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Mineralogy of Pegmatites

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TRIP E MINERALOGY OF PEGMATITES OF THE NEWRY HILL AREA, NEWRY, MAINE

Leader: D. R. Peacor

Meet at 8:15 A.M., Sunday, October 9, at the base of Plumbago Mountain, on Route 5. The meeting place is easily recognized through the Abbott farmhouse on the east side of the road, and the ore hopper and pasture on the west side. The one mile long dirt road up to the mines was passable by car on July 16. If it has been washed out by October we will arrange for jeeps to ferry those few who are unable to walk to the top of the hill.

INTRODUCTION

There are five major quarries in the area (Fig. 1) and many smaller prospect pits. The mineral suites from three of these quarries are different and a unique opportunity to study a wide range of pegmatite minerals is available. These quarries, particularly the Dunton and Nevel quarries, have produced a variety of quality mineral specimens. Persistent mineral collectors have extensively picked over the dumps, but this still remains the finest pegmatite mineral locality in New England.

Mining History

The Dunton pegmatite was first quarried in 1903 and 1904 when it was worked for gem tourmaline, but little gem quality material was found, since the tourmaline was embedded in cleavelandite and had to be blasted loose. (2). The General Electric Company quarried the Dunton, Crooker and Kinglet pegmatites for pollucite from 1926 to 1929 (6), and the dumps of the Dunton Quarry were reworked in 1935 for amblygonite, spodumene and plagioclase. (5). The Nevel Quarry was opened in 1940 and was worked sporadically for feldspar and accessory minerals until 1949 Harvard University and the Whitehall Company unsuccessfully attempted to work the Dunton Quarry for feldspar and gem tourmaline (6). In the mid-fifties the Nevel Quarry was again mined for spodumene and feldspar while the Scotty Mine was prospected and quarried for beryl. None of the quarries is in operation at the present time.

The quarries will be visited in the following order: Nevel; Dunton; Crooker; Scotty; Kinglet. The Crooker and Kinglet Quarries may be by-passed if time is short, since the mineralogy of each is very similar to that of the Dunton Quarry.

General Mineralogy

The Dunton, Crooker and Kinglet pegmatites are similar in that they contain relatively large amounts of albite, especially the variety cleavelandite is associated with the typical accessories such as amblygonite and lepidolite. The Nevel pegmatite contains perthite as the chief feldspar and cleavelandite is less abundant than in the above three pegmatites. The most

Trip E Road Log

recent quarrying was carried out in a quartz-cleavelandite-spodumene zone, the debris of which covers up old dump material, thus giving the appearance that this zone is unduly important. Lepidolite is rare in the Nevel Quarry, and lithia tourmaline has not been found. The mineral suite of the Scotty pegmatite is entirely different than those of the other pegmatites. Cleavelandite is not present, and perthite is the major feldspar, although some albite is found. The lithia minerals characteristic of the other pegmatites are lacking, but this pegmatite is the only commercial beryl prospect in the area, the other pegmatites being worked for feldspar and accessory pollucite, amblygonite, spodumene and gem tourmaline.

Nevel Quarry

This quarry, the largest of the group, is unfortunately filled with water, and only a short entranceway is accessible. The dumps are extensive and relatively fresh however. Dump material from the mining operations of the mid-forties has been used as road fill. This is actually one of the better exposures of rock removed at this time as more recent dumpings cover waste near the mine.

Shainen recognizes four intermediate zones in addition to the border, wall, core and core margin zones. (6). The relatively fine-grained wall zone entirely surrounds the quarry. Tourmaline (variety schorlite) occurs sparsely only in this zone with minor garnet, and in the thin border zone. Actinolite-chlorite schist originated through pegmatite and granite contact metamorphism of gabbro (6) and is exposed above the quarry. Some segregated actinolite may be seen in the border zone, and schorlite crystals are abundant in the schist, particularly near the contact.

The quartz-albite-perthite-triphyllite pegmatite (intermediate zone) is exposed on the right side of the quarry entranceway. The triphylite is partially altered to heterosite (purple when fresh or powdered) and blue vivianite. Fragments of this zone are abundant in the road fill leading to the quarry.

The most recent dump material is easily recognized by the fresh white appearance. Spodumene crystals six to eight inches in diameter and three or four feet long are not unusual, and are usually embedded in a quartz-cleavelandite matrix. White anhedral beryl partially replaced by cleavelandite, red-black sphalerite and blue-green manganapatite occur in masses up to six or eight inches in diameter associated with the spodumene. A tapiacite crystal over an inch in diameter was found embedded in sphalerite associated with spodumene, muscovite and quartz. Small columbite and cassiterite grains embedded in quartz are abundant. Lepidolite occurs sparingly as small plates in massive quartz, and aggregates of amber prisms of eosphorite three or four mm. long line cavities in cleavelandite.

