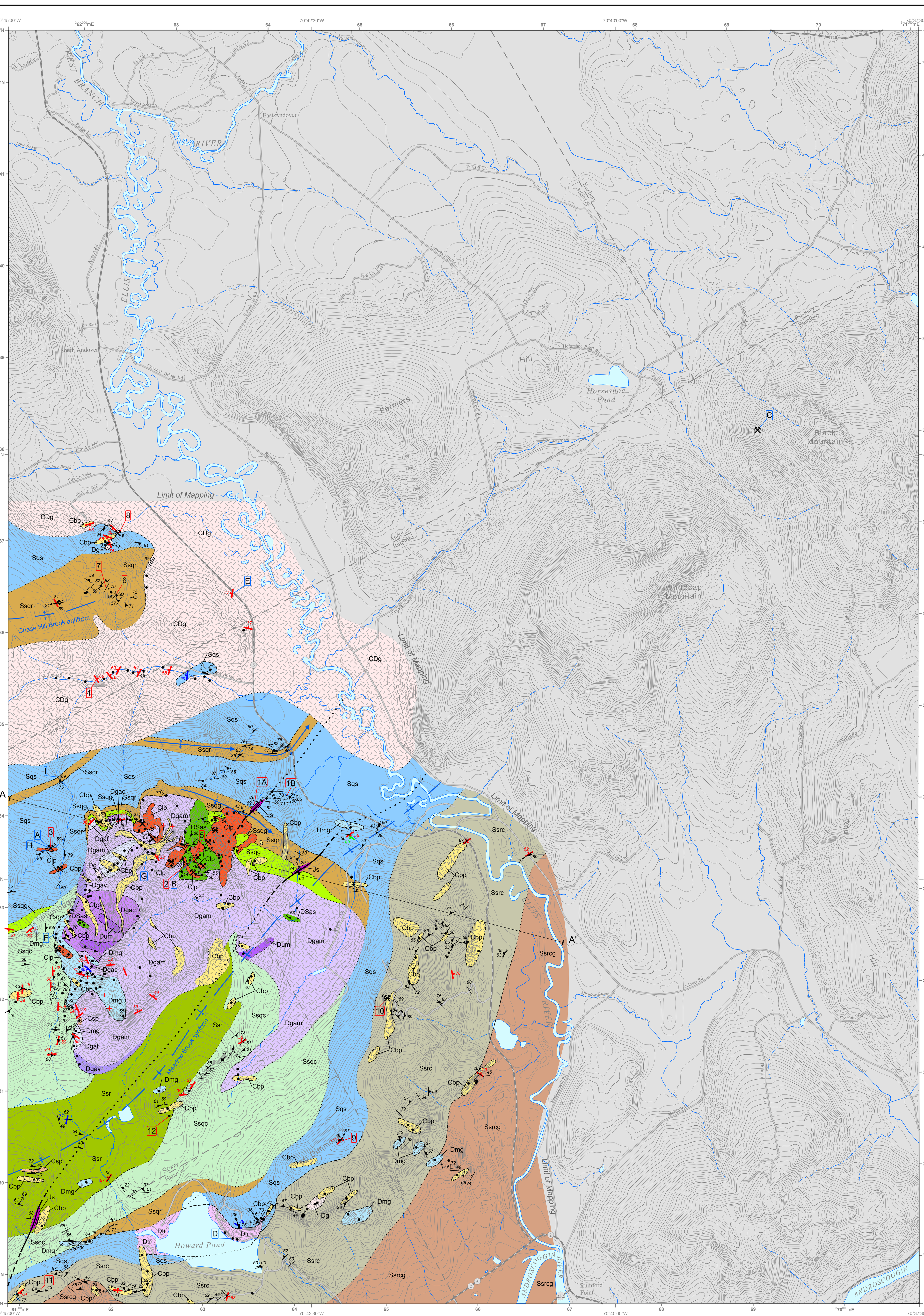
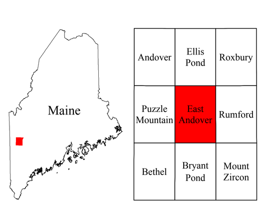


