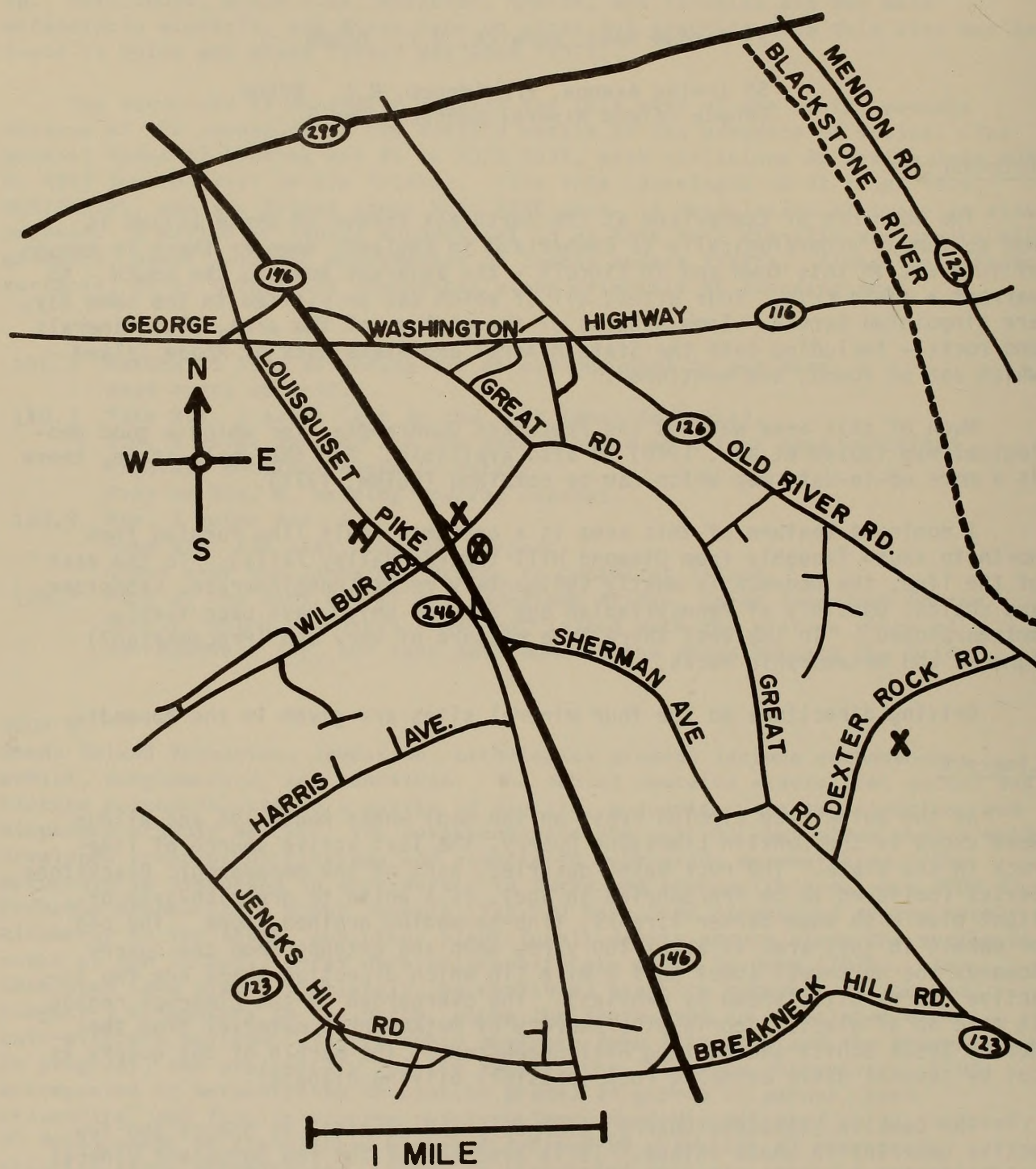
A dominant feature of this area is a presumed fault line running from north to south (roughly from Diamond Hill towards Valley Falls). To the east of the line, the bedrock is mostly sedimentary rocks (conglomerate, sandstone and shales) possibly of Pennsylvanian age some of which have been feebly metamorphosed . To the west there is a mixture of very old (Precambrian?) igneous and metamorphic rocks.