Some fragments from the triphylite zone exposed in the entranceway are scattered over central part of the dump. Triphylite is abundant, occasionally as unusual euhedral crystals embedded in quartz. Shainen estimates that this zone contains 43% quartz, 22% triphylite, 18% albite, 15% muscovite, 2.02% beryl, and minor black tourmaline and columbite. Fairfieldite (white sheafs of crystals four or five mm. long in cavities after triphylite, with prismatic blue vivianite crystals), heterosite and vivianite are alterations

of the triphylite. Some manganapatite is also present. The fairfieldite and vivianite crystals are hydrothermal triphylite alterations while the heterosite and earthy vivianite are weathering products.

The following minerals were found during quarrying from 1940 to 1949 but were not observed recently on the dumps.

Rose quartz crystals: Up to three quarters inch long in clusters lining cavities in the core margin zone (6).

Uraninite: Small euhedral to subhedral crystals in the core margin and some intermediate zones (6).

Amblygonite: Some of the finest crystals known were found lining cavities in the core margin zone associated with quartz, beryl, triphylite, eosphorite, cassiterite and rhodochrosite (4).

Rhodochrosite: In cavities with amblygonite (4).

Autunite: Yellow-green films of platy crystals near altered uraninite or along open joints.

A small water-filled pit south of the Nevel Quarry is in perthite-quartz--albite pegmatite. The associated dumps contain siderite after deeply altered triphylite, columbite, and spodumene as accessories.

Dunton Quarry

During recent mining and reworking of the dumps, the quarry was almost entirely filled in with old dump material, and now little may be seen of the structure of the pegmatite. A fairly large section of the upper quarry wall is still exposed however. Minor black tourmaline and garnet occur in the border zone (one to three inches thick, 99% albite) and wall zone (eight inches to four feet thick, 60% quartz, 30% albite, 6% muscovite.) Shainen recognized two intermediate zones in addition to the core and core-margin zones (6). Cleavelandite is the major feldspar of all of these zones, and lithia tourmaline in some color variety is found in all zones. Some of the intermediate zone is exposed in the upper quarry wall.

Lilac aggregates of lepidolite plates intergrown with cleavelandite, quartz, spodumene, and green, red and blue tourmaline are common on the dumps. Green tourmaline is commonly enclosed in muscovite books, while watermelon tourmaline crystals up to three inches in diameter are embedded in large perthite crystals. Massive blue tourmaline is intimately associated with triphylite which is often altered to siderite, vivianite and heterosite. The triphylite may be completely altered, leaving a cavity in blue tourmaline, and black manganese oxides may coat all of these minerals.

Herderite occurs as small "gumdrop"-like spheroidal groups in cavities in cleavelandite. Prismatic eosphorite crystals similar to those found in the Nevel Quarry, are also found lining albite cavities.

The following minerals have been found in past years but were not found on recent field trips.

Beryllonite: Palache and Shannon described this mineral as occurring in white crystals embedded in cleavelandite. It alters to fibrous botryoidal herderite, and is often coated with that mineral (1).

Amblygonite: Cameron recorded a mass of pegmatite 25 feet by 15 feet made up predominantly of amblygonite nodules six to eight inches in diameter (5). Amblygonite is usually associated with cleavelandite and lepidolite.

Pollucite: Large masses were associated with lepidolite, spodumene and pink tourmaline, and fractures in it were filled with chalcedony (2).

Microlite: Octahedral brown crystals are embedded in lepidolite or cleavelandite (6).

Cassiterite: Subhedral small crystals are embedded in cleavelandite (6).

Francolite: "Light colored radiating masses" coating crystal cavities (2).

Fraser has reported opal, pyrite, apatite, sphalerite, reddingite and rose quartz crystals (2). Shainen recorded autunite and torbernite (6) while Hess and others have reported "gummite" and uranophane as alterations of uraninite (3). Beryl is only a minor accessory mineral.

Scotty Quarry

This quarry is water free and the pegmatite structure is well exposed. Perthite is the dominant feldspar, but some non-cleavelandite albite is present. Very little of the beryl for which this mine was worked can now be found. Occasional crystals one or two inches in diameter occur in the quarry wall. Large crystals over a foot in diameter were once quarried.

The following minerals were recently observed.

Tourmaline: Layers of aggregates of small black crystals at the contact and in the contact rocks.

