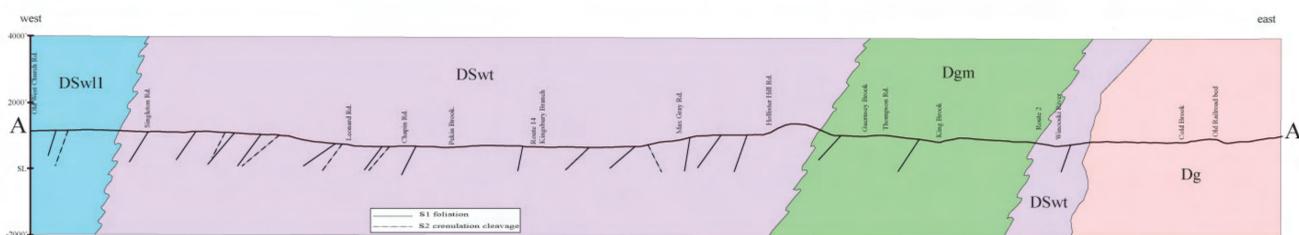


Bedrock Geologic Map of the Plainfield Quadrangle, Washington County, Vermont

Authors: Jonathan Kim and Abigail Ruksznis



Description of Map Units

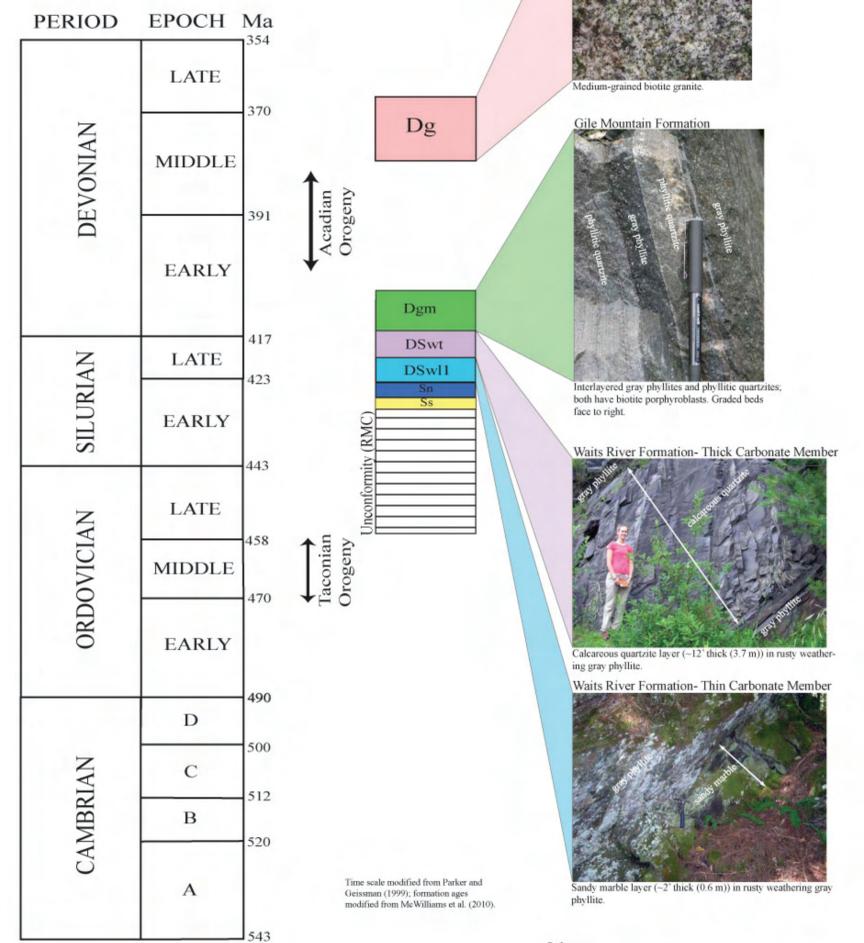
- Cretaceous**
  - +** Fine-grained, dark gray, biotite-phyric, mafic dike (lamprophyre).
- Devonian**
  - Dg** **New Hampshire Series Granite**  
Medium- coarse grained biotite granite composed of K feldspar, plagioclase feldspar, quartz, and biotite +/- muscovite, garnet.
  - Dgm** **Gile Mountain Formation**  
Rusty weathering, locally graphitic, gray phyllites with conspicuous biotite porphyroblasts (+/- garnet, staurolite) that are interlayered with gray phyllitic quartzites. Layers of punky, brown weathering, sandy, marble and gray massive calcareous quartzite occur infrequently. Calcareous amphibolite horizons irregularly occur at the boundaries between calcareous and siliceous layers.
- Silurian-Devonian**
  - DSwt** **Waits River Formation**  
Thickly bedded carbonate member: rusty weathering, locally graphitic, gray phyllites with biotite porphyroblasts (+/- garnet) that are interlayered with punky, brown weathering, sandy marble and massive gray calcareous quartzite; these carbonate layers generally range from 2 - 3' in thickness (0.6 - 0.9 meters). Phyllitic quartzite horizons are locally present. Garnet occurs on an irregular basis. Calcareous amphibolite horizons occur sporadically at the boundaries between calcareous and siliceous units. This unit is identical to that mapped by Walsh et al. (2010) in the Montpelier Quadrangle.
  - DSwt1** **Waits River Formation**  
Thinly bedded carbonate member: rusty weathering, locally graphitic, gray phyllites with biotite porphyroblasts (+/- garnet) that are interlayered with punky, brown weathering, sandy marble and massive gray calcareous quartzite; these carbonate layers generally range from 0.5 - 3' in thickness (0.2 - 0.9 meters). Phyllitic quartzite horizons are locally present. Garnet occurs on an irregular basis. Calcareous amphibolite horizons occur sporadically at the boundaries between calcareous and siliceous units. This unit is identical to that mapped by Walsh et al. (2010) in the Montpelier Quadrangle.