Driving directions to the four mineral sites are given in the Appendix.

Limerock

At the point (see circled cross on the map) where Route 146 and Wilbur Road cross is the Conklin Limestone Quarry, the last active source of limerock in the state. The rock being quarried, part of the metamorphic Blackstone Series (believed to be Precambrian in age), is a white to greenish-gray or light blue with some darker streaks, fine-to-medium grained stone. The bed of marble in this area is about 100 yards deep and extends from the quarry towards the northwest about half a mile (in which direction there are two inactive quarry sites shown by crosses). The overburden in the Limerock region is made up of glacial debris plus bedrock of metamorphic material from the Mussey Brook Schist and Hunting Hill Greenstone. The marble of the quarry is cut by several dikes of mafic rock (possibly olivine diabase).

The Conklin Linestone Quarry, (formerly the Harris), is one of the few active quarries in Rhode Island. It is also one of the few permanent mineral collecting areas in the state. Ed Conklin, the owner, does allow mineral hunters to collect here. The limerock is recrystallized limestone, technically marble because the area has been metamorphosed. It is dolomitic, having about 40% magnesium so the formula is near $CaMg\ (CO_3)_2$. Also there is minor amount (a few percent) of silica.


295
146
GEORGE
WASHINGTON
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116
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MENDON RD
BLACKSTONE
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PIKE
GREAT
RD.
126
OLD RIVER RD.
WILBUR RD.
246
SHERMAN AVE
GREAT
RD.
DEXTER ROCK RD.
HARRIS
AVE.
JENCKS HILL RD
123
146
BREAKNECK HILL RD.
123
1 MILE

Being a working quarry, one must go there a number of times in order to acquire a suite of minerals that are fully representative of the geologic environment; there is a regular turnover as the rock is continually being mined and taken away. There are about 40 species of minerals that have been collected from the Conklin Quarry or about 50 minerals including varieties. This is indeed a favorite area of mineral hunters with specimens being found in overburden, rock piles, and the quarry pit.

The most notable mineral obtainable here is Bowenite, the State Mineral of Rhode Island. Bowenite is a gemmy translucent variety of massive serpentine, possibly the antigorite polytype, of formula $(Mg, Fe)_3Si_2O_5(OH)_4$. The predominant color is an apple or yellow-green hue. It also exists in brown, pink or blue colors, and occasional colorless. It is usually admixed with the limerock and can have talc flakes or magnesite present. A vein of Bowenite exitsts in the north-central area of the quarry, and as deeper excavating is accomplished, more Bowenite becomes available. It has a very fine structure and will take a good polish. Thus it can be worked into a beautiful gem.

Table I is a list of minerals that have been collected at the Conklin Quarry, along with their formulae. Only the more prevalent or important minerals will be further expounded upon.

Several crystal forms of calcite have been found at Conklin, including rhombohedral, scalenohedral and nail head forms. Nail head crystals occur as overgrowths on top of scalenonhedral forms, which in turn appear as dog tooth crystals and thin wafer-line forms. The rhombohedrons are smallish, squatty crystals. The calcite crystals are generally colorless or grayish.

In the past calcite crystals have been collected from the southern part of the quarry. Other types of calcite specimens are crystals enclosing dendrites and crystals with quartz crystal growth on top. An exciting find was drusy quartz crystals over massive fluorescent calcite.

Many of the calcite crystals fluoresce a beautiful rose color. The limerock (colorless and white, bluish, brown or green) shows a yellow to blue fluorescence. However, this fluorescence gradually lessen with time and exposure.

Next to calcite, iron minerals are the most common occurance here. Black or reddish-brown goethite is found as botryoidal masses plus films and sometimes exhibits beautiful iridescent colors. Goethite has been collected on the top level to the east. Limonite geodes which contain sparkling druzy quartz crystals coating black or brown goethite have been obtained on the top level at the west side of the pit. Limonite matrices with colorless quartz crystals "coating" red-brown or black goethite forming little "trees" make for beautiful specimens, especially under the microscope. Other attractive micromounts are white-coated calcite crystals on drusy quartz which cover black goethite; this makes for a beautiful contrast under the microscope.

