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MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–1898–D (SHEET 1 OF 2)
Pamphlet accompanies map

Base prepared by U.S. Army Topographic Command, 1956
100,000-foot grid based on Maine Coordinate system, West zone, and New Hampshire and Vermont Coordinate systems
Planimetry revised in 1972 by the U.S. Geological Survey from aerial photographs taken 1972

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GEOLOGIC MAP OF THE SHERBROOKE–LEWISTON AREA, MAINE, NEW HAMPSHIRE, AND VERMONT, UNITED STATES, AND QUEBEC, CANADA

By

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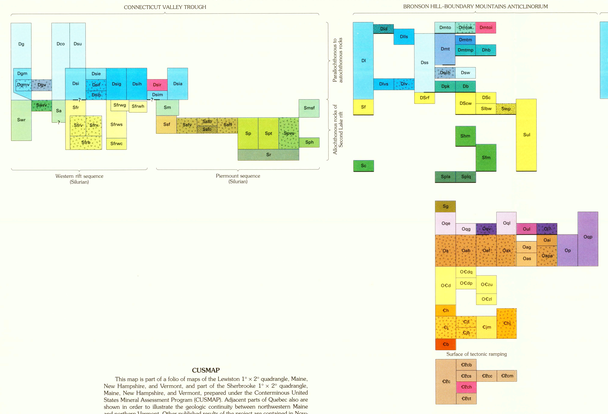
1995

CORRELATION OF MAP UNITS

STRATIFIED METAMORPHIC ROCKS

[Heavy line at lower contact of unit indicates unconformity or disconformity]



PLUTONIC AND RELATED VOLCANIC ROCKS

[Order of listing is not necessarily the same as order of emplacement]

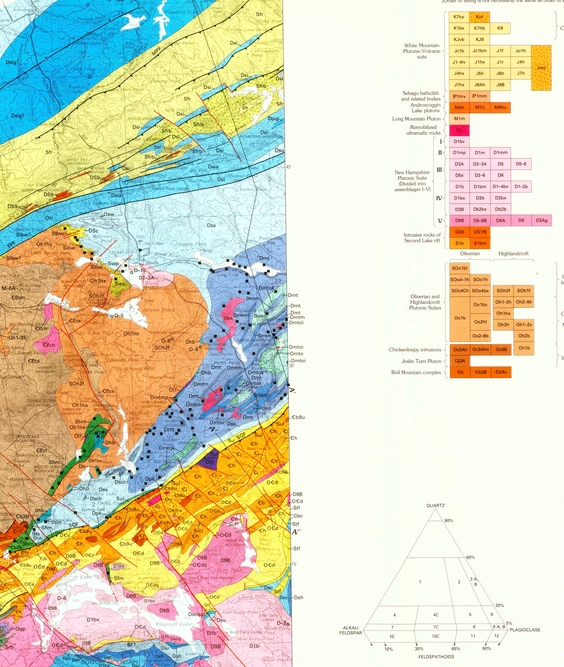


Figure 1. Explanation of plutonic rock symbols. Classification of Streckeisen and others (1973); triangular diagram modified from Osberg and others (1985). Petrographic compositions from triangular diagram and other features are incorporated in map symbols, as shown by the following example, unit Ordx (Ordovician porphyritic biotite granite of Oliverian Plutonic Suite):

1 2 3 4 5
O o 1 b ×

1. **Age**: O, Ordovician.
2. **Formal rock unit name**: o, Oliverian Plutonic Suite; k, Kinsman Granodiorite, for example. Name symbols are used only for some regionally important or locally distinctive units.
3. **Composition**: 1, granite (from units Jz1b and Ordb); 2–6, granodiorite to tonalite (from unit D2-6); 1f9, intrusive felsite and diabase or gabbro (from unit D5f9); for example, All compositions from diagram, as follows:
   1 Granite — 7C Monzonite
   2 Granodiorite — 8 Monzodiorite
   3A Tonalite — 9 Diorite or gabbro
   3B Trondhjemite — 9A Diorite
   4 Quartz syenite — 9B Gabbro
   4A Quartz monzonite — 10 Foid-bearing syenite
   4C Quartz monzodiorite — 10C Foid-bearing monzonite
   5 Quartz diorite — 11 Foid-bearing monzodiorite
   6 Quartz tonalite — 12 Foid-bearing gabbro or diorite
   (Unusually rocks (not shown on triangular diagram)
4. **Characteristic dark mineral and color**: b, biotite (± muscovite); m, muscovite (± biotite); h, hornblende or hastingsite (± biotite); c, nepheline (± hastingsite); g, abundant garnet; l, leucocratic. Omitted from symbol, if assemblage III of New Hampshire Plutonic Suite and some other units.
5. **Texture and structure**: x, porphyritic; v, variably porphyritic or seriate-porphyritic to equigranular; p, pegmatitic; f, fine-grained or aphanitic; m, mixed with abundant inclusions of metasedimentary or plutonic country rocks