Garnet: Crystals up to a quarter inch in diameter are common in the wall zone. The color of some suggests that they are spessartite.

Triphylite: Found sparingly and usually altered to siderite, heterosite or vivianite.

Ludlamite: Aggregates up to an inch in diameter were found with siderite as a hydrothermal triphylite alteration.

Columbite: Tabular crystals up to three inches long.

Anthophyllite: A single one one half inch seam was found in the contact rock.

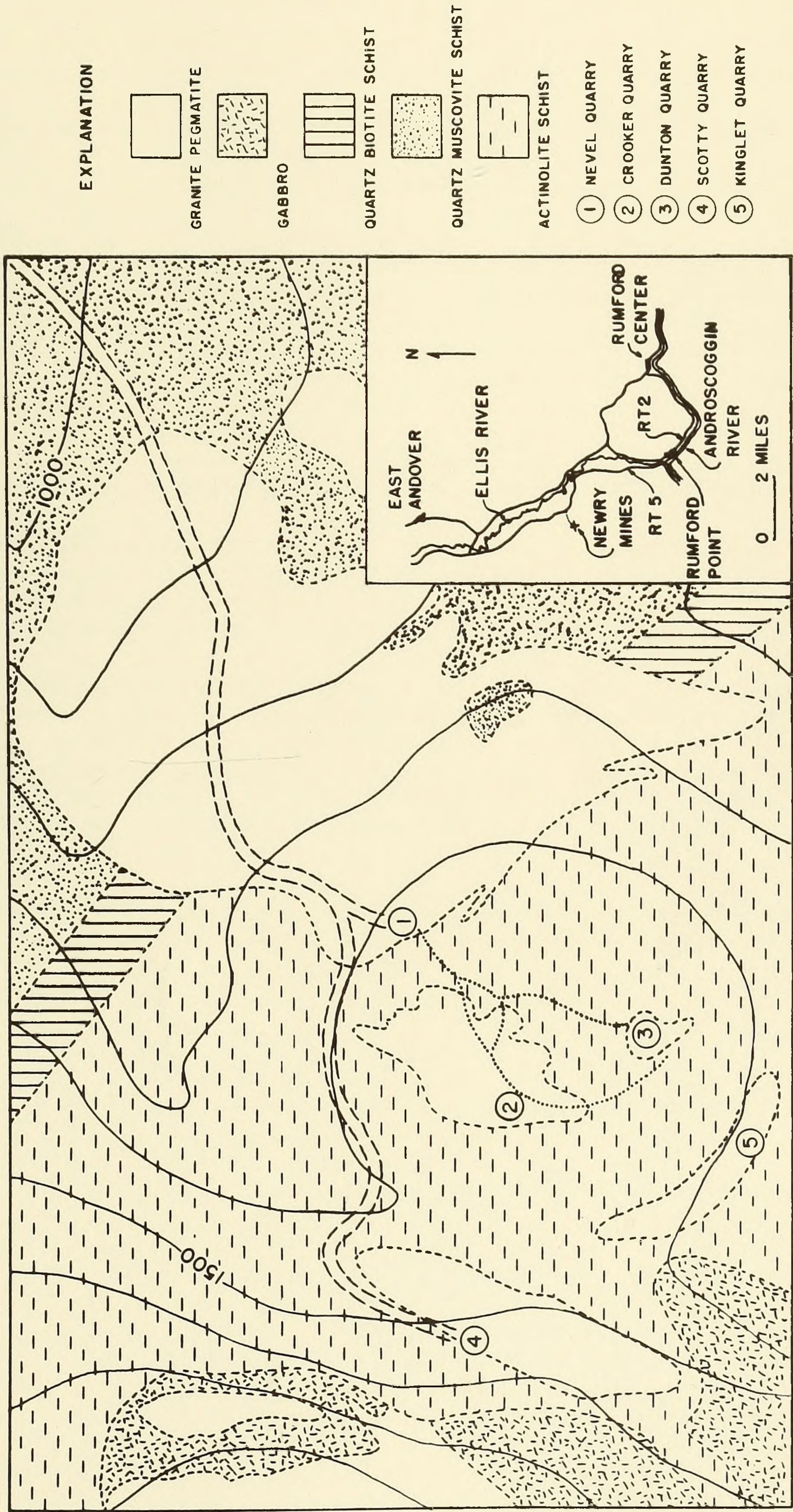


FIG 1. GEOLOGICAL MAP OF THE NEWRY HILL AREA
 AFTER SHAININ AND DELLWIG (MODIFIED)