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Bedrock Geologic map of the Mount Dartmouth 7.5' Quadrangle, New Hampshire

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Mt. Dartmouth Quadrangle, New Hampshire - Bedrock Geology

Bedrock mapping by:

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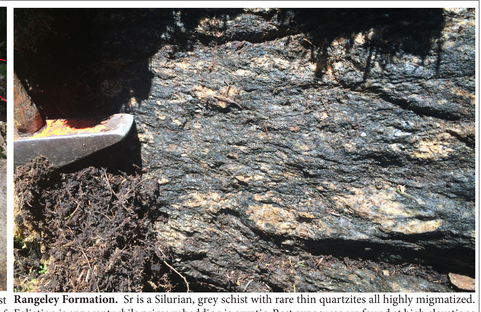
BEDROCK GEOLOGIC HISTORY OF THE MOUNT DARTMOUTH QUADRANGLE

The Mount Dartmouth 7.5' Quadrangle, located in the White Mountain National Forest of Northern New Hampshire was last mapped at a scale of 1:62,500 by Billings et al. (1946 and 1979). Lyons et al. (1997) reinterpreted the bedrock geology of the quadrangle as a part of the Bedrock Geologic Map of New Hampshire. The purpose of this study was to produce an updated, detailed bedrock map and cross section at a scale of 1:24,000 to better define and evaluate the igneous rock types and metamorphosed stratigraphy of the area.

From youngest to oldest the new mapping has identified the following: 1) the 8 km long, 100 meter wide, NS striking Mill Brook Dike Zone, previously recognized by Fowler-Billings (1944). The dike is an altered diabase of within plate tectonic affinity with associated brittle joints that is Cretaceous-Jurassic in age (?)formed during the breakup of Pangea; 2) the Jurassic Conway Granite and Cherry Mountain hornblende syenite, both more or less unchanged from previous maps; 3) three distinct phases of the Devonian Bretton Woods granite, including the dominant fine- to medium-grained, two-mica granite (Tmg), a pegmatite zone, and flow aligned porphyritic granite (Tmgx); 4) the Silurian Rangeley formation (Sr), subdivided into the dominant migmatitic gray schist with internal layers of rusty schist and rusty granofels (Srr) and calc-silicate pod-bearing migmatized schists (Src) ; 5) the Ordovician Jefferson Oliverian Dome with a variably foliated, coarse-grained (Oo1bx) and medium-grained (Oo1b)biotite granite and also a variably foliated, coarse-grained hornblende granite (Oo1h); and 6) a near complete lack of any Ammonoosuc Volcanics (Oal) with the exception of one unusual lens (xenolith?) preserved in the interior of the Dome.

A major normal (?) fault, the Pine Peak Fault, manifest by a belt of interconnected silicified pods, strikes diagonally northeast across the quadrangle and forms the fundamental break between the Bretton Woods Granite and Rangeley Formation to the SE (downthrown?) and the Oliverian Dome rocks to the NW (upthrown?). The fault is likely related to the nearby Ammonoosuc Fault that moved in the Jurassic to Triassic. The Rangeley Formation preserves a penetrative foliation that is a D1 Acadian, Early Devonian fabric, which shows evidence of later refolding. The Jefferson Dome shows two different types of foliations. The principal foliation is related to the formation of the northeast plunging anticlinorium and is likely a Late Devonian, NeoAcadian effect. The younger foliation is characterized by S-C mylonitic fabrics and/or steep dipping foliations. These define dextral oblique shear zones at Mill Brook and Appleby Mountain in the Dome and are likely Carboniferous, Alleghanian effects. Some of these foliations are in turn crenulated, probably due to motion along the Pine Peak Fault.

Mill Brook Dike Zone. A zone of Cretaceous to Jurassic (?), 5-30 m wide diabase dikes best exposed along Mill Brook. The zone extends 8 km throughout the quadrangle. The core of the dikes are characterized by phenocrysts (see inset) of zoned plagioclase (An 50-70). Dikes intruding Oo1h are outlined by red lines in the photo.



Rangeley Formation. Sr is a Silurian, grey schist with rare thin quartzites all highly migmatized. Foliation is apparent while primary bedding is cryptic. Best exposures are found at high elevations on Mts. Dartmouth and Desolation.

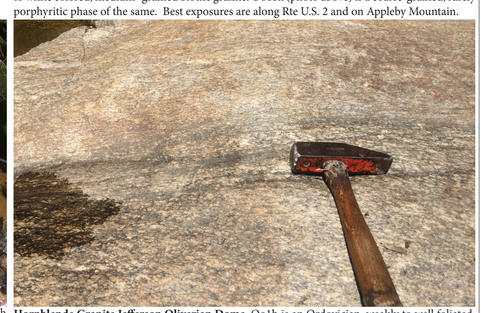
Cherry Mountain Syenite. J7h is a Jurassic, massive, white and black, medium- to coarse-grained, hornblende and magnetite-bearing syenite. Best exposures can be found on the Humps, Cherry Mountain, and Owlshead.

