1-1-1965

# Geology of the Keazar Falls - Newfield Area, Maine

Gilman, Richard A.

TRIP H

## Geology of the Kezar Falls - Newfield Area, Maine

Leader: Richard A. Gilman, Fredonia State College,
Fredonia, New York.

### INTRODUCTION

During the summers of 1962-1964 the writer has carried out field work in the Kezar Falls-Newfield-Buxton areas as part of the mapping program of the Maine Geological Survey. The purpose of this program has been to examine the major stratigraphic and structural relationships in an area previously unmapped. Mapping in adjacent areas has been done by Hussey in southern York County, Quinn in the Wolfeboro, N.H. quadrangle, and by Wilson in the Ossippe Lake, N.H. quadrangle.

The region is underlain by schists and migmatites in the sillimanite zone of regional metamorphism and by granitic bodies of the New Hampshire and White Mountain magma series.

The Rindgemere formation, believed to be correlative with the Littleton formation, has been divided into three major lithic types: (1) pelitic schists and migmatites with the general mineral assemblage of quartz-feldspar-biotite-muscovite-garnet-sillimanite, (2) rusty weathering quartz-feldspar-sulfide schists, and (3) well bedded grey-green calc-silicate granulite. The Berwick formation is exposed in the eastern part of the area and is consistently a grey, granular, quartz-feldspar-biotite granulite (granulite refers to texture only).

Intrusive rocks tentatively assigned to the New Hampshire plutonic series are represented by muscovite-biotite granite and a foliated biotite quartz-monzonite to quartz-diorite. Both of these units are commonly cut by pegmatites. Rocks of this series are abundant and will be seen on this trip. Rocks belonging to the White Mountain plutonic-volcanic series are represented by several isolated stocks in the Kezar Falls and Newfield quadrangles. These are mostly syenites and granites, but volcanics are also present on Burnt Meadow Mountain. These have not been cut by pegmatites. None of these stocks are easily accessible and will not be seen on this trip.

The predominantly northeast trending structures of Southern Maine are replaced by northwest trends in much of the Newfield-Kezar Falls area. The structural pattern is complex and has not as yet been completely studied. The northeast trending folds of the Berwick formation plunge southwesterly below the pelitic schists of the Rindgemere formation. Mapping of the

structure has been based on both schistosity (which in many places can be shown to be parallel to bedding) and bedding, especially in the calc-silicate granulite. As yet no clear regional pattern of folding has evolved, but the structures at individual outcrops suggest the following conclusions concerning the type of deformation.

A) The schistosity, which is probably parallel to bedding in most instances, has been folded.
B) The lack of consistent trends of fold axis suggests multiple folding.
C) The occurrence of folds with nearly horizontal axial planes, the predominance of gentle southwesterly dips, and numerous exposures of overturned beds suggest a fold pattern involving northwest trending folds with axial planes dipping gently to the southwest.

Quadrangle Maps Needed :

Kezar Falls, Sebago Lake, Newfield, Buxton 15' quadrangles.

Assembly Point

Town Hall, Limington, Maine
at junction of State Routes 11 and 117.

Time

9:15 a.m. SHARP, from Town Hall. If you arrive late, follow directions to first stop. Allow 1 hour and 15 minutes driving time from Brunswick to Limington.

Directions to Reach Assembly Point

Take Interstate 95 (U. S. Route 1 part of the way) to the Falmouth entrance of the Turnpike. Leave Maine Turnpike at exit 8 (Portland-Westbrook). Turn left beyond the turnpike booth following signs to juctions with Route 25. Make right turn on Route 25 and follow through Westbrook, Gorham, and Standish to East Limington. At East Limington (59.6 miles from Bowdoin Campus) turn left on Route 11 and proceed to junction with Route 117 in Limington. Town Hall is on the corner at this junction. LEAVE AS MANY CARS HERE AS POSSIBLE. THE TRIP WILL END AT THIS POINT.

