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Progress Report  
of Geologic Mapping in the Ellsworth, Great Pond,  
Lead Mountain, Tug Mountain, and Wesley Quadrangles, Maine

1974 Field Season  
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The following report represents the findings from the first summer's field studies of a project designed to explore the pre-Silurian rocks between the Ellsworth region on the southwest and Wesley on the northeast. The findings are the result of six weeks of field work.

Rock Units:

The rocks of most immediate concern in this study belong to the Charlotte Group as described by Alcock (1946) and Larrabee (1965). The Ellsworth Schist as exposed in the Ellsworth quadrangle has been mapped in detail by McGregor (1964) unpublished Ph.D. thesis, University of Illinois) and is not considered here. Much of the region is underlain by a coarse-grained porphyritic granite that is similar to the Lucerne granite. Other granitic rocks and gabbro have been found in the Wesley quadrangle. None of the plutonic rocks are discussed in detail. Exposures of unmetamorphosed Silurian(?) volcanic rocks were found in the center of the Wesley quadrangle. These are similar to volcanic rocks found to the south in the Columbia Falls and Machias quadrangles. Little is known of their aerial extent--this should be a project for future work.

Charlotte Group:

Metasedimentary rocks of the Charlotte Group have been subdivided by previous workers into the Pale and Dark Argillites. These terms are not appropriate in this region since few of the

rocks are argillites. A preferable subdivision of the Charlotte Group has been established in New Brunswick by Ruitenberg (1968). This scheme has been carried into Maine by Ludman (1974) and is perhaps appropriate for this study area as well. In New Brunswick these consist of the Cookson Fm. of Ordovician age, the Digdeguash Fm (Ordo) and the Flume Ridge Fm. of Ordo-Silurian age. The Cookson Fm. is characterized by rusty weathering quartzites, phyllites and schists; the Digdeguash by non-rusty massive-to-bedded grey-brown quartzitic schists frequently showing excellent graded bedding; the Flume Ridge by calcareous, thinly bedded quartzites and minor phyllites.

In the area covered by this report it seems possible, though not conclusive, that three units similar to those just mentioned can be followed from the Wesley area to Ellsworth. It is suggested that a belt of rusty weathering schists and bedded quartzite lies along the southern edge of the discontinuous, northeast trending band of metasedimentary rocks <sup>see</sup> (map). These are poorly exposed except near Wesley and on either side of Graham Lake (Ellsworth Quadrangle). Intervening exposures are restricted to inclusions(?) within the Lucerne-type granite. This unit commonly carries abundant condierite. This unit may be correlative with the Cookson Fm.

Immediately to the northwest of the belt of rusty rocks is a belt of interbedded grey-brown quartzitic mica schists (or phyllites) and bedded quartzites. This unit is well exposed

on the shores of the Chain Lakes (Wesley and Big Lake Quads) where excellent graded bedding is common. Non-rusty, quartzitic schists are also found on Pleasant Mtn. (Lead Mtn. quad.), which appear to be transitional into the rusty schists to the south. In the Ellsworth region, non-rusty quartzitic rocks are sparsely represented north of the rusty rocks. This suggests that a belt of non-rusty quartzitic schists lies to the northwest of the rusty belt. In the Chain lakes area these rocks lie along strike with rocks that Ludman (1974) correlated with the Digdeguash Fm. of New Brunswick. In the Lead Mtn. and Ellsworth quadrangles this correlation becomes extremely tentative, but worth pursuing in future studies.

Lying to the northwest of these rocks is a belt of distinctively banded pale green and purple-grey calcareous quartzites with interbedded biotite schist or phyllite. Banding is uniformly on the order of a few inches to a fraction of an inch. This unit exists in the Ellsworth-Great Pond quadrangles and in the Lead Mtn. quadrangle, but has not yet been found in the Wesley - Big Lake Quadrangles, but the northernmost exposures in the Chain Lakes (Big Lake quad.) contain slightly calcareous quartzites and phyllites. Presumably the major belts of calcareous quartzites lies just to the north of these exposures (see Westerman, 1972).