SOURCES OF GEOLOGIC INFORMATION

J. Dykstra Eusden, field work, 2020-2021.
Myles Felch, field work, 2020-2021.



SCALE 1:24,000

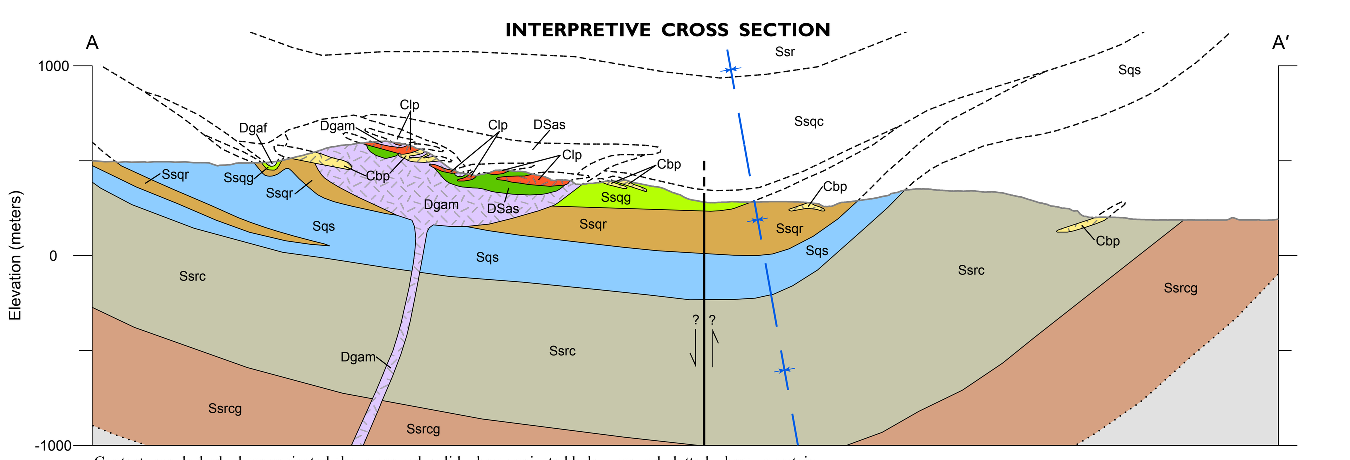
CONTOUR INTERVAL 20 FEET

Approximate Mean Declination, 2021 15° W

Base map features from Maine Office of GIS - 1:24,000 USGS contour lines, E911 roads, 1:24,000 National Hydrography Dataset, USGS GNIS placenames and 1:24,000 political boundaries. Map projection Universal Transverse Mercator, North American Datum, 1927.

The use of industry, firm, or local government names on this map is for location purposes only and does not impute responsibility for any present or potential effects on the natural resources.

INTERPRETIVE CROSS SECTION



Contacts are dashed where projected above ground, solid where projected below ground, dotted where uncertain.
Inferred motion on faults is indicated by arrows.
No vertical exaggeration.

GEOLOGIC TIME SCALE

Geologic Age	Absolute Age*
Cenozoic Era (Cz)	0-66
Mesozoic Era (Mz)	
Cretaceous Period (**K**)	66-145
Jurassic Period (**J**)	145-201
Triassic Period (**Ŧ**)	201-252
Paleozoic Era (Pz)	
Permian Period (**P**)	252-299
Carboniferous Period (**C**)	299-359
Devonian Period (**D**)	359-419
Silurian Period (**S**)	419-444
Ordovician Period (**O**)	444-485
Cambrian Period (**Є**)	485-541
Precambrian time (**pЄ**)	Older than 541

* In millions of years before present (Ma). (Walker, J.D., Geissman, J.W., Bowring, S.A., and Babcock, L.E., compilers, 2012 Geologic Time Scale v. 4.0: Geological Society of America, doi: 10.1130/2012.CTS004R3C.)

BEDROCK GEOLOGY OF THE EAST ANDOVER QUADRANGLE

The geologic map was created to better understand the distribution, geometry, origin, and resource potential of lithium-bearing pegmatites around Newry Hill and on the north and west flanks of Plumbago Mountain. These pegmatites are within the Rumford series of the Oxford County pegmatite field (Wise and Francis, 1992). The adjacent metasedimentary rock units were also important to map in detail as these constrain the earlier history of geologic events and structural framework for the pegmatites. The consistent spatial association of two mafic units, the metagabbro and actinolite schist, with the lithium-bearing pegmatites around Plumbago Mountain suggests some process-oriented geochemical and/or structural linkages between these rocks. Because there is nearly a 30-million-year difference between the oldest dated pegmatite in the mapped area (328 Ma, Crooker pegmatite) and the youngest nearby dated pluton (356-365 Ma, Mooselookmeguntic Igneous Complex), granitoids in the region may have been the source of some contact metamorphism but are likely not the source of the pegmatitic magmas.

Numerous studies have been done on the pegmatites in this region, most notably by Shainin and Dellwig (1954) and Barton and Goldsmith (1968). Both publications resulted in excellent maps and descriptions of the pegmatites and the present map mostly preserves the outlines of the pegmatites as shown by Barton and Goldsmith (1968). Simmons et al. (2020) described the Plumbago North pegmatite, the most prominent lithium-bearing pegmatite in the region, as being one of the world's top ten largest lithium deposits with excellent resource potential. The Plumbago Mountain gabbro was studied by Moody (1974) for his M.S. degree at the University of Wisconsin. The metasedimentary rocks in the southern part of the study area were previously mapped by Brady (1991) for his M.S. thesis at the University of Maine at Orono. Moench and Hildreth (1976) mapped the entire Rumford, Maine, 15' quadrangle, the southwest quadrant of which encompasses the East Andover 7.5' quadrangle. The Bethel, Maine, 7.5' quadrangle, just southwest of the study area, was mapped by Eusden et al. (2020). The adjacent Puzzle Mountain 7.5' quadrangle was also mapped as part of this project (Koteas, 2022).