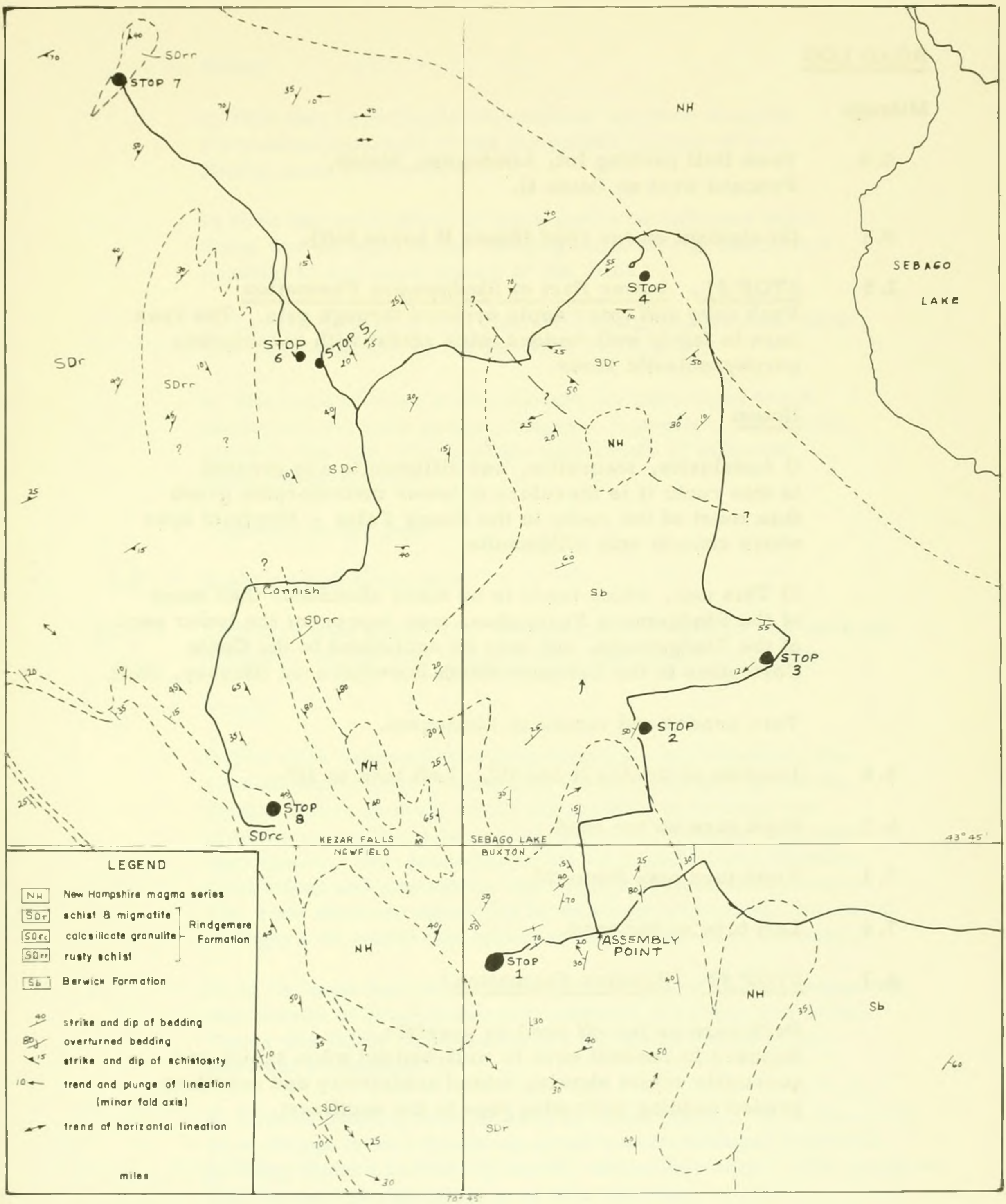


FIGURE I. GEOLOGIC SKETCH MAP OF THE CORNISH AREA.

