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Title of article Basaltic rocks in the Rensselaer Plateau and Chatham slices of the Taconic allochthon: Chemistry and tectonic setting

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Tables A and B

Table **A**. List of volcanic localities in the Taconic allochthons

	Locality (see fig. 1)	Description	Reference
1	Ward Hollow hill 1300 ft. elev. 1 mi SW of Banker Pond	5 m thick sill or flow of augite basalt analysis 4, table 2	Potter, 1972, p. 12, Prindle and Knopf, 1932, p. 282 (this report)

A small exposure at the crest of the hill 1280 ft, 3.2 km southwest of Banker Pond consists of dark, fine-grained basalt about 5 m thick (loc. 1, fig. 1; Potter, 1972). The thick basalt is chilled at its upper and lower contact, and is consordant with bedding in graywacke above and beneath. At the lower contact a thin 1 cm layer of laminated green phyllite separates the basalt and the graywacke. The basalt is strictly concordant to this layer. Both rocks are cross foliated by the regional foliation trending N60^{o}E and dipping 65^{o} southeast. A sample 0.6 m from the base of the basalt contains glomeroporphyritic (40%) augite and flow-oriented laths of albite 0.5 to 1 mm long (25%), set in a finer grained intergranular matrix consisting of granular epidote and tiny albite. The rock is not vesicular. Potter (1972) described this rock as a lamprophyric dike but the observations presented here indicate that it is a metamorphosed sill or flow of basaltic composition. Attempts to trace this basalt beyond the hill were not successful.

2	Banker Pond NW facing hill 3000 ft SW of Banker Pond	14 m thick mass of pillow basalt and agglomerate with admixed purple and green slate, variolitic basalt analysis 5, table 2 and fig. 3.	Potter, 1972, p. 12

The basalt is aphanitic to variolitic with fine flow-banding and pinhole size calcite-filled and flattened vesicles, although these are not abundant. Veins of epidote and fine-grained quartz criss-cross the highly fractured basalt. Most of the basalt is plagiophyric and top of the unit contain microphenocrysts of augite 0.07 mm long, (45%) and 55% microphenocrysts of plagioclase up to 0.12 mm long. In the lower pillowed zone, red and green argillite are intermixed with angular fragmental pillow basalt and chaotic zones of disrupted green and red argillite. The observation from the lower and flow or series of flows that were extruded onto fine grained argillite that can be interpreted as the upward fining sequence of a turbiditic graywacke sequence.

3	2 mi N of Stillham on south side of road leading NW to Babcock Lake	Two lenses of black and dark green fine-grained to glassy basalt 3-15 m thick and intermixed laminated tuff(?) and graywacke section approximately 45 m thick.	Potter, 1972, p. 12 (this report)

Irregular circular patches rich in chlorite, opaques and granular plagioclase suggest the presence of local patches of glass in the original rock. The greener layers are slightly coarser grained than the black rock and contain submicroscopic augite and flow layering comparable to that seen in the finer grained volcanic rock. Owing to poor exposure the proportion of true basalt to interbedded volcanic sediments is uncertain, but probably represents less than 20% of the 45 m thickness of epidote-rich phyllites. The thickest basalt flow observed was approximately 1.5 m thick. The observations here indicate basaltic lava flows and intercalated volcanic derived sediments.

Locality	Description	Reference

4 Stillham, N.Y., cliffs south of E-W highway — Potter, 1972, p. 12 (this report)

Two layers, (a) stilpnomelane-rich phyllite and carbonate pitted tuffaceous rock and (b) lower dark green compact aphanitic to glassy basalt. Thickness about 16 m.

5 Turner Mtn and hill 1653 — Balk, 1953, p. 829 (this report)

Two layers of holocrystalline augite basalt approximately 16 m to 30 m thick overlie coarse Rensselaer Graywacke and contain interbedded fine-grained tuffaceous beds between layers. Contacts concordant with strata, chilled borders and internal flow structure near contacts. Chemical analyses (1), (9), (10) from upper flow or sill, sample (2) from lower flow or sill exposed for 1 mi along strike of E-W trending 45^{o} SE dipping beds. Intercalated conglomerate contains clasts of aphanitic volcanic rock, and beds of tuffaceous sediments.

6 Glass House, Averill Park, NY, quadrangle — Prindle and Knopf, 1932 p. 282 (this report)

One layer of fine-grained augite basalt 3 to 10 m thick overlying Rensselaer Graywacke Member with conformable contact. Analyses 3, table 2. Exposures are 60 meters north of the trail leading from Glass Lake to Bare Top Mtn. At this locality the basalt is chilled near its margin and is approximately 10 m thick although the outcrops are sporadic. The basalt can be traced 80 m northwest from the tril parallel to the N50^{o}W trend of bedding in the overlying graywacke.