LIST OF MAP UNITS

[Symbols for plutonic rocks are derived from the triangular diagram shown and explained in figure 1. Isotopically dated plutonic rock units indicated by age (for example, K, Cretaceous) and locality number; isotopically dated hornblende metamorphic rock units indicated by letter M and locality number. Fossil-dated stratified metamorphic rock unit indicated by letter F]

Map unit symbol	Map unit	Isotopic age determination
	White Mountain Plutonic-Volcanic Suite (Early Cretaceous and Jurassic)	
	Early Cretaceous rocks—Includes New England–Quebec igneous province of McHone and Butler (1984)	
K7hx	Porphyritic hornblende-biotite syenite at Pleasant Mountain	K–1
K7vt	Trachyte at Pleasant Mountain	
K1bx	Porphyritic biotite granite at Megantic Mountain	K–2
K7hb	Hornblende-biotite syenite at Megantic Mountain	K–2
K9	Gabbro-diorite at Megantic Mountain	K–2
	Early Cretaceous or Jurassic rocks	
Kjvb	Basalt plug at Red Ridge	
Kjg	Granite gabbro plug or dike near Bridgton	
	Jurassic rocks—Includes White Mountain Magma Series province of McHone and Butler (1984)	
Jz1b	Conway Granite and Conway-type granite—Biotite monzogranite	J–2 to J–4 and J–6 to J–11
Jz1bm	Conway-type granite containing abundant plutonic inclusions	
Jz1m	Porphyritic phase of Gay Brook ring dike	
Jz1f	Mount Osceola Granite—Hornblende-biotite monzogranite granite	J–16
Jz1v	Leucocratic granite to quartz syenite	
J1-4lv	Hornblende granite porphyry	J–5, J–10, J–19
J1hx	Riebeckite granite	J–15
J1r	Hastingsite or ferroferrichtite quartz syenite	J–1, J–10
J4b	Porphyritic hornblende quartz monzodiorite	J–13, J–14, J–17
J4hx	Hornblende-biotite quartz monzodiorite, quartz monzonite, and diorite	J–10
J5b	Hornblende-biotite granite	
J7h	Hornblende or ferroferrichtite syenite and quartz syenite	J–12
J7hx	Porphyritic hornblende syenite	J–18
J8Ah	Hornblende-biotite diorite	
J9b	Olivine-augite gabbro	
J9hy	Hornblende Vikingite	J–20
	Sebago batholith and related bodies (Pennsylvanian)	
P1mw	Weld's textured two-mica granite—Most body of Sebago batholith	C–1, C–2
P1hsm	Twin Mill Granite—Biotite granite containing abundant metasedimentary inclusions	
	Androscoggin Lake plutons (Mississippian?)	
M4h	Hornblende-biotite quartz syenite	
M1hx	Hornblende diorite	
M7m	Hornblende diorite to gabbro and pyroxenite	C–4
M1m	Two-mica granite of Long Mountain pluton (Mississippian)	C–3
M1m	Remobilized ultramafic rocks (Devonian?)—Emplaced mainly along or near faults	
	New Hampshire Plutonic Suite (Devonian)— Divided into five assemblages (I–V)	
	Assemblage I—Probable youngest Devonian plutons	
D1bv	Variably textured biotite granite	D–8
	Assemblage II—Two-mica granite and related rocks	
D1mp	Pegmatitic granite and pegmatite	D–4
D1m	Two-mica granite	D–3, D–4
D1mm	Two-mica granite containing abundant granodiorite to quartz diorite inclusions	
	Assemblage III—Biotite or hornblende-biotite granite to quartz diorite; muscovite absent	
D2-A	Biotite granodiorite and hornblende-biotite granodiorite to tonalite	D–2A, D–2B, D–15