## ROAD LOG

Mileage

0.0 Town Hall parking lot, Limington, Maine.
Proceed west on Route 11.

0.1 Go straight on tar road (Route 11 bears left).

1.5 STOP #1. Lower Part of Rindgemere Formation
Park cars and enter apple orchard through gate. The rock here is fairly well-bedded mica schist with conspicuous porphyroblastic knots.

Notes:

1) Andalusite, staurolite, and sillimanite are present in this rock; it is therefore of lower metamorphic grade than most of the rocks in the Kezar Falls - Newfield area which contain only sillimanite.

2) This unit, which tends to be more aluminous than most of the Rindgemere Formation, may represent the lower part of the Rindgemere, and may be equivalent to the Gonic Formation in the Lebanon-North Berwick area (Hussey, 1961).

Turn around and return to Limington.

3.6 Junction of Routes 11 and 117. Left turn on 117.

6.3 Right turn on tar road.

7.1 Right turn onto Route 25.

7.4 Left turn on tar road.

8.7 STOP #2. Berwick Formation?

Park cars as far off road as possible.
Exposed in roadcut here is well-bedded mica schist and quartzitic schist showing folded schistosity and excellent graded bedding indicating tops to the southeast.

Notes:

1) This unit is probably transitional between Berwick Formation (quartzitic) and the pelitic schists of the Rindgemere Formation.

2) Note the orientation of mica flakes in different beds. Some are parallel to the bedding-schistosity; others are parallel to the axial planes of the folds.

3) Lenses of gray-green calc-silicate granulite seen here are quite common in the Berwick Formation.

4) The axes of folds of the schistosity commonly trend northeast and have gentle plunges. A problem for future study is the age relationships and trends of different generations of folds.

Continue on tar road.

9.2 Right turn at 4 corners.

11.5 Left turn onto Route 11. Proceed across bridge and park off highway. STOP #3. Steep Falls, Berwick Formation.

Notes:

1) The rock exposed here is primarily a well-bedded, fine to medium-grained gray biotite-quartz feldspar granulite. Biotite flakes in most cases lie parallel to bedding and in some cases there is a good lineation developed in biotite aggregates. The granulite is cut by granite (also showing a foliation) and pegmatite, the pegmatite being the younger. The rock does not appear to be severely deformed, but small stringers of quartz are highly contorted in some instances.

2) At the west end of the exposure, at water's edge, numerous thin lenses of gray-green calc-silicate granulite are found. These are fairly common in this biotite granulite of the Berwick Formation.

3) Graded bedding may be seen in some places. It is observed as a change from coarser-grained quartz-feldspar material grading upward to finer-grained, micaceous rock. This suggests that the unit is rightside up at this outcrop.

4) Rocks of this lithology are consistently found to the east of the pelitic schists. The contact is placed where this

lithology becomes the predominant rock type. The contact is believed to be gradational.

Continue on Route 11.

12.0 Left turn on Route 113.

13.5 Right turn on Route 107.

15.4 Bear left on 107.

18.8 Road from the right (they have the yield); be ready for left turn.

19.2 Left turn onto Douglas Hill Road.

20.1 Sharp left turn. At this point, crowd into as few cars as possible. Parking is very limited at Stop #4.

20.4 STOP #4. Douglas Hill, Rindgemere Formation. Park cars in public parking area. Walk up path to top of Douglas Hill. Beautiful view of Sebago Lake and the White Mountains.

The excellent exposures on the top of Douglas Hill are typical of most of the sedimentary rocks of the Kezar Falls-Newfield area. These are similar to rocks of the Rindgemere Formation in the Berwick Quadrangle mapped by Hussey (1962) and Katz (1917). They are considered to be correlatives of the Lower Littleton Formation of eastern New Hampshire.