The strikingly banded pale green and purple-grey calcareous quartzites and phyllites are similar to units included in the Kellyland Fm. by Larrabee, and in the Flume Ridge Fm. by Ludman (following the nomenclature of Ruitenberg in New Brunswick).

### Stratigraphic Relations in the Metasedimentary Rocks:

Nowhere within the areas examined do outcrops show conclusively the relative age relations between the three types of metasedimentary rocks described above. Where graded bedding is found it nearly always indicates tops to the southeast but isoclinal folds have been observed, and graded bedding indicating tops to the northwest are occasionally encountered. On the basis of graded bedding and the general southeasterly dip in the Gread Pond-Ellsworth area, McGregor concluded that the Ellsworth schist lies above the Charlotte Group and that the metasedimentary units get older to the northwest. However, others (Ruitenbergh, 1968, Ludman, 1974) have concluded that the sequence gets younger from the Cookson Fm. to the Flume Ridge Fm. If this sequence is in fact represented in the Ellsworth-Great Pond area, then the age relationships are just reversed from those arrived at by McGregor. At the present time I favor the interpretation of Ludman because it is based on graded bedding at the contact between the Cookson and Digdeguash Formations. Graded bedding has not been observed at the contacts between units in the Ellsworth-Great Pond area, and the general attitude of schistosity and bedding is not sufficient to determine relative ages conclusively. Future work needs to focus on this problem.

### Structure:

At this time only a few general comments concerning structural relationships of the metasedimentary rocks can be made.

A general northeasterly strike is prevalent throughout the area, two exceptions being in the eastern part of the Lead Mtn. quadrangle, and near the fire tower at Wesley (north of the intersection of routes 9 and 192, Wesley quadrangle) where shallow dips and variable strikes suggest the crest of a major fold.

In the Ellsworth-Great Pond area, dips are steep to the south or vertical, the latter being the usual case in the central and northern regions. In the banded, calcareous quartzites (bcq) the pelitic interbeds nearly always display a fine cleavage oblique to the bedding. As a general rule this cleavage is oriented more nearly north-south than the bedding in the same outcrop. This cleavage can be seen to be axial plane to minor folds of the bedding, but as yet no major folds have been discovered associated with this structure.

In the Chain Lakes region (Wesley and Big Lake quadrangles) there are numerous exposures showing the bedding to be overturned toward the northwest (facing is southeast based on excellent graded bedding) and a few that face northwest. Also along the east side of the lakes exposures show several macroscopic isoclinal folds to which the regional foliation is axial plane. These attitudes would suggest that a major overturned syncline occupies this position with the adjacent anticlinal crest lying to the south in the vicinity of Wesley.

No faults are shown on the map. Dave Stewart (personal communication) has suggested that the northern contact of the Ellsworth Schist is a fault, but as yet no field evidence has been found to support this.

Recommendations for Future Work:

1. The remainder of the Wesley quadrangle should be mapped. Little can be done with stratigraphic problems as such until the regional distribution of rock types is pretty well established. Considering the work that has been done by Westerman and myself, one additional field season should provide this information.
2. The region north of the Chain Lakes looks promising for structural and stratigraphic control. This would involve detail mapping the Big Lake-Wabassus Lake quadrangles, part of which is shown on Westerman's map, other parts on Larrabee's maps. Several weeks of detailed field work there should evaluate the desirability of further work.
3. Larrabee's maps show metasedimentary rocks extending into the Nicatous Lake quadrangle from the Lead Mountain quadrangle. The problem here lies in the large amount of porphyritic granite in this area, but if sufficient exposures can be found there may be enough to construct a continuous section of metasedimentary rocks starting at Rt. 9 and working northward. This would most likely require an entire field season. The region is remote with few roads.