7 Mercer Mountain State Line NY, MA quadrangle — Ratcliffe, 1974

Mass of poorly layered epidote green-stone with relict intersertal texture and augite, interlayered at base with green slate of the Nassau Formation and overlying Rensselaer Graywacke Member. Sedimentary rocks and basalt are interbedded for approximately 20 meters, fragmental structures present.

8 Fog Hill, State Line NY, MA quadrangle — Ratcliffe, 1974

Lower, thick mass of epidote-actinolite greenstone with relict intersertal texture and augite, up to 30 m thick interlayered with Rensselaer Graywacke Member and Nassau Formation phyllite. Locally discordant stocks or sills of coarse grained stilpnomelane-rich coarse grained augite basalt overlie the lower greenstone with thin layers of metasediment in between. A north eastern extension (8A) grades into a thin lenses of the tuffaceous(?) stilpnomelane-rich basalt that exhibits gradational contacts upwards into overlying siltstone, chemical analyses (6) of upper basalt, (7) of lower greenstone, table 2.

9 Queechy Lake, Canaan, quadrangle — Ratcliffe, 1978

Two layers of basalt, a lower fine-grained black tuffaceous or glassy layer 15-7 m thick and a upper epidote greenstone and coarse-grained stilpnomelane-rich augite basalt up to 130 m thick, resembles upper layer at Fog Hill. Relict igneous textures in upper layer. Lower basalt rests on olive drab siltstone. Analysis 8 of base of upper basalt, table 2.

Locality	Description	Reference
10 The Knob Cannan Mountain	One layer of epidote greenstone and coarse basalt 70 m thick(?) resting on Rensselaer Graywacke Member and olive drab siltstone perhaps tuffaceous, with base of glassy(?) basalt 10 ft thick resembling fine-grained variolitic basalt from pillow lava locality at Banker Pond locality 2, and at Stillham locality 4.	Ratcliffe, 1978 (this report)
11 Berkshire Boys Farm Canaan, NY quadrangle	Two relatively continuous 15 m layers of epidote greenstone and stilpnomelane-rich volcanic rock each exhibiting gradational contacts upwards with overlying green or gray slate, and interlayered with lenses of Rensselaer Graywacke, a third locally has a layer 10 m thick of tuffaceous greenstone overlying a lens of Rensselaer Graywacke. Total thickness of interlayer basalt and metasedimentary rock 170 m. Belt continuous to south with locality (8). Entire sequence thins and fines northward.	Ratcliffe, 1978 (this report)
12 Jiminy Peak, Hancock, N.Y. quadrangle	Four small occurrences of epidote-rich greenstone and interlayered metasedimentary rocks, lacking igneous textures thickness 5 to 1.5 with magnetite-rich green phyllite.	This report and on geologic map of Massachusetts data from Potter and Ratcliffe, unpub. geologic map of Hancock quadrangle.
13 Berlin Mountain, Stephentown powerline exposure	30-50 m section of laminated quartz-epidote rich tuffaceous rocks with minor pods or blocks of epidote-rich variolitic basalt, locally near top resembling dismembered zones of pillow basalt, abundant admixed quartz throughout, rest of section overlain by Rensselaer Graywacke, section right side up. These rocks closely resemble laminated phyllites present beneath the upper Turner Mountain flow, beneath basalt at The Knob, and interlayered at the tops of the basaltic rocks east of Canaan Valley. A sample of one of the most felsic-appearing layers, resembling metarphyolite is actually iron-rich quartzose sediment (see section on chemistry).	Potter, 1979, Balk, 1953 (this report)
14 Localities where pebbles of basalt	(A) epidote basalt pebble (B) aphanitic felsite in quartz conglomerate have been seen in in Nassau Formation	Balk, 1953, plate 8, fig 3 Ratcliffe, Bird, and Bahrami, 1975, p. 81
Rensselaer Graywacke	(C) localities within Rensselaer plateau slice where volcanic pebbles have been noted, largely felsic or intermediate volcanics.	
15 Tuff localities in the slate belt between North Petersburg and Cherry Plain, N.Y.	Most occur within Rensselaer Plateau slice as shown on Massachusetts geologic map but several appear in Giddings Brook slice of Potters usage, correlation of slices here is uncertain and verification of these rocks a tuffs is lacking.	Balk, 1953, plate 1

Table B. Instrumental neutron activation analyses of trace elements in basalts from the Taconic allochthon.