Hematite has been found in specular form as well as encrusting forms. The most unusual iron mineral collected here in the past is reddish-brown to silvery flake-like lepidocrocite exhibiting a pretty picture under the microscope.

Several varieties of quartz in combination with calcite or goethite have been mentioned. Quartz as rock crystal is fairly common. The writer (RLC) does have a citrine specimen from the Conklin Quarry. Some of the quartz crystals are stained brownish-yellow and also light blue chalcedony on chert is an exciting find at Conklin. Probably the predominant variety of quartz at

Table I

Minerals Found at Conklin Limestone Quarry

Mineral	Formula and/or Description	Mineral	Formula and/or Description
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)$	Epidote	$Cu_2(Al,Fe)_3Si_3O_{12}(OH)$
Adularia	$KAlSi_3O_8$-(orthoclase)	Essonite	$Ca(Al_2Si_6O_{10})\cdot 5H_2O$-(garnet)
Almandine	$Fe_3Al_2(SiO_4)_3$-(garnet)	Fosterite	Mg_2SiO_2
Anatase	TiO_2	Galena	PbS
Albite	$Na(Al,Si)(ALSi_2O_8)$	Goethite	FeO(OH)
Antigonite	$(Mg,Fe)_3Si_2O_5(OH)$-(serpentine)	Graphite	C
Aragonite	$CaCO_3$	Hematite	Fe_2O_3
Asbestos	$Mg_6(Si_4O_{10})(OH)_8$-(Chrysotile)	Hornblende	$Na,Ca_2(Mg,Fe,Al)_5(OH)_2(Si,Al)_8O_{22}$
Bornite	Cu_5FeS_4	Hydromagnesite	$Mg_5(CO_3)_4(OH)_2\cdot 4H_2O$
Bowenite	"Gem" Serpentine	Ilmenite	$FeTiO_3$
Calcite	$CaCO_3$	Kaolinite	$Al_2Si_2O_5(OH)_4$-(clay)
Chlorite	$(Mg,Al,Fe)_{12}(Si,Al)_8O_{20}(OH)_{16}$	Lepidochrocite	FeO(OH)
Chryscolla	$Cu_2H_2Si_2O_5(OH)_4$	Limonite	$FeO(OH)\cdot nH_2O$
Chert	SiO_2-(Quartz)	Magnesite	$MgCO_3$
Citrine	SiO_2-(Quartz)	Magnetite	$FeO\cdot Fe_2O_3$
Dendrites	MnO_2-(pyrolusite)	Malachite	$Cu_2(CO_3)(OH)_2$
Dolomite	$CaMg(CO_3)_2$	Microcline	$KAlSi_3O_8$-(feldspar)

Mineral	Formula and/or Description	Mineral	Formula and/or Description
Molybdenite	MoS_2	Siderite	$FeCO_3$
Montmorillonite	$(Al,Mg)_8(Si_4O_{10})_3(OH)_{12}\cdot 12\ H_2O$-(clay)	Talc	$Mg_3Si_4O_{10}(OH)_2$
		Tourmaline	$WX_3Y_6(BO_3)_3Si_6O_{18}(OH,F)_4$
Muscovite	$KAl_2(Al,Si_3)O_{10}(OH)_2$-(mica)	Tremolite	$Ca_2Mg_5Si_8O_{22}(OH)_{12}$
Pyrite	FeS_2	Wad	$MnO_2\cdot nH_2O$
Pyrolusite	MnO_2	Zoisite	$Ca_2Al_3(SiO_4)_3OH$
Quartz	SiO_2 (crystals)	Marble	$CaCO_3$-(a rock)
Quartz	Chalcedony	Limestone	$CaCO_3$-(a rock)
Quartz	Hyalite Opal		
Rhodochrosite	$MnCO_3$		
Rhodonite	$(Mn,Fe,Mg)SiO_3$		
Rutile	TiO_2		
Scheelite	$CaWO_4$		
Scolecite	$Ca(Al_2Si_3)O_{10}\cdot 3H_2O$		

the quarry is chert, usually of brown color and occasionally of polishable grade.

There are several other minerals of interest. In the contact zone of limerock and the greenstone, schorl, the black variety of tourmaline, has been found; schorl is also associated in small pegmatite veins with mica and quartz. Typical adularia crystals occur with quartz and sometimes with malachite also. Specimens of limerock with lovely pink montmorillionite coating have been collected.