There are four main groupings of bedrock shown on the map. These include: 1) the oldest metasedimentary units; 2) the next youngest mafic units that are part of, or associated with, the Plumbago Mountain Pluton; 3) a variety of younger granitoids; and 4) three types of pegmatites which are the youngest units in the study area.

Metasedimentary units

These units consist of interbedded schist, quartzite, and granofels in various abundances and thickness that weather to either a gray, moderately rusty, or deeply rusty color. Upright and mostly inverted graded bedding is fairly common and, along with miscellaneous lithologies such as calc-silicate pods and conglomerate, helped establish the stratigraphic order. Overall, the stratigraphy appears to be inverted with the current exposure level revealing a downward facing macroscopic synformal anticline (Meadow Brook synform) and a complimentary antiformal syncline (Chase Hill Brook antiform). Abundant evidence of early, isoclinal nappe-scale folding and later, open folding was found. The rocks have been metamorphosed to the lower sillimanite zone (amphibolite facies) with a small region of staurolite zone and vestiges of early andalusite metamorphism preserved as pseudomorphs. Migmatite is rare and much less common than found just to the southwest in the Bethel and Puzzle Mountain quadrangles. Moench and Hildreth (1976) mapped the Plumbago Mountain fault in the study area based on what they determined as stratigraphic truncations. However, our mapping and new detrital zircon geochronology does not support its existence. Samples collected on either side of the fault have the same, within error, maximum depositional ages (440 ± 4 and 443 ± 4 Ma respectively, see **Locations H** and **I**). The Ordovician age of these samples reflects eroding Bronson Hill/Boundary Mountain arc rocks sourcing the zircons in the Rangeley Formation. The detrital zircon "bar codes" are also very similar to each other and most like the 1st Acadian detrital zircon cycle of Bradley and O'Sullivan (2017). These data all point to a Silurian age for the metasedimentary units in the East Andover quadrangle.

Mafic Units of the Plumbago Mountain Pluton

The two units that have been described but never subdivided in the published maps of the Plumbago Mountain Pluton (Shainin and Dellwig, 1954; Barton and Goldsmith, 1968) are the gabbro and actinolite schist. Shainin and Dellwig (1954) suggest that the actinolite schist is an altered phase of the gabbro, where the former grades into the latter and was altered due to the intrusions of pegmatites on Newry Hill. Conversely, Barton and Goldsmith (1968) recognize isoclinal folding and relict bedding in the actinolite schist which displays sharp contacts with the gabbro (which they refer to as an amphibolite) in both outcrop and core logs (**Photo 5**). We support the interpretations of Barton and Goldsmith (1968) and conclude that the actinolite schist is older than the gabbro that intrusively cuts it, is better linked to the metasedimentary units, and is of possible volcaniclastic origin. The gabbro is metamorphosed, rarely foliated, has igneous layering (?), displays intrusive phaneritic textures with mostly medium grain sizes, and includes rare lenses of pegmatitic gabbro, ultramafic and altered accumulate. A new U-Pb zircon age for the Plumbago Mountain Pluton is 417 ± 1 Ma indicating an Early Devonian (Lochkovian) age (**Location G**). This would also suggest that the actinolite schist could be no younger than earliest Devonian and more likely Silurian in age.

Granitoids

Three types of granitic intrusions are found in the mapped area: two-mica granite, muscovite granite, and trondhjemite. All three intrude into the metasedimentary units and the two granites are observed to cross cut the gabbro. There is one large mappable pluton of two-mica granite, and two smaller intrusions of the same rock type that are too small to map. The Mooselookmeguntic Igneous Complex (**Photo 4**) makes up the larger pluton and is about 1 kilometer north of the lithium-bearing pegmatites, the spatial arrangement of which may suggest that the pluton served as the source for these pegmatites (but see discussion below). A new U-Pb zircon age for the two-mica granite of the Mooselookmeguntic Igneous Complex is 365 ± 2 Ma indicating a Late Devonian age (**Location E**). However, new zircon ages for the granite in the adjacent Puzzle Mountain quadrangle (Koteas, 2022) extend the age into the Early Mississippian (Carboniferous).

There are numerous small mappable plutons of muscovite granite throughout the map and one larger pluton that intrudes the gabbro on its western margin. A new U-Pb zircon age for the largest muscovite granite pluton is 409 ± 3 Ma indicating an Early Devonian (Pragian) age (**Location F**). These two new ages and the presence of a weak foliation in the muscovite granite suggest these granites intruded 44 million years apart and bracket a period of late Acadian D2 deformation. The trondhjemite outcrops around Howard Pond and forms the only pluton of its kind in the study area. A new U-Pb zircon age for the trondhjemite pluton is 362 ± 2 Ma indicating a Late Devonian age (**Location D**).