Sample:	1	2	3	4
	51-10	51-11	51-5	56-2
Replicates:	(2)	(2)	(2)	(2)
Na (%)	1.60 ±3%	2.25 ±3%	1.83 ±3%	1.64 ±3%
Ca (%)	6.05 ±5%	6.22 ±5%	4.42 ±6%	5.82 ±5%
Sc (PPM)	38.3 ±2%	33.9 ±2%	38.1 ±2%	37.1 ±2%
Cr (PPM)	7.1 ±15%	57.6 ±3%	86.4 ±3%	78.1 ±2%
Fe (%)	12.79 ±2%	11.24 ±1%	12.60 ±2%	11.61 ±2%
Co (PPM)	49.5 ±2%	50.5 ±2%	58.9 ±%	52.6 ±2%
Ni (PPM)	<130	89 ±18%	81 ±18%	80 ±18%
Zn (PPM)	165 ±3%	131 ±4%	151 ±5%	126 ±6%
Rb (PPM)	42 ±11%	32 ±14%	35 ±10%	65 ±7%
Sr (PPM)	330 ±15%	440 ±13%	<500	470 ±20%
Zr (PPM)	252 ±11%	158 ±16%	188 ±15%	260 ±17%
Sb (PPM)	0.30 ±30%	0.46 ±19%	0.44 ±25%	0.50 ±11%
Cs (PPM)	3.37 ±3%	1.61 ±5%	1.14 ±11%	1.02 ±8%
Ba (PPM)	444 ±6%	350 ±7%	439 ±6%	603 ±5%
La (PPM)	28.2 ±2%	19.3 ±2%	21.6 ±2%	18.9 ±3%
Ce (PPM)	63.9 ±3%	43.7 ±3%	46.4 ±3%	42.9 ±3%
Nd (PPM)	40 ±8%	28.9 ±6%	31.1 ±9%	27.9 ±6%
Sm (PPM)	10.83 ±2%	7.52 ±2%	7.81 ±2%	7.72 ±2%
Eu (PPM)	3.01 ±2%	2.22 ±2%	2.23 ±2%	2.32 ±2%
Tb (PPM)	1.53 ±3%	1.14 ±3%	1.13 ±4%	1.16 ±3%
Ho (PPM)	2.07 ±6%	1.35 ±11%	1.50 ±7%	1.63 ±11%
Yb (PPM)	4.12 ±3%	2.97 ±4%	3.00 ±3%	2.87 ±3%
Lu (PPM)	0.581 ±3%	0.435 ±3%	0.443 ±4%	0.433 ±3%
Hf (PPM)	6.74 ±3%	4.77 ±2%	4.80 ±2%	4.87 ±5%
Ta (PPM)	1.64 ±3%	1.12 ±4%	1.12 ±3%	1.10 ±4%
Th (PPM)	2.23 ±6%	1.60 ±7%	1.62 ±7%	1.55 ±7%
U (PPM)	0.65 ±7%	<0.5	0.45 ±10%	<0.5
La/CHOND	91.2	62.6	70.0	61.0
Ce/CHOND	79.2	54.1	57.5	53.2
Nd/CHOND	67.1	48.2	51.9	46.5
Sm/CHOND	55.5	38.6	40.1	39.6
Eu/CHOND	41.1	30.19	30.38	31.63
Tb/CHOND	32.8	24.43	24.21	25.04
Ho/CHOND	28.89	18.86	20.85	22.80
Yb/CHOND	19.80	14.27	14.41	13.79
Lu/CHOND	18.10	13.55	13.79	13.49

Error limits one standard deviation based on counting statistics, in percent. G.A. Wandless, analyst. Normalized to CI chondrite values of Anders and Ebihara (1982).