Explanation of Map Symbols

- +** Outcrop location- this study.
- ▲** Outcrop location- König (1961).
- Lithologic Contacts**
  - known
  - - - approximate
  - · - · - inferred
  - [Diagonal hatching] Zone of abundant xenoliths of metasedimentary rock.
  - [Horizontal hatching] Zone of abundant granite dikes and sills.

Explanation of Structural Symbols

- [Symbol] Strike and dip of Acadian (Devonian) S1 foliation or bedding/ S1 composite fabric.
- [Symbol] Strike and dip of bedding schistosity of König (1961); equivalent to the Acadian (Devonian) S1 foliation above.
- [Symbol] Strike and dip of Acadian (Devonian) S2 crenulation cleavage.
- [Symbol] Trend and plunge of Acadian intersection or stretching lineation (L1). Proxy for orientation of F1 fold axis.
- [Symbol] Trend and plunge of Acadian crenulation lineation (L2). Proxy for orientation of F2 fold axis.



References

König, R.H., 1961. Geology of the Plainfield Quadrangle, Vermont. Vermont Geological Survey Bulletin #16, 86 p., 2 plates, scale 1:62,500.

McWilliams, C., Walsh, G., and Wintsch, R., 2010. Silurian-Devonian Age and Setting of the Connecticut Valley -Gaspe Trough in Vermont Based on U-Pb SHRIMP Analyses of Detrital Zircons. American Journal of Science, v. 310, p. 325-363.

Palmer, A.W. and Geissman, J., (compilers), 1999. Geologic Time Scale, The Geological Society of America.

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http://www.amr.state.vt.us/dec/geology.htm  
Base map from U.S. Geological Survey.  
Quadrangle names printed in blue.  
Coordinate System: Vermont State Plane, meters, NAD 83.  
Grid overlay on map is Universal Transverse Mercator, Zone 18N, NAD 83.  
Digital Cartography by Jonathan Kim  
Date: November, 2011

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Late Silurian-Early Devonian -----> Early Devonian - Middle Devonian -----> Cretaceous (?)

## Planar Structures

### Bedding



Beds of marble and phyllite in the Waits River Formation.



Beds of quartzite and phyllite in the Gile Mountain Formation.

### Acadian S1 Foliation



The dominant S1 foliation in gray phyllites of the Waits River Formation. S2 is at a low angle to S1.

### Acadian S2 Foliation



S2 crenulation cleavage in gray phyllites of the Waits River Formation.



S1 foliation (sub-vertical) and S2 crenulation cleavage (sub-horizontal) in gray phyllites of the Waits River Formation.

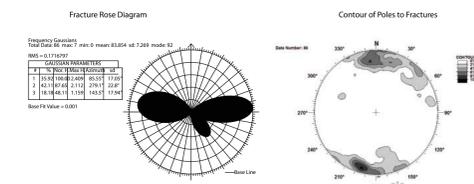
### Fractures



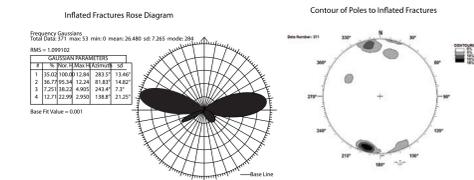
East-west trending steeply south dipping fractures in calcareous quartzite of the Waits River Formation. Fractures that formed perpendicular to S1/bedding are the most common type in the Plainfield Quadrangle. See rose diagrams and equal area nets below.