Pegmatites

Three types of pegmatite are mapped in the study area: barren pegmatite, schorl-bearing pegmatite, and lithium-bearing pegmatite. Typically, the pegmatites intrude along bedding and/or foliation planes in the country rock and as such are mostly classified as sills. There are places, however, where discordant pegmatite dikes cut earlier fabrics, and some of these dikes connect to pegmatite sills. Dimensions of the pegmatites vary considerably with most pegmatites being too small to show at the map scale while others are up to several hundreds of meters thick and up to a kilometer in length. Textural, mineralogical, and grain size variations within any single mapped pegmatite are complex and characterized by heterogeneities at the meter to decimeter scale. In very rare instances, mylonitic shear fabrics (left-handed?) are found in the barren pegmatites. The barren pegmatites are most abundant in the metasedimentary rocks and typically form ridges and hilltops. Some barren pegmatites have intruded the gabbro, but none were found that intrude the actinolite schist. Schorl-bearing pegmatites are much less common and found in both the metasedimentary units and the gabbro. The Crooker, Dunton, Kinglet, Rose Quartz Crystal, Scotty, and Whitehall lithium-bearing pegmatites have intruded into either the gabbro or actinolite schist or both. The Main lithium-bearing pegmatite (Twin Tunnels) intrudes the gabbro, actinolite schist, and metasedimentary units, while the Spodumene Brook and Plumbago North lithium-bearing pegmatites have intruded only into the metasedimentary units. The only lithium-bearing pegmatite mapped on the southwest side of Plumbago Mountain, the Forgotten pegmatite, intrudes along the contact of metasedimentary units and the gabbro and is the only body of its kind associated with a muscovite granite. Miarolitic cavities are found in some of the Newry Hill and Plumbago Mountain lithium-bearing pegmatites and some have produced many world class specimens of multi-colored tourmaline. New U-Pb cassiterite ages were determined for the Plumbago North and Crooker quarries and are 327 ± 5 Ma (**Location A**) and 328 ± 4 Ma (**Location B**) respectively, indicating that these pegmatites are Carboniferous (Late Mississippian) in age. Though not in the mapped region, the Black Mountain pegmatite was also dated and yielded a similar age of 332 ± 3 Ma (**Location C**), within uncertainty of the pegmatites on Newry Hill. Previous geochronology of lithium-bearing pegmatites in the southern portion of the Oxford County pegmatite field show they are almost all Permian (Bradley et al., 2016). Given that the age of the Mooselookmeguntic Igneous Complex has been determined to be Devonian (Solar et al., 1998), a daughter-parent connection between the Newry Hill pegmatites and two-mica granite is dubious. Similarly, the pegmatites of Paris Hill (Mt. Mica) and their age discrepancy with the spatially associated Sebago pluton led Webber et al. (2019) to propose a Permian anatectic, decompression melting origin for the Paris Hill pegmatites. The 34-million-year difference between the oldest dated pegmatite (328 Ma, Crooker pegmatite) and the youngest nearby dated pluton (365 Ma, Mooselookmeguntic Igneous Complex) further refutes the daughter-parent connection between the pegmatites and two-mica granite in this region. However, any anatectic decompression melting would have to be Carboniferous, not Permian, in age to form these distinctly older pegmatites.

Geologic history

The following is an overview of the geologic history from oldest to youngest. 1) Early Silurian-Early Devonian flysch deposition of metasedimentary units along with possible eruption and/or deposition of proto-actinolite schist as a mafic volcaniclastic. 2) Early Devonian D1 isoclinal folding, formation of foliation, reversal of tops, and early andalusite metamorphism; 3) Early Devonian intrusion of the Plumbago Mountain Pluton; 4) Early Devonian intrusion of the muscovite granite; 5) Early to Middle Devonian amphibolite facies metamorphism (peak metamorphism); 6) Middle Devonian D2 open folding to create the map-scale downward facing synform that folded all the units (metasedimentary rocks, actinolite schist, and meta-gabbro, and muscovite granite (?)); 7) Late Devonian widespread intrusion of granitoids (Mooselookmeguntic Igneous Complex, other two-mica granites, biotite granites, and trondhjemite) accompanied by some staurolite-grade contact metamorphism; 8) Carboniferous pegmatite intrusions due to anatexis accompanied by widespread dravite exomorphism of units adjacent to the pegmatites; 9) Permian to Jurassic minor shear zones and silicified zones marking northeast-striking brittle faults.

EXPLANATION OF UNITS

INTRUSIVE ROCKS

Jurassic(?) [J]

Js — **Silicified zone.** Regions of nearly pure white quartz with rusty-weathering zones and numerous white quartz veins cutting the quartz matrix that are sometimes vuggy with small (centimeter-sized), euhedral quartz crystals. The zones dip steeply, based on attitude of quartz veins, and vary from 1 meter (m) to 20 m in width. The outcrops of this unit weather positively as ridges and commonly form lineaments seen on the lidar hillshade image. Interpreted to mark a late brittle fault; most likely a normal fault, although the sense and amount of displacement were not determined (**Photo 1A**). In one area adjacent to a silicified zone there were numerous crenulations most likely the result of slip on the fault (**Photo 1B**).