Calc-silicate and rusty Rangeley Formation. These are both members of the Silurian Rangeley Formation. Src (left) is a gray, migmatized schist with 10-50 cm, oval shaped, calc-silicate pods composed of plagioclase+ grossular+diopside. Srr (right) is a rusty weathering schist with rusty granofels. Best exposures are on the SE flank of the Dartmouth Range.

Conway Granite. Jc1b is a Jurassic, massive, pink, coarse-grained, biotite granite. Best exposures can be found on Mt. Oscar and at the Lower Falls of the Ammonoosuc River.

Biotite Granite Jefferson Oliverian Dome. Oo1b is an Ordovician, weakly to well foliated, pink to white colored, medium- grained biotite granite. Oo1bx (photo above) is a coarse-grained, rarely porphyritic phase of the same. Best exposures are along Rte U.S. 2 and on Appleby Mountain.

Pine Peak Fault Silicified Zone. The Pine Peak Fault extends for approximately 11 km through the quadrangle and marks the boundary between the Bretton Woods Granite and Rangeley Formation on the SE and the Oliverian rocks on the NW. The fault is characterized by silicified zone pods made of massive milky quartz with anastomosing veins of milky quartz veins that strike NW-SE, and dip steeply NW. Motion on the fault is likely similar to the Ammonoosuc Fault with NW side up and an age of Jurassic to Triassic (?). Best exposures are found on Currier Mountain.



Hornblende Granite Jefferson Oliverian Dome. Oo1h is an Ordovician, weakly to well foliated, buff colored, coarse to rarely porphyritic, hornblende +/- biotite granite. The photo above also shows a shear zone (under hammer head)with weakly developed S-C fabrics indicating dextral oblique strike-slip motion, that probably developed in the Carboniferous or Alleghanian orogeny(?). Best exposures are in Mill Brook.

Bretton Woods Granite. Tmg is a Devonian, massive, fine- to medium-grained, white, muscovite + biotite granite typically associated with pegmatite. Tmgx is a porphyritic phase of Tmg with flow-aligned (?) potassium feldspars (see inset). Best exposures are along the Ammonoosuc River at Upper Falls.

Ammonoosuc Volcanics. Oal is an Ordovician, massive to foliated, dark green to black amphibolite. Only one exposure of it is found south of Cherry Mountain where it is cut by the Mill Brook Dike. Foliation attitudes suggest that this lense is a xenolith (?).

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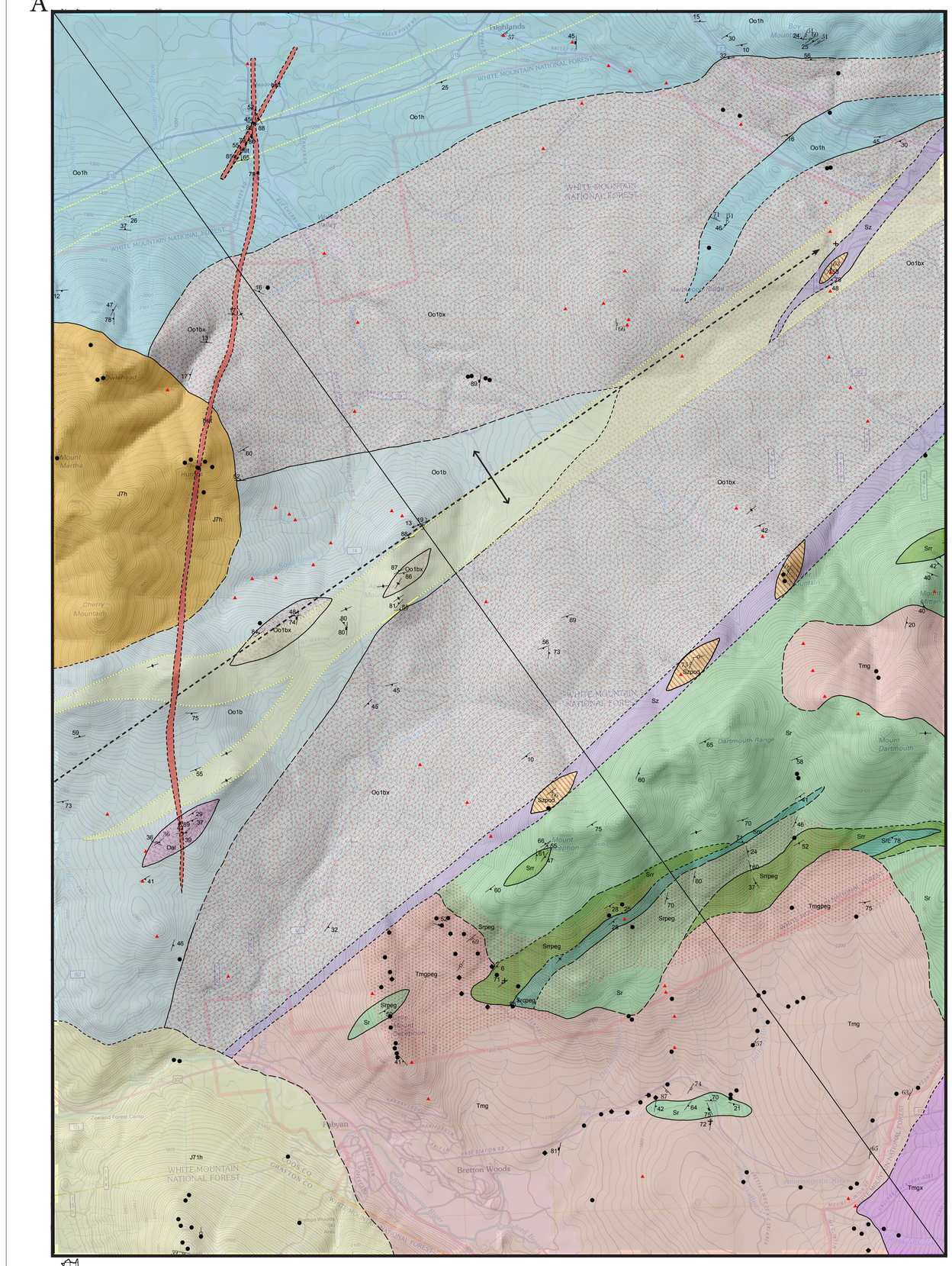