Table B. continued

Sample:	5 56-3B	6 63-1	7 63-2	8 63-3
Replicates:	(2)	(2)	(2)	(2)
Na (%)	3.55 ±3%	2.21 ±3%	1.68 ±3%	2.03 ±3%
Ca (%)	7.4 ±5%	5.1 ±7%	7.0 ±5%	4.9 ±8%
Sc (PPM)	38.6 ±2%	39.6 ±2%	33.8 ±1%	36.9 ±2%
Cr (PPM)	426 ±2%	<6	100.7 ±2%	46.8 ±4%
Fe (%)	6.65 ±2%	11.82 ±2%	10.89 ±1%	11.98 ±2%
Co (PPM)	30.2 ±2%	44.5 ±2%	55.1 ±2%	50.6 ±2%
Ni (PPM)	81 ±17%	<140	98 ±19%	<140
Zn (PPM)	61 ±8%	146 ±4%	127 ±4%	141 ±4%
Rb (PPM)	<26	60 ±13%	<30	29 ±14%
Sr (PPM)	440±17%	330 ±29%	480 ±11%	750 ±8%
Zr (PPM)	<270	309 ±10%	170 ±15%	210 ±31%
Sb (PPM)	0.61 ±10%	0.39 ±20%	0.46 ±16%	0.52 ±21%
Cs (PPM)	<0.6	9.49 ±2%	0.33 ±21%	4.55 ±3%
Ba (PPM)	<240	410 ±8%	168 ±14%	179 ±17%
La (PPM)	1.95 ±4%	25.2 ±2%	16.5 ±3%	22.5 ±2%
Ce (PPM)	5.2 ±23%	57.5 ±4%	37.5 ±5%	49.6 ±4%
Nd (PPM)	<10	36 ±13%	27.0 ±7%	32.1 ±6%
Sm (PPM)	1.85 ±2%	9.83 ±2%	6.46 ±2%	8.53 ±2%
Eu (PPM)	0.678 ±4%	2.85 ±2%	1.95 ±3%	2.52 ±3%
Tb (PPM)	0.47 ±7%	1.45 ±3%	0.93 ±4%	1.23 ±4%
Ho (PPM)	0.84 ±11%	1.76 ±7%	1.21 ±12%	1.64 ±19%
Yb (PPM)	2.07 ±4%	3.80 ±3%	2.55 ±4%	3.21 ±3%
Lu (PPM)	0.313 ±3%	0.58 ±8%	0.369 ±4%	0.467 ±3%
Hf (PPM)	1.01 ±6%	6.36 ±3%	3.89 ±5%	5.20 ±3%
Ta (PPM)	0.090 ±15%	1.78 ±3%	0.95 ±5%	1.26 ±3%
Th (PPM)	<0.7	2.09 ±7%	1.37 ±7%	1.83 ±7%
U (PPM)	<0.4	0.59 ±8%	0.53 ±10%	0.55 ±12%
La/CHOND	6.30	81.6	53.6	72.9
Ce/CHOND	6.43	71.3	46.5	61.4
Nd/CHOND		60.7	45.1	53.6
Sm/CHOND	9.49	50.4	33.1	43.7
Eu/CHOND	9.23	38.9	26.63	34.4
Tb/CHOND	10.09	31.15	20.06	26.40
Ho/CHOND	11.73	24.56	16.91	22.92
Yb/CHOND	9.96	18.28	12.25	15.45
Lu/CHOND	9.75	18.11	11.49	14.56

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Fe (%)	12.79 ±2%	11.24 ±1%	12.60 ±2%	11.61 ±2%
Co (PPM)	49.5 ±2%	50.5 ±2%	58.9 ±%	52.6 ±2%
Ni (PPM)	<130	89 ±18%	81 ±18%	80 ±18%
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Ce (PPM)	63.9 ±3%	43.7 ±3%	46.4 ±3%	42.9 ±3%
Nd (PPM)	40 ±8%	28.9 ±6%	31.1 ±9%	27.9 ±6%
Sm (PPM)	10.83 ±2%	7.52 ±2%	7.81 ±2%	7.72 ±2%
Eu (PPM)	3.01 ±2%	2.22 ±2%	2.23 ±2%	2.32 ±2%
Tb (PPM)	1.53 ±3%	1.14 ±3%	1.13 ±4%	1.16 ±3%
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Yb (PPM)	4.12 ±3%	2.97 ±4%	3.00 ±3%	2.87 ±3%
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Ce/CHOND	79.2	54.1	57.5	53.2
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Sm/CHOND	55.5	38.6	40.1	39.6
Eu/CHOND	41.1	30.19	30.38	31.63
Tb/CHOND	32.8	24.43	24.21	25.04
Ho/CHOND	28.89	18.86	20.85	22.80
Yb/CHOND	19.80	14.27	14.41	13.79
Lu/CHOND	18.10	13.55	13.79	13.49

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Hf (PPM)	1.01 ±6%	6.36 ±3%	3.89 ±5%	5.20 ±3%
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Th (PPM)	<0.7	2.09 ±7%	1.37 ±7%	1.83 ±7%
U (PPM)	<0.4	0.59 ±8%	0.53 ±10%	0.55 ±12%
La/CHOND	6.30	81.6	53.6	72.9
Ce/CHOND	6.43	71.3	46.5	61.4
Nd/CHOND		60.7	45.1	53.6
Sm/CHOND	9.49	50.4	33.1	43.7
Eu/CHOND	9.23	38.9	26.63	34.4
Tb/CHOND	10.09	31.15	20.06	26.40
Ho/CHOND	11.73	24.56	16.91	22.92
Yb/CHOND	9.96	18.28	12.25	15.45
Lu/CHOND	9.75	18.11	11.49	14.56

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