In conclusion while the minerals collected at Conklin Quarry are not spectacular, except for some specimens when viewed under the microscope, they certainly are of "beauty" and interest to the geologist and the serious mineral collector. The minerals that attract the most attention are bowenite, goethite in various forms, chalcedony, chert and crystals of calcite. The lepidocrocite specimens stand out as interesting and unusually beautiful forms of an iron mineral.

Old Dexter Quarry Kiln

About 0.3 mile SE from Conklin on Wilbur Road to Great Road, go right 1.6 miles on Great Road to Dexter Rock Road, go left 0.8 mile on Dexter. Near the first house on the right are the remains of an old kiln. The quarry (shown as a cross on the map) is filled and now used as a dump. Beautiful rhombohedral calcite crystals of yellowish cast have been collected here. The yellow color is caused by limonite precipitation on the calcite. Sericite mica and also very small prismatic needles of scolecite (a zeolite) have been taken (dried out) on the kiln sides. Unusual quartz crystals also were obtained before the quarry was filled.

Diamond Hill

Well to the north of the quarry and just to the east of Route 114 is a considerable mound (1000 feet wide and mile long) of vein quartz. The west bluff of this mount (known as Diamond Hill presumably because of the quartz crystals) which is south of the ski trail area shows particularly clearly from a distance.

Quinn et al. (1949) have suggested that this quartz probably was deposited by hot waters moving along a fault between the Pennsylvanian rocks to the east and the older rocks on the west. The quartz is more resistant to erosion than the surrounding rock and this is the presumed reason that Diamond Hill stands out above the nearby terrain.

The rock is primarily milky quartz with numerous vugs (some having fair crystals); also present are agate and jasper (a little of which is polishing quality) plus iron oxides (hematite, goethite and limonite - at one time abundant enough to be mined).

Route 114 Roadcut

About 200 yards west of the juntion of state routes 121 and 114 on the north side of the latter road is a large roadcut having an unusual

array of minerals. The bedrock is primarily Quincy Granite, a gray medium-grained massive rock. Cutting the granite are many veins of quartz and of blackish rock with metallic sheen. Also there is some granite gneiss with considerable hornblende.

This site is where crystals of the rare mineral danalite (or one of its isostructual relatives) have been found, even as recently as early 1981. The prettiest specimens are light pink tetrahedra. Other minerals obtained from this cut include ankerite, fluorite, sphalerite, apatite and pennenite among others. The Quincy Granite has finely-divided riebeckite and aegirite besides quartz, microperthite and biotite; chemical analysis indicates that this rock fits the modern classification scheme as an Alkaline Feldspar Granite.

Iron Mine Hill

Close to the southwest corner of West Wrentham Road and Elder Ballou Meeting House Road can be found the remnants of a once-active quarry of cumberlandite. This peculiar igneous rock has been disignated the state rock of Rhode Island.

Cumberlandite is very dense and weakly magnetic. While most often black, exposed surfaces tend to be brownish. It is principally made up of magnetite and ilmenite in an intimate fine-to-medium-grained mixture, along with some olivine, labradorite and spinel. The feldspar stands out as white to greenish crystals up to half an inch long. On well weathered specimens, this component weathers relatively rapidly and leaves a surface with pits of characteristic shape.

Cumberlandite, because of its unusual nature and single source, presents the possibility of tracing the path(s) of the glaciers that passed over Rhode Island. Remnant cumberlandite stones have been found in an area which roughly follows Narragansett Bay fanning out as the boulder train proceeded southward. One of us (JOE) has found cumberlandite stones in Providence, East Providence, Block Island and Little Compton; a sufficient number were found in the moraines at Little Compton to indicate that Quinn's (1976) portrayl of the "boulder train" does not reach far enough to the east side of Narragansett Bay. Specimens in the Roger Williams Park Museum collection include some from Cranston, Prudence Island, Johnston, Warwick Neck, Pawtucket and Bristol. Quinn (1976) reports that some of this rock has been found on Martha's Vineyard. As would be expected, these well-traveled pieces of cumberlandite are usually found in morainal locations. Black magnetic sand, in all probability from glacier grinding of cumberlandite, has been collected on beaches at Warren and Block Island.