Notes:

1) The rocks are characterized as coarse-grained garnet-mica schists and migmatites. Quartz veins and pods are numerous, and the migmatite is cut by pegmatite.

2) The foliation maintains a general N 70 E strike with a moderate to steep northerly dip. The schistosity has been folded with fold axes plunging to the northeast.

3) Most of the area to the east is underlain by the Sebago pluton (mostly biotite-muscovite granite to quartz monzonite).

Turn around; return down tar lane to Douglas Hill Road. Pick up cars.

21.1 Left turn on Douglas Hill Road.

21.2 Bear left at "Y".

22.6 Bear left onto tar road.

24.8 Bear left.

26.8 Right turn onto Route 5.

27.7 STOP #5. Lunch. Turn left off Route 5 into State Highway Commission picnic ground. Good view of the Hiram Falls hydroelectric plant on the Saco River. Stop #6 will be at the foot of the dam on the other side of the river.

Continue north on Route 5.

29.9 East Hiram. Go left, crossing the Saco River. Make left turn immediately after the bridge.

30.1 Keep straight.

32.0 STOP #6. Hiram Falls, Rindgemere Formation. Park cars in parking area. Follow path to the ledges at the foot of the dam.

Notes:

1) The outcrops below the dam are of two types of metasediments, pegmatite, and diabase dikes. Large blocks of migmatite are enclosed in pegmatite and have apparently been rotated. In the overflow channel, a well-bedded granular schist is exposed. It has been folded and ptygmatic folds are observable in some places. The beds are graded, but a consistent top direction is difficult to determine.

2) Potholes are well-developed here and some of the ptygmatic folds are best exposed on the sides of these potholes.

3) In much of the Kezar Falls quadrangle the Rindgemere Formation is migmatite with randomly oriented "spangles" of muscovite. Well-bedded mica schist becomes more abundant in the northern portion of the Newfield quadrangle (Stop #8).

Return to Junction with Route 5.

33.9 Straight on Route 5.

38.4 STOP #7. Rusty and Non-rusty Schists of the Rindgemere Fm.
Two exposures are seen in roadcuts along the west side of Route 5. The southern outcrop is of a rusty medium-to-coarse grained quartz-mica schist with pyrite. The northern exposure is of fairly typical poorly-bedded schist and schistose quartzite. The bedding is parallel to schistosity, but both are deformed and an eastward plunging fold is present.

Turn around. Follow Route 5 to Cornish.

46.6 Route 5 turns right to Cornish.

48.7 Right turn onto Routes 25 and 5.

49.4 Left turn on Route 5, just west of Cornish business district.

53.2 Left turn onto gravel road; becomes tar road in 0.2 mile.

53.7 STOP #8. Calc-silicate and Associated Schists of the Rindgemere Formation.
Park at first farmhouse, walk up woods road and climb southwest side of Pease Mountain.

Notes:

1) This is one of the better exposures of this unit in the area. Commonly only a few feet of section are exposed, but it is presently believed that the zone containing most of the calc-silicate is on the order of 100 to 200 feet thick.

2) Minerals of the calc-silicate include diopside, grossularite, idocrase, calcite, quartz, sphene, and plagioclase.

3) The rocks associated with the calc-silicate are granular biotite schist, and a muscovite-biotite-garnet-sillimanite schist in which the muscovite and sillimanite are oriented in the schistosity plane. This is usually referred to as a "whispy schist" as opposed to the "spangled schist" and migmatite seen earlier.

Return to cars; return to Route 5.

54.1 Left on Route 5.

54.3 Berry's Ledge (roadcut) on right. Noted idocrase-scheelite-grossularite locality in punky weathering calc-silicate. Extreme contortion of bedding is well demonstrated here.

59.2 Left turn on Route 11 in Limerick Village.

66.2 Town Hall parking area in Limington. END OF TRIP.