Carboniferous [C]

Clp — **Lithium-bearing pegmatite.** Very coarse to coarse-grained, simply zoned, sheet-like white pegmatite. Minerals include quartz, perthitic and graphic microcline, plagioclase (including var. cleavelandite, **Photo 2A** muscovite, schorl; ± one or more of these Li-bearing minerals listed in decreasing order of abundance: spodumene, montebrasite, lepidolite, and pink/red, green, or blue elbaite; and trace amounts of columbite-tantalite, pollucite, vivianite, and cassiterite. Observed mineral grain size is typically less than 5 centimeters (cm; 2 inches [in]) in length and width, with extreme cases up to 11 m in length in the case of spodumene (**Photo 3**). Sizes of the distinct mineral types varied at each pegmatite outcrop. Some pegmatite bodies contain miarolitic cavities up to several meters in their longest direction. The world famous Dunton Gem Mine is included in this group. Small centimeter- to decimeter-scale bands of fine-grained aplite are often found in the pegmatite. Barren and schorl-bearing zones may be included in this unit as it is exceedingly heterogeneous with frequent changes in texture and mineralogy on decimeter and meter scales. Outer zones commonly contain granitic or aplitic units, whereas inner zones contain blocky and coarse crystals on the decimeter and meter scale. Zoning is less pronounced in some dikes. Lithium-bearing minerals are commonly found in the inner zones. New U-Pb cassiterite ages were determined for the Plumbago North and Crooker pegmatites and are 327 ± 5 Ma (**Location A**) and 328 ± 4 Ma (**Location B**), respectively, indicating that these pegmatites are Carboniferous (Late Mississippian) in age. Though not in the mapped region, the Black Mountain pegmatite was also dated and yielded a similar age of 332 ± 3 Ma (**Location C**), within uncertainty of the pegmatites on Newry Hill.

Csp — **Schorl pegmatite.** Very coarse to coarse-grained white pegmatite. Minerals include quartz, perthitic microcline, plagioclase (var. cleavelandite in some cases), muscovite, schorl, ± beryl, ± garnet. Observed mineral grain size is typically less than 5 cm (2 in) in length and width, with extreme cases up to 30 cm (12 in) in length. Grain sizes of the distinct mineral types vary at each pegmatite outcrop. Small cm-scale bands of fine-grained aplite are often found in the pegmatite. Only three bodies of this type are mapped.

Cbp — **Barren pegmatite.** Very coarse to coarse-grained white pegmatite, the most abundant group of pegmatites in the map area. Minerals include quartz, perthitic microcline, plagioclase (var. cleavelandite in rare cases), muscovite (often exhibiting a plumose texture), ± garnet. Additional rare element accessory phases were not observed in the field. Observed mineral grain size is typically less than 5 cm (2 in) in length and width, with extreme cases up to 30 cm (12 in) in length. Sizes of the distinct mineral types varied at each pegmatite outcrop. Small cm-scale bands of fine-grained aplite are often found in the pegmatite. In most instances mappable pegmatite bodies form tops of small hills and ridges in the region flanked by metasedimentary rocks and have generally intruded parallel to the foliation of the latter. There are also numerous pegmatite intrusions at the majority of metasedimentary migmatite outcrops that are too small to show on the map including one mylonitic pegmatite.

Early Carboniferous-Devonian [CD]

Mooselookmeguntic Igneous Complex (Tomascak et al., 2005)

CDg — **Muscovite-biotite granite.** Medium- to fine-grained equigranular, white to light gray granite and rarely granodiorite. Mottled appearance due to the combination of minerals including quartz, potassium and plagioclase feldspars, muscovite, biotite, ± garnet, and accessory minerals zircon and apatite. Rarely, a weak foliation is observed. Centimeter- to meter-wide regions of fine-grained aplite and/or barren pegmatite are often found in muscovite-biotite granite outcrops. The largest muscovite-biotite granite pluton shown on the map is part of the Mooselookmeguntic Igneous Complex (**Photo 4**). The many smaller plutons on the map were injected as sills following strike of the metasedimentary units, and present as oblong ellipses in map view. A new U-Pb zircon age for the two-mica granite of the Mooselookmeguntic Igneous Complex is 365 ± 2 Ma indicating a Late Devonian age (**Location E**). However, new zircon ages for the granite in the adjacent Puzzle Mountain quadrangle (Koteas, 2022) extend the age into the Early Mississippian (Carboniferous).

Devonian [D]

Dtr — **Trondhjemite.** Medium-grained, equigranular, light gray trondhjemite at Howard Pond. Composed of plagioclase, quartz, biotite, and traces of muscovite and microcline. A weak foliation is commonly observed. Centimeter- to meter-wide regions of barren pegmatite are often found in trondhjemite outcrops. A new U-Pb zircon age for this pluton is 362 ± 2 Ma indicating a Late Devonian age (**Location D**).