Other nearby sites

A large number of minerals have been found in the townships of Cumberland and Lincoln. Miller (1971) lists 140 and 84 reported minerals and varieties respectively from these two towns. Some of the more unusual finds include astrophyllite, sagenetic quartz, molybdenite and cecilite (an ore of uranium, thorium, rare earths and noble metals).

Directions to some of the locations can be obtained from the authors. Additional references that might prove useful to the mineral collector are listed in the reference section.

REFERENCES

Baho, J.B., 1906, A trip to Cumberland, R.I., V.13, p.33-36.

Chester, A.H. and Cairns, R.I., 1887, Crocidolite from Cumberland, R.I.: Amer. Jour. Sci., V.34, p.108-116.

Johnson, B.L., 1908, Contributions to the geology of R.I.: Notes on the history and geology of Iron Mine Hill, Cumberland: Amer. Jour. Sci., V.25, p.1-12.

Miller, C.E., 1971, Rhode Island minerals and their locations (ed., O.D. Hermes), Univ. Rhode Island publication, 83p.

_____, 1972, Minerals of Rhode Island (ed., O.D. Hermes), Univ. Rhode Island publication, 83p.

Quinn, A.W., 1971, Bedrock geology of Rhode Island: U.S. Geological Survey Bull. 1295, 68p.

_____, Ray, R.G., and Seymour, 1949, Bedrock geology of the Pawtucket quadrangle, Rhode Island-Massachusetts: U.S. Geological Survey Geol. Quad. Map GQ-1.

_____, Chute, N.E., and Allen, W.B., 1948, The geology and ground water resources of the Pawtucket quadrangle, R.I.: R.I. Indus. Commis. Geol. Bull., V.3, 85p.

Warren, C.H., 1908 Contributions to the geology of R.I.: Petrography and mineralogy of Iron Mine Hill, Cumberland: Amer. Jour. Sci., V.25, p.12-38.

_____, and Powers, S., 1914, Geology of the Diamond Hill-Cumberland District in R.I.-Massachusetts: Geol. Soc. Amer. Bull., V.25, p.435-476.

Winslow, W.S., Jr. 1942, in R.I.: Rocks and Minerals, V.17, p.51.

_____, 1945, Notes on some mineral localities in R.I.: Rocks and Minerals, V.20, p.463-466.

APPENDIX

Directions to Mineral Sites

An excellent free road map of Rhode Island may be obtained from the Department of Ecomonics Department, 7 Jackson Walkway, Providence, R.I. 02903.

I. To the Conklin Quarry (at Limerock, Rhode Island)

A. From the south, go north on Route 146 to the Sherman Avenue Exit. Follow Sherman, Great Road and then Wilbur Road (keeping to the left at intersections) until almost back to 146. The quarry will be on your left.

B. From the north, depart from Route 146 south at exit labeled Route 246. Double back over this parallel road about 200 yards, cross over Rt. 146, and the quarry will be directly on your right.

II. To Diamond Hill

A. From Conklin Quarry take Route 146 north to Interstate 295 (3 km). Go east on 295 to R.I. 114 (6 km), and proceed north on 114 about 5 km. There are places to pull cars off the road near the very visible west face of Diamond Hill. This is about 0.5 km south of the main parking lot of the State Park.

B. Unless you are familiar with the area, the more satisfactory way to go to Diamond Hill is by way of Interstate 295 and R.I. 114.

III. To the Route 114 Roadcut

Proceed on 114 north from the west face of Diamond Hill (about 1 km) to the junction of routes 121 and 114. Turn left with 114 (which here goes west) and travel about 200 miles to the large road cut on the north side of the road. Cars can be pulled over to the shoulder of the road.

IV. To Iron Mine Hill

A. From the route 114 raoadcut, proceed west about 2 km to West Wrentham Road. Turn south on this road and proceed less than 1 km to Elder Ballou Meeting House Road. About 100 meters on the left of this road, there is room for a couple of cars to pull off. The old quarry is about 100 100 miles to the south.

B. The quarry can also be reached from the south. State Route 122 (Mendon Road) connects (in the village of Cumberland Hill) with the south terminus of West Wrentham Road.