EXPLANATION OF UNITS

INTRUSIVE ROCKS

Cretaceous - Jurassic (?)

Diabase of the Mill Brook Dike Zone. 5 to 30 m wide dike(s) with porphyritic (plag) core and chilled edges. Mineralogy: plag+pyx+hbl+chlor+mag, variably altered with minor cataclasis.

Jurassic

J7h, Cherry Mountain Syenite. Coarse-grained white and black syenite. Mineralogy: ksp+plag+hbl+mag+quartz.

J71h, Conway Granite. Coarse-grained pink granite. Mineralogy: ksp+plag+quartz+bio.

Jurassic - Triassic (?)

Sz, Silicified Zone of the Pine Peak Fault. Interpreted extension of silicified pods defining a normal (?) fault.

Szpod, Silicified Zone Pod. 10-100 m wide zones of pure milky quartz criss crossed by abundant, 1-5 cm wide veins of milky quartz.

Devonian

Tmg, Bretton Woods Granite. Medium- to coarse-grained two mica, white granite. Mineralogy: qtz+plag+ksp+musc+bio.

Tmgx, Porphyritic phase of the Bretton Woods Granite. 1-2 cm long, strongly aligned ksp phenocrysts. Mineralogy: qtz+plag+ksp+musc+bio.

__peg, region of abundant pegmatite veins and stringers, part of the Bretton Woods Granite. Mineralogy: qtz+plag+ksp+/-musc+/-bio.

STRATIFIED ROCKS

Silurian

Sr, Rangeley Formation. Gray, sill+musc+bio+gar, schists and thin, 1-3 cm quartzites, everywhere migmatized.

Src, Calc-silicate member of the Rangeley Formation. Same as Sr with10-30 cm long, oval, calc-silicate pods composed of plag+gross+ diop.

Srr, Rusty member of the Rangeley Formation. Interbedded rusty schists and rusty granofels.

Ordovician

Oo1h, hornblende granite of the Oliverian Jefferson Dome. White to buff, coarse-grained, rarely porphyritic, ksp+plag+qtz+hbl+/bio variably foliated granite.

Oo1b, biotite granite of the Oliverian Jefferson Dome. Pink, medium-grained ksp+plag+qtz+bio variably foliated granite.

Oo1bx, coarse-grained phase, biotite granite of the Oliverian Jefferson Dome. Pink, rarely porphyritic, medium-grained ksp+plag+qtz+bio variably foliated granite.

Oal, Ammonoosuc Volcanics. Dark green to black, massive, foliated amphibolite composed of hbl+bio+plg+ qtz+sph.

EXPLANATION OF SYMBOLS

- Diabase dike
- Pegmatite
- Crenulation of foliation axial plane and hinge line
- Foliation. In Sr, may be parallel to original bedding
- Vertical foliation
- Mineral lineation, typically hornblende
- Vertical quartz vein
- Quartz vein
- Float of >3m diameter angular blocks
- Outcrop

EXPLANATION OF LINES

- Regional axial trace of plunging Jefferson Dome
- Contact - accurate
- Contact - inferred
- Contact - approximate
- Shear zone, or shear zone border. Solid accurate, dashed approximate
- Shear zone, marked by S-C fabrics, and/or steeply dipping foliations. Symbols, ⊕ is away from ○ and is toward the observer

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A NORTHWEST — INTERPRETIVE CROSS SECTION - NO VERTICAL EXAGGERATION — SOUTHEAST A'