Dmg — **Muscovite granite.** Medium- to coarse-grained equigranular, white to light gray granite. Mottled appearance due to the combination of minerals including quartz, potassium and plagioclase feldspars, muscovite, rare biotite, and accessory phases of monazite, apatite and zircon. Rarely, a weak foliation is observed. Centimeter- to meter-wide regions of fine-grained aplite and/or barren pegmatite are often found in muscovite granite outcrops. The largest muscovite granite pluton shown on the map is on the west flank of the Plumbago Mountain Pluton. The other smaller plutons on the map were injected as sills following strike of the metasedimentary units, and present as oblong ellipses in map view. A new U-Pb zircon age for this pluton is 409 ± 3 Ma indicating an Early Devonian (Pragian) age (**Location F**).

Plumbago Mountain Pluton.

Dgam — **Medium-grained metagabbro.** This unit makes up the main body of the Plumbago Mountain Pluton and is a green to dark gray, medium-grained, hypidiomorphic, tremolitic metagabbro (**Photo 5**). Mineralogy includes tremolite, plagioclase, chlorite, biotite, ± magnetite, ± talc, ± olivine, ± quartz, ± serpentine. Zones of foliation and/or igneous layering are seen frequently, and their orientations suggest the metagabbro has been deformed in addition to being metamorphosed. Near pegmatite contacts, the metagabbro is often finer grained and commonly hosts euhedral dravite up to 3 cm in length. A new U-Pb zircon age for the Plumbago Mountain Pluton is 417 ± 1 Ma indicating an Early Devonian (Lochkovian) age (**Location G**).

Dgaf — **Fine-grained metagabbro.** A fine-grained, green to dark gray, hypidiomorphic, tremolitic metagabbro. Mineralogy includes tremolite, plagioclase, chlorite, biotite, ± magnetite, ± talc, ± olivine, ± quartz, ± serpentine. Zones of foliation and/or igneous layering are infrequently seen in this unit.

Dgac — **Coarse-grained metagabbro.** A coarse-grained, green to dark gray, hypidiomorphic, tremolitic metagabbro. Mineralogy includes tremolite, plagioclase, chlorite, biotite, ± magnetite, ± talc, ± olivine, ± quartz, ± serpentine. Zones of foliation and/or igneous layering are rarely seen in this unit.

Dgav — **Very coarse grained metagabbro.** A very coarse grained, rusty-weathering metagabbro with adcumulate texture. Mineralogy includes intergrown, randomly oriented, 2-4 cm laths of tremolite (presumably replacing olivine and/or pyroxene), plagioclase, chlorite, biotite, ± magnetite, ± talc, ± olivine, ± quartz, ± serpentine.

Dum — **Ultramafic rock.** A medium- to fine-grained, dark gray, metamorphosed ultramafic rock. Mineralogy includes olivine, tremolite, chlorite, ± talc. Ultramafic bodies shown on the map are taken from Moench and Hildreth (1976) and Moody (1974).

STRATIFIED ROCKS

Devonian-Silurian(?) [DS]

DSas — **Actinolite schist.** A light to dark green actinolite schist. Mineralogy includes actinolite, chlorite, biotite, plagioclase, quartz, and abundant dravite tourmaline near pegmatite contacts (**Photo 2B** and **5**). A strong foliation is ubiquitous and relict compositional layering (bedding?) is less common. Both fabrics are deformed by open and isoclinal folds.

Silurian(?) [S]

Ssqr — **Moderately rusty weathering schist, quartzite, and granofels with no or rare calc-silicate pods.** Rose-red brown moderately rusty-weathering mica schist interbedded with thin (1-5 cm) quartzite interbeds (**Photo 6**). Minor discontinuous layers of 1-meter-thick rusty-weathering quartz-plagioclase-biotite granofels. Calc-silicate pods rare or absent (**Photo 7**). **Equivalent lithologically but not stratigraphically to Ssqr (Bethel quad).** Not previously distinguished by Moench and Hildreth (1976), may be part of the Rangeley Formation.

Sqs — **Quartzite with gray schist, no calc-silicate pods.** Light gray quartzite, in beds of variable thickness; well bedded and often graded. Contains thin interbeds of gray schist, 1 to 5 cm in thickness (**Photos 1B, 8**, and **9**). Calc-silicate pods are rare or absent. **Equivalent lithologically but not stratigraphically to Sqs (Bethel quad). Could be unit Ssg, which is equiv to Ssrc in Bethel.** Correlates with Moench and Hildreth's (1976) Perry Mountain Formation.

Ssqg — **Gray biotite granofels, no calc-silicate pods.** Medium-grained, granoblastic quartz-plagioclase-biotite granofels, minor gray schist, and no calc-silicate pods. **Equivalent lithologically but not stratigraphically to Ssqg (Bethel quad).** Correlates with Moench and Hildreth's (1976) Madrid Formation but may instead correlate to the Rangeley Formation. Nearly identical lithologically, but not stratigraphically, to unit Ssrcg.

Ssrc — **Deeply rusty weathering to moderately rusty weathering schist, quartzite, and granofels with no calc-silicate pods.** Red-brown rusty-weathering mica schist interbedded with thin (1-5 cm) quartzite interbeds (**Photo 10**). Minor discontinuous layers about 1 meter thick of rusty-weathering quartz-plagioclase-biotite granofels and calc-silicate granofels (**Photo 11**). Calc-silicate pods rare or absent. **Equivalent to Ssrc (Bethel quad).** Correlates with Moench and Hildreth's (1976) Smalls Falls Formation but may instead correlate to the Rangeley Formation.