East-west trending steeply south dipping fractures in phyllites of the Waits River Formation.



Frequency-azimuth rose diagrams (left) and contoured equal area nets (right) of fractures in the Plainfield Quadrangle accounting for only one fracture of each azimuth at each outcrop/field station (Salvini et al., 1999).



Frequency-azimuth rose diagrams (left) and contoured equal area nets (right) of fractures in the Plainfield Quadrangle accounting for all fractures of each azimuth at each outcrop/field station (Salvini et al., 1999). The dominant fracture azimuth is clearly E-W. Note the subordinate southeast and southwest trending fracture sets.

## Folds

### Acadian F1 Folds



Reclined isoclinal F1 fold in phyllitic quartzite of Gile Mountain Formation.



Reclined isoclinal F1 folds within calcareous quartzite bed of the Waits River Formation.

### Acadian F2 Folds



Asymmetric open F2 folds that deform S1 in phyllites of the Waits River Formation.



Closeup of F2 folds and the associated crenulation lineation (L2) in phyllites of the Waits River Formation. These folds deform S1 and plunge gently to the north (right) throughout the Plainfield Quadrangle.

### Acadian F3 Folds



Open fold (F3) that deforms S1 and S2 in phyllites of the Waits River Formation.

## Lineations

### Acadian L1 Lineation



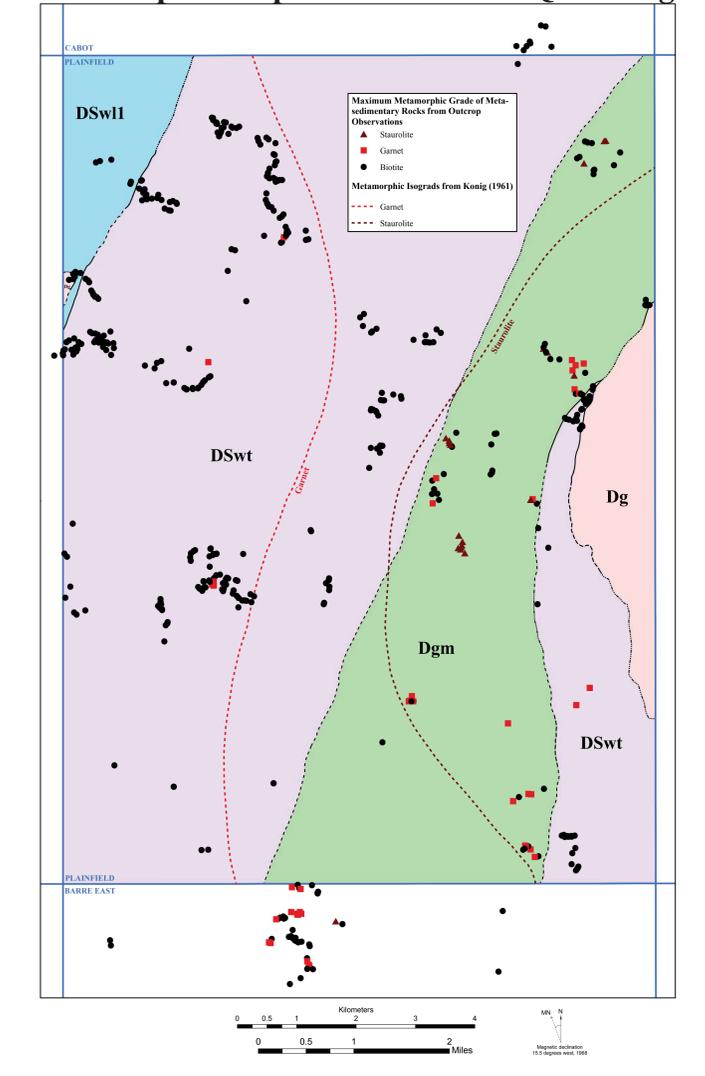
Steeply-plunging intersection lineation (L1) of S1 on bedding in phyllites of the Gile Mountain Formation.

### Acadian L2 Lineation



Gently-plunging crenulation lineations (L2) on S1 of phyllites in the Waits River Formation. Garnets have asymmetric tails that suggest they were deformed by this crenulate cleavage.

## Metamorphic Map of the Plainfield Quadrangle



### References:

König, R.H., 1961, Geology of the Plainfield Quadrangle, Vermont: Vermont Geological Survey Bulletin #16, 86 p., 2 plates, scale 1:62,500.

Salvini F., Billi, A., Wise, D.U., 1999, Strike-slip fault-propagation cleavage in carbonate rocks: the Mattinata fault zone, Southern Apennines, Italy: Journal of Structural Geology, vol. 21, pp. 1731-1749 ISSN: 0191-8141.