D2-3A	Biotite and hornblende-biotite quartz monzodiorite	D–1, D–13
D5	Hornblende-biotite quartz monzodiorite to quartz diorite	D–5
D5v	Feldspar-porphyritic hornblende-biotite quartz monzodiorite	
D2-6	Biotite and hornblende-biotite granodiorite to tonalite or quartz diorite	D–2A, D–2C, D–7
D6	Hornblende-biotite quartz diorite	
	Assemblage IV—Muscovite-bearing biotite granodiorite to granite and tonalite	
D1b	Biotite granite	D–3
D1bm	Biotite granite containing abundant metasedimentary inclusions	
D1-4lx	Porphyritic hornblende and quartz syenite	D–3
D1-2b	Biotite granite and granodiorite	D–12, D–16
D1bx	Porphyritic biotite granite	D–6
D2b	Biotite granodiorite	
D2bx	Porphyritic biotite granodiorite	
D3B	Trondhjemite	
Dk2bx	Kinsman Granodiorite	
Dk2b	Berlin Mills Granodiorite	D–9
	Assemblage V—Mafic and hybrid rocks	
D9B	Gabbro, troctolite, norite, epidiorite, and minor ultramafic rocks	D–1
D5-9B	Hornblende quartz monzodiorite to gabbro	
D9A	Diorite	
D9	Epidiorite	
D3Ag	Garnet-bearing pentlandite-bearing tonalite	
	Intrusive rocks of Second Lake rift (Early Devonian and Silurian)	
D5f9	Sheeted and massive diabase and gabbro dikes (Early Devonian and Silurian)	
D5-f9	Sheeted biotite granite and intermediate to mafic rocks	
S1b	Hypabyssal biotite granite (Silurian)	S–1
S1bm	Mixed biotite granite and intermediate to mafic rocks	
	Oliverian Plutonic Suite (Silurian? and Ordovician)	
	Intrusive rocks of Second Lake rift (Early Devonian and Silurian)	
SOo1bz	Leucocratic biotite granite	S–3, O–14
SOo1b-1h	Hornblende-biotite syenite to quartz syenite	O–1
SOo1h	Hornblende-biotite granite	
SOo4Ch	Hornblende-biotite quartz monzonite	
SOo4bx	Porphyritic biotite quartz syenite	
	Ordovician rocks (Cincinnatian and Mohawkian)	
	Biotite granite	O–2, O–8
Oo1b	Porphyritic biotite granite	
Oo1bx	Leucocratic hastingsite granodiorite	O–12
Oo2bl	Biotite granodiorite, trondhjemite, and quartz diorite	O–10
Oo2-4b	**Highlandcroft Plutonic Suite (Silurian?), Llandoverian?, and assemblage III of New Hampshire Plutonic Suite (Devonian) in late Whiterockian?**	
	Silurian (Llandoverian) or Ordovician (late Cincinnatian) rocks	
	Biotite granodiorite and quartz porphyry	
SOh2f	Aplitic granite and quartz porphyry	
SOh1f	Ordovician (Cincinnatian and Mohawkian) rocks	
Oh1-2h	Hornblende-biotite granite to granodiorite	O–11
Oh2-4h	Hornblende-bearing granodiorite to diorite or gabbro	O–11
Oh1bx	Porphyritic hornblende-biotite granite	O–5
Oh2h	Hornblende-biotite granodiorite	O–6
Oh1-2x	Porphyritic granite to granodiorite	O–4
Oh2-4	Diorite and gabbro	O–3
	Ordovician (late Whiterockian?) rocks	
Oh1b	Biotite granite	O–9
	Chickwolnepy intrusions (Ordovician; late Whiterockian)	
Oz3Ah	Hornblende-biotite tonalite	
Oz3Ahb	Porphyritic hornblende-biotite tonalite	O–7
Oz3Ag	Gabbro and diorite	
Oz3A	Tonalite of Joslin Turn pluton and related bodies (Ordovician; late Whiterockian)	O–13
	Bull Mountain Complex, undivided	
Kb	Bull Mountain Complex, undivided—Shown only in section A–A′	
Cz3Ag	Tonalite	C–1
Cz4b	Gabbro, epidiorite, and ultramafic rocks	