Ssrcg — **Gray biotite granofels, no calc-silicate pods.** Medium-grained, granoblastic quartz-plagioclase-biotite granofels, minor gray schist, and no calc-silicate pods. **Equivalent to Ssrcg (Bethel quad).** Correlates with Moench and Hildreth's (1976) Madrid Formation but may instead correlate to the Rangeley Formation.

Ssqc — **Gray schist and quartzite with calc-silicate pods.** Heterogeneous unit of variably interbedded gray schist and quartzite where schist is generally more abundant. Calc-silicate pods are found sporadically throughout the unit. **Equivalent to Ssqc (Bethel quad).** Correlates with Moench and Hildreth's (1976) Perry Mountain and also Hildreths Formation but may instead correlate to the Rangeley Formation.

Ssr — **Moderately rusty weathering schist and granofels.** Red-brown moderately rusty weathering mica schist with rare interbedded quartzite, rare conglomerate (**Photo 12**), and minor, discontinuous layers 1-3 meters thick of rusty-weathering quartz-plagioclase-biotite granofels. Calc-silicate pods are found sporadically throughout the unit. **Equivalent to Ssr (Bethel quad).** Not previously distinguished by Moench and Hildreth (1976), may be part of the Rangeley Formation.

EXPLANATION OF LINES

Contact between rock units of stratigraphic or intrusive origin (well located, approximately located, poorly located).

Synformal and antiformal fold axis. Plunging synclinal and anticlinal fold axes.

High-angle fault (well located, approximately located, poorly located), based on prominent topographic lineaments that align with silicified zones.

A — A'

Line of cross section.

EXPLANATION OF SYMBOLS

Note: Structural symbols are drawn parallel to strike or trend of measured structural feature. Barb or tick indicates direction of dip, if known. Annotation gives dip or plunge angle, if known. For most planar features, symbol is centered at observation point; for joints, observation point is at end of strike line opposite dip tick. For linear features, tail of symbol is at observation point. Multiple measurements at a site are represented by combined symbols. Symbols on the map are graphical representations of information stored in a bedrock database at the Maine Geological Survey. The database contains additional information that is not displayed on this map.

- Outcrop of mapped unit.
- Vein (inclined).
- 20 20 Aplitic or felsic dike (inclined).
- \+ 20 Pegmatitic dike (outcrop, strike only, inclined, vertical).
- 20 Bedding, tops unknown (inclined, vertical).
- 20 20 Bedding, tops known (inclined, overturned inclined).
- 20 Foliation (inclined, vertical).
- 20 20 20 Mineral lineation, plunging (crenulation, mineral, unspecified).
- 20 Axial plane of fold (inclined, vertical).
- 20 Axis of minor fold (plunging).
- Rock quarry (active, inactive) or prospecting pit.
  a) Swasey Quarry, b) Plumbago North, c) Spodumene Brook, d) Forgotten prospect, e) Whitehall, f) Rose Quartz Crystal Locality, g) Scotty, h) Kinglet, i) Dunton, j) Crooker, k) Twin Tunnels, l) Perham, m) Elliot, n) Black Mountain.
- 1 Photo location.
- A Geochronology sample location. See **Table 1**.

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Bedrock Geology of the East Andover Quadrangle, Maine

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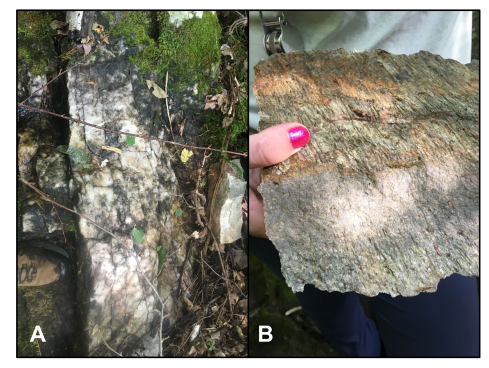

Photo 1: A: White quartz veins marking a silicified zone that is interpreted to be a northeast-striking, steeply dipping, late-stage fault (strike-slip?). Motion along the fault may be associated with the formation of localized crenulations seen in the photo on the right. B: Late crenulations of foliation and bedding in schists and quartzites of unit Sqs. The plunge of these lineations was always down dip and nearly as steep as the dips of the bedding and foliation. These are localized structures in a brook east of Newry Hill and may be related to strike-slip (?) motion along the silicified zone fault nearby.