4. In the Great Pond quadrangle, work should be done along the west side of the Union River to seek out exposures of metasedimentary rocks east of the large granite body. This would attempt to tie the metasedimentary rocks of the Great Pond area with those further south along Route 9. Also, the region to the north and west needs to be examined with the aim of carrying the stratigraphy to the Bangor-Old Town area.



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Great Pond  
and  
Ellsworth  
Quadrangles

R. Gilman  
1974

LEGEND

Metasedimentary Rocks  
(not in known stratigraphic order)

- bcg - bedded calcareous quartzite, usually color banded - pale green and purple grey; banding from fraction of an inch to several inches (= Flume Ridge Fm. ??)
- gbqs - grey-brown quartzitic schist: poorly bedded but may show graded bedding with coarse sand at base (= Digdequash Fm. ??)
- rs - rusty schist: well bedded locally; abundant cordierite locally (= Cookson Fm. ??)
- EOe - Ellsworth schist green-grey laminated feldspathic chlorite-biotite schist

Plutonic Rocks

- Dgl - coarse grained, grey, porphyritic granite similar to the Lucerne granite
- X - strike and dip of bedding
- 40 - strike and dip of foliation

- geologic contacts:
- ..... inferred
  - - - approximate
  - - - approximated from State Geologic Map

Area mapped by D. Stoesser  
U. of Maine M.S. thesis 1966

(Kelleyland Fm.)  
(bcg?)

Dgl

Great Pond

(metasediments)  
(gbqs?)

(red beds)  
(Syenite)  
(metavolcanics)  
(metasediments)

RIVER

Dgl

Dgl

Dgl

boundary taken from state geologic map

bcg

Dgl

Dgl

gbqs

Great Pond  
Ellsworth

bcg

rs

(etc. cited by J. McGregor)

LAKE

Dgl

Dgl

EOe

rs

GRAHAM

Dgl

EOe

(Area mapped in detail by  
J. D. McGregor, 1964  
unpublished Ph. D. thesis  
Univ. of Illinois)



LEAD MOUNTAIN  
TUG MOUNTAIN  
&  
WESLEY  
Quadrangles  
R. Gilman  
1974

LEGEND

Metasedimentary Rocks

- bcg - color banded (pale green-grey) calcareous quartzite; buff weathering siltstone and minor black phyllite. (= Pine Ridge Fm ??)
- gbqs - grey-brown quartzite and schist; thin bedded (1-6") abundant graded bedding in Chain Lakes area. (Digdequash Fm ??)
- rs - rusty weathering schist & quartzite massive to thin bedded. (Cookson Fm ??)

Plutonic Rocks

- Dgl - coarse grained <sup>porphyritic</sup> grey granite of the Locomotive type
- gr - grey fine-med grained granite
- js - pink-grey Jonesboro-type granite
- wgdr - grey, med grained hbd. granodiorite with characteristic blue-grey quartz. Whettnayville-type.
- gb - gabbro

- shear zone: brecciated rocks.
- contacts:
  - ..... inferred
  - approximate
  - - - taken from state geologic map
  - x observed exposures in plutonic rocks

GREAT POND

NICATOUS LAKE

LABASSUS LAKE

Big Lake Quadrangle

TUNK LAKE

CHERRYFIELD

Columbia Falls

Wesley Quadrangle

Lead Mountain Quadrangle

Tug Mountain Quadrangle

Dgl ?

Dgl ?

Dgl

Dgl

Dgl

Dgl

Dgl

Dgl

wgdr

Sv

gr

gb

gb

gb

js

js

bcg

gbqs

rs

gbqs

gbqs

rs

rs

rs

gr

rs

rs

Dgl

rs

rs

New road - St. R. Paper Co.

SILVERMOUNT MOUNTAIN

(Also See Waferman's map, 1972 for this area)

70'

70'

70'

70'

70'

70'

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193

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