STRATIFIED METAMORPHIC ROCKS

Connecticut Valley trough

Lower Devonian parallelic̄hronous to autochthonous rocks

Map unit symbol	Map unit	Isotopic age determination
Dg	**Mountain Spring Complex (Lower Devonian?)**—Main body	
Dgm	**Rangeley Slate Member**	
Dgjvp	Volcanic facies	
Dgjr	Volcanic and sedimentary member	
D-Gc	Compton Formation (Lower Devonian; Emsian, Siegenian, and Gedinnian)	F
Dsu	Seboomook Group (Lower Devonian)	
Dsi	Ironbound Mountain Formation—Main body	
Dsix	Euxinic shale member	
Dsf	Felsic volcanic member	
Dsb	Basaltic to andesitic member	
Dsg	Grenier Ponds Conglomerate Member	
Dsh	Grit lenses at Halls Stream	
Dsir	Rhyolite and micrograntite intrusions	D–14
Dsim	Magnetite-bearing shale and siltstone facies	
Dsia	Altered slate near Deer Pond fault	
	Silurian rocks of Second Lake rift in Piermont-Frontenac allochthon	
	Western rift sequence—Frontenac Formation; lenticularly included in Rangeley River and Ayers Cliff Formations	
Sfr	Rangeley River Formation (Silurian)	
Sa	Volcanic and sedimentary member	
Sa/u	Ayers Cliff Formation (Silurian)?	
Sa	Frontenac Formation (Silurian; Pridolian?, Ludlovian, and Wenlockian)	
Sfr	Predominantly sedimentary facies	
Sfu	Mixed volcanic and sedimentary facies	
Sfm	Proximal bimodal volcanic facies	M–1, M–3, M–8
Sfvb	Basalt lenses	
	Western facies of Frontenac Formation (Silurian)	
Sfwx	Shale and arenite member	F
Sfwg	Graded-bedded graywacke member	
Sfwh	Hornblende schist lenses	
Sfwc	Calcareous member	
	Piermont sequence—Units correlated with Silurian and Silurian(?) units of Central Maine trough (L. CMT)	
Sm	Madrid Formation (Silurian?; Pridolian? and Ludlovian)	F
Ssf	Smalls Falls Formation (Silurian; Ludlovian?)—Main body	
Sslv	Felsic volcanic lenses	
Sslb	Basalt lenses	
Sslc	Polymictic conglomerate lenses	
Smaf	Madrid Formation (Silurian?) and Smalls Falls Formation (Silurian), undivided	
Sp	Perry Mountain Formation (Silurian; Ludlovian? and Wenlockian?)	
Spq	Quartzite, sandstone, and tuff near Parmachenee Lake (Silurian?; Llandoverian)	
Sg	Greenvale Cove Formation (Silurian?; lower Llandoverian?)	
Sgh	Quimby Formation (Ordovician; Cincinnatian)	
Ssp	Eustis shale and graywacke member	
Ssg	Graywacke member	
Ssv	Volcanic member	M–10
Ssl	Garnet granofels at Loon Lake	
Ssd	Laminated limestone and quartzite at Upton (Ordovician; Cincinnatian)	
Ssbr	Lobster Mountain Volcanics(?) (Ordovician; Cincinnatian)	
Ssa	Ammonoceuse Volcanics (Ordovician; Mohawkian and upper Whiterockian)	
Ssi	Undivided volcanic rocks—Shown in section F–F′ and locally on map	
Ssp	Basaltic facies	
Ssf	Felsic volcanic facies	
Ssb	Proximal bimodal volcanic rocks	M–9
Ssq	Volcaclastic graywacke facies	
Sss	Sedimentary and basaltic volcanic facies	
Ssi	Silicate iron-formation and quartz-kyanite facies	
Sssx	Pyritic alteration facies	
Sp	Partridge Formation (Ordovician; Mohawkian and upper Whiterockian)	
Spq	Quimby and Partridge Formations, undivided—Shown in section F–F′ and locally on map	
O-Cd	Dead River Formation (Ordovician; Whiterockian, to Upper Cambrian?)	
O-Cdq	Quartzite-rich member	
O-Cdp	Quartzite and phyllite member at Percy	
O-Ca	Aziscohos Formation (Ordovician; Whiterockian, to Upper Cambrian)	
O-Cu	Upper greenish-gray shale member	
O-Cv	Lower black shale member	
Cb	Bull Mountain Complex, undivided (Cambrian?)	F
C1	Jim Pond Formation, undivided (Cambrian?)	
C2	Dacite member	M–4
C2b	Basalt member	
Cjm	Magaloway Member	
Cfp	Harmon Mountain and Jim Pond Formations, undivided (Cambrian?)	
Cc	Bull Mountain Complex, undivided (Cambrian?)—Shown only in sections A–A′ and C–C′. Members listed under plutonic and related volcanic rocks	
CBz	Rocks of Cabin Brook area (Cambrian or Proterozoic)—Shown only in sections F–F′, B–B′, and C–C′	
CBzb	Bag Pond Gneiss	
CBza	Sarampus Falls facies	
CBzc	Coburn Gore facies	
CBzm	McKenney Stream facies	
CBzh	Hedgehog Mountain facies	
CBzt	Twin Bridges facies	