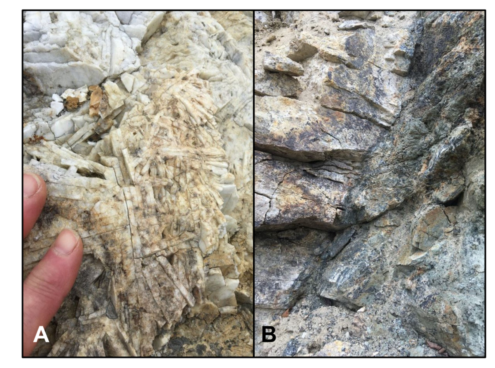

Photo 2: A: Interlocking blades of plagioclase (var. cleavlandite) near the wall zone at the top of the Crooker pegmatite. B: Sharp contact between the Crooker pegmatite to the left and the actinolite schist to the right. The actinolite schist has abundant dravite mineralization throughout.

Photo 3: Interlocking, randomly oriented crystals of spodumene, some up to 5 meters in length, exposed at the Plumbago North quarry. Evan Saltman (Bates '22) for scale.

Photo 4: Medium-grained two-mica granite of the Mooselookmeguntic Igneous Complex cross cut by several generations of barren pegmatite veins in Howe Brook.

Photo 5: Metagabbro is phaneritic and medium-grained, with white plagioclase phenocrysts in a matrix of dark amphibole (actinolite/tremolite) that are most likely an alteration product of pyroxene and less so olivine. Actinolite schist is massive, well foliated, composed of largely of amphibole (actinolite/tremolite), in places shows "relict bedding" (Barton and Goldsmith, 1968), and has dravite mineralization (large black crystals) where adjacent to pegmatite. Contact between the metagabbro and actinolite schist is sharp suggesting an intrusive relationship. *Base of NEBI core 63-8, 105 ft depth.*

Photo 6: Bedding, defined by quartzite and schist layers dipping from upper left to lower right, and foliation, dipping nearly vertically, are at high angles to each other in this outcrop of the moderately rusty to gray-weathering unit **Ssqr**. These non-parallel structural fabrics suggest the outcrop is within the hinge region of an early F1 fold.

Photo 7: Oval calc-silicate pod, below hammer, lies parallel to well bedded schists and quartzites of unit **Ssqr**. The presence or absence of calc-silicate pods was helpful in establishing the stratigraphic order in units that were otherwise quite similar lithologically.

Photo 8: Folded quartzites and schists of unit **Sqs** exhibiting a well-developed axial planar foliation oriented roughly horizontally in the photo (Swasey Quarry). This is likely an early F1 fold.

Photo 9: Well bedded and slightly folded schists and quartzites of unit **Sqs** intruded by a sill of barren pegmatite on the right, at the summit of Mt. Dimmock. Bedding in this outcrop is inverted, dipping to the northwest.

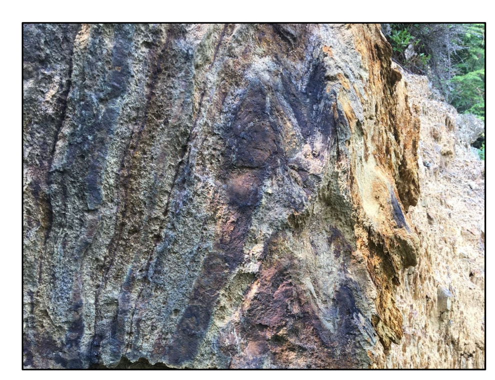

Photo 10: Isoclinally folded rusty-weathering schists and quartzites of unit **Ssrc** immediately adjacent to the Elliot pegmatite quarry. The deep rusty weathering makes it difficult to determine whether the foliation is folded, which would suggest an intermediate-aged fold, or axial planar, which would indicate an early fold.

Photo 11: A late fold of rusty-weathering granofels and schists of unit **Ssrc**. Both bedding and foliation are folded by this open fold.

Photo 12: Pavement outcrop of rusty-weathering conglomerate with large (5-10 cm diameter) rounded clasts of amphibolite (metagabbro?) in a matrix of rusty, well foliated schist. This may indicate that the mafic units of Plumbago Mountain (**Dgam** metagabbro and/or **DSas** actinolite schist) were present to be eroded during **Ssr** deposition or that an older unrelated mafic rock was present.

TABLE 1. GEOCHRONOLOGY

Location	Unit	Mineral	Method	Age±2σ (Ma)	Source
A	Clp (Plumbago North)	Cassiterite	LA-ICP-MS U-Pb	327 ± 5	This study
B	Clp (Crooker)	Cassiterite	LA-ICP-MS U-Pb	328 ± 4	This study
C	Clp (Black Mountain)	Cassiterite	LA-ICP-MS U-Pb	332 ± 3	This study
D	Dtr	Zircon	LA-ICP-MS U-Pb	362 ± 2	This study
E	CDg	Zircon	LA-ICP-MS U-Pb	365 ± 2	This study
F	Dmg	Zircon	LA-ICP-MS U-Pb	409 ± 3	This study
G	Dgam	Zircon	LA-ICP-MS U-Pb	417 ± 1	This study
H	Sqs	Detrital Zircon	LA-ICP-MS U-Pb	440 ± 4	This study
I	Sqs	Detrital Zircon	LA-ICP-MS U-Pb	443 ± 4	This study

Location is shown on the map by a letter in a blue box.

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