Central Maine trough

Western sequence

[See figure 3 for location of eastern boundary; corresponds to northwestern limit of eastern facies of Madrid and Smalls Falls Formations]

Map unit symbol	Map unit	Isotopic age determination
Dt	Littleton Formation, main body (Lower Devonian?)	F
	Seboomook Group (Lower Devonian)	
Dsu	Upper shale and sandstone	
Ddd	Day Mountain Formation	
Dsdg	Granule conglomerate lenses	
Dsbl	Impure limestone lenses	
Dst	Temple Stream Formation	
Dsl	Lower shale and sandstone	
Dsh	Hildreths Formation	
Dshx	Euxinic shale member	
Dsc	Carrabassett Formation	
Dsq	Impure quartzite member	
Dsx	Euxinic shale member	
DSom	Mount Blake, Hildreths, and Carrabassett Formations (Lower Devonian) and Madrid Formation (Silurian?) undivided—Shown in geologic map	
DSlr	Littleton Formation (Lower Devonian), Madrid Formation (Silurian?), and Smalls Falls, Perry Mountain, and Rangeley Formations (Silurian), undivided—Shown in migmatitic gneiss	
Slf	The Forks Formation (Silurian?; Pridolian? and Ludlovian?)	
Sm	Madrid Formation (Silurian?; Pridolian? and Ludlovian?)	
Smaf	Madrid Formation (Silurian?) and Smalls Falls Formation (Silurian), undivided	
Saf	Smalls Falls Formation (Silurian; Ludlovian?)	
Sp	Perry Mountains Formation (Silurian; Ludlovian? and Wenlockian?)	
Spq	Quartzite, sandstone, and tuff near Parmachenee Lake (Silurian?; Llandoverian)	
Sg	Greenvale Cove Formation (Silurian?; lower Llandoverian?)	
Sgh	Quimby Formation (Ordovician; Cincinnatian)	
Ssp	Eustis shale and graywacke member	
Ssg	Graywacke member	
Ssv	Volcanic member	
Ssl	Garnet granofels at Loon Lake	
Ssd	Laminated limestone and quartzite at Upton (Ordovician; Cincinnatian)	
Ssbr	Lobster Mountain Volcanics(?) (Ordovician; Cincinnatian)	
Ssa	Ammonoceuse Volcanics (Ordovician; Mohawkian and upper Whiterockian)	
Ssi	Undivided volcanic rocks—Shown in section F–F′ and locally on map	
Ssp	Basaltic facies	
Ssf	Felsic volcanic facies	
Ssb	Proximal bimodal volcanic rocks	
Ssq	Volcaclastic graywacke facies	
Sss	Sedimentary and basaltic volcanic facies	
Ssi	Silicate iron-formation and quartz-kyanite facies	
Sssx	Pyritic alteration facies	
Sp	Partridge Formation (Ordovician; Mohawkian and upper Whiterockian)	
Spq	Quimby and Partridge Formations, undivided—Shown in section F–F′ and locally on map	
O-Cd	Dead River Formation (Ordovician; Whiterockian, to Upper Cambrian?)	
O-Cdq	Quartzite-rich member	
O-Cdp	Quartzite and phyllite member at Percy	
O-Ca	Aziscohos Formation (Ordovician; Whiterockian, to Upper Cambrian)	
O-Cu	Upper greenish-gray shale member	
O-Cv	Lower black shale member	
Cb	Bull Mountain Complex, undivided (Cambrian?)	F
C1	Jim Pond Formation, undivided (Cambrian?)	
C2	Dacite member	
C2b	Basalt member	
Cjm	Magaloway Member	
Cfp	Harmon Mountain and Jim Pond Formations, undivided (Cambrian?)	
Cc	Bull Mountain Complex, undivided (Cambrian?)—Shown only in sections A–A′ and C–C′. Members listed under plutonic and related volcanic rocks	
CBz	Rocks of Cabin Brook area (Cambrian or Proterozoic)—Shown only in sections F–F′, B–B′, and C–C′	
CBzb	Bag Pond Gneiss	
CBza	Sarampus Falls facies	
CBzc	Coburn Gore facies	
CBzm	McKenney Stream facies	
CBzh	Hedgehog Mountain facies	
CBzt	Twin Bridges facies	

Eastern sequence

[See figure 3 for location of eastern boundary; corresponds to northwestern limit of eastern facies of Madrid and Smalls Falls Formations]

Map unit symbol	Map unit	Isotopic age determination
Dsc	Carrabassett Formation of Seboomook Group (Lower Devonian)	
Sms	Eastern facies of Madrid Formation (Silurian?; Pridolian? and Ludlovian?)	
Ssfe	Eastern facies of Smalls Falls Formation (Silurian; Ludlovian)	F
Sp	Perry Mountain Formation (Silurian; Ludlovian? and Wenlockian?)	
Sg	Greenvale Formation (Silurian?; lower Llandoverian?)	
Ss	Principal sandstone and shale facies	
Sf	Thorncrag Hill Member of Hussey (1983)	
Sst	Unnamed limestone member	
Ssy	Taylor Pond Member of Hussey (1983)	
Sse	Euxinic shale lenses	
Ssc	Conglomerate member	
Ssp	Patch Mountain Limestone Member	
Ssw	Waterville Formation (Silurian; Wenlockian and Llandoverian)	F
Sset	Limestone member	
Sse	Euxinic shale lenses	

Approximate boundary of bimodal metadiabase-metafelsite dike swarm—Teeth on side of area containing more abundant dikes and sills. Metadiabase and metafelsite dikes and sills about equally abundant. Metadiabase dikes and sills identical to those of metadiabase dike swarms. Metafelsite dikes are typically 1–3 m thick, fine grained, foliated, usually porphyritic and composed of rhyolite or dacite. One metafelsite dike dated at 418±6 Ma (site S–2); considered comagmatic with similarly dated (site M–3) felsic metatuff of the Frontenac Formation (S?o), and is possibly coeval with felsic of sheeted dikes at Marble Mountain (Index 11).

■ Fossil locality or two or more closely spaced localities—See list by quadrangle, this sheet

O_{7-8} Isotopically dated rock-sample locality—See list by age and determination number, sheet 2. Where same age and number are shown at two or more localities, two or more samples contribute to same determination. Where age and number not accompanied by locality point, location of point is not known or is outside map area

FOSSIL LOCALITIES

[Listed by formations in 15-minute qds. Single symbol may represent two or more closely spaced localities. Numbers correspond to those used in figure 2. Data for localities outside of map area are cited in the description of map units]

ARNOLD POND QUADRANGLE (7)

Fitch(?) Formation (S?f)—Shaly fauna found in calcareous slate, shaly limestone, and conglomeratic limestone at one locality near south margin of qd (Green, 1968; Harwood, 1973, locality 5–6; Siluro; Ludlovian?).

ATTEAN QUADRANGLE (4)

Shale and sandstone of Seboomook Group (Dsa)—Brachiopod *Leptocoelia flabellites* (Conrad) found in stamped road cut in Moose River village, Early Devonian; late Siegenian (Orskianian). Also, bryozoans, crinoid columnals, brachiopods, and *Tentaculites* sp. found variously on two islands in Wood Pond and in block of hornfels on east shore of Wood Pond; fossils from the island not age-diagnostic, but fossils from the block, which almost certainly came from the vicinity of the islands, indicate an Early Devonian (late Siegenian? Orskianian?) age.

Conglomeratic sandstone near Crocker Pond (DSc)—Brachiopods at two localities near lower contact (Boucot and Heath, 1969; Albee and Boudette, 1972); ages are Siluro (Pridolian?) and Ludlovian and Siluro- or Early Devonian(?).

Limestone and slate at Little Big Wood Pond (Sltbw)—Brachiopods, cephalopods, pelecypods, gastropods, corals, ostracodes, worm tubes, trilobite, and stromatoporoids found at 24 localities (Boucot and Heath, 1969; Albee and Boudette, 1972); Siluro; Ludlovian(?) and Pridolian.

Conglomerate at Wood Pond (Swp)—Corals, cephalopods, and a gastropod found at one locality in a thin micaceous layer and in quartzite (Boucot and Heath, 1969; Albee and Boudette, 1972); Siluro (Pridolian or Ludlovian).

CUPSUPTIC QUADRANGLE (13)

Fitch(?) Formation (S?f)—Brachiopods and corals found at one locality in calcareous limestone overlying Early(?) Quartzite (S?q); late Early Devonian; Lake Harwood, 1973, locality 5–3, p. 23; Siluro; Pridolian.

Rangeley Formation, quartz-rich polymictic conglomerate facies of member B (Srbc)—Fragments of brachiopods and small horn corals found in the matrix of conglomerate, and corals found in boulders (Harwood, 1973, localities 5–1 and 5–2). Not age-diagnostic, but faunal assemblage is consistent with late Llandoverian age established for quartz conglomerate of Rangeley Formation in Kennebago Lake qd.

Hurricane Mountain Formation (Ch)—Pitrithe sponges (either Protospongia, sp., or Diagorgella, sp.) found in black slate by Harwood (1973, p. 23, locality D–3). The fossils were examined by R.W. Finke in 1964 and again in 1984 (uncommon; to R.H. Moench, 1983, and to G.M. Boone, 1984). On the basis of his latter examination, Finke favored a Cambrian age for these forms, and he suggested that the organisms grew in a quiet, oxygenated marine environment (despite the black slate host of the fossils); he noted that an Ordovician age, though unlikely, is not ruled out.

Kennebago Formation (Ok)—Graptolites from black slate at locality near contact with overlying quartz-rich polymictic conglomerate of member B of the Rangeley Formation (Srbc) (locality O–1 of Harwood, 1973), and fragments of shelly fossils from calcareous graywacke at Kamankeag Brook, which is shown on 15-minute quadrangle map (locality O–2 of Harwood, 1973). Fossils recovered from locality O–2 are not age-diagnostic (Harwood, 1973, p. 29). Graptolite assemblage recovered from locality O–2 (Harwood, 1973, p. 23) is indicative of *Climacograptus bicornis zone* (Harwood and Berry, 1967) of Ordovician (early Mohawkian) age.

INDIAN STREAM QUADRANGLE (11)

Shale and arenite of western facies of Frontenac Formation (Sfvw)—Species of *Nematophyton* (Protonema) found in two cobbles embedded in metagraywacke (Bothner and others, 1990, p. 372). Specimens are possible fungus remains having a range from Siluro-Devonian (late Wenlockian) through late Devonian.

KENNEBAGO LAKE QUADRANGLE (14)

Rangeley Formation, impure limestone and quartz conglomerate lenses of member C (Srcl)—Shelly fauna identified by A.J. Boucot (written commun., 1964) in quartz-granule conglomerate at three localities southeast of Kennebago Lake (Moench and Boucot, 1970; Moench and Pankiwskyj, 1991); Siluran; late Llandoverian, C4–C5.

Rangeley Formation, impure limestone and quartz conglomerate lenses of member C (Srcl)—Shelly fauna identified by A.J. Boucot (written commun., 1964) in laminated metalimestone overlying quartz conglomerate at one locality 15 km northeast of Kennebago Lake (Moench and Boudette, 1970; Boudette, 1970; Siluro; late Llandoverian, C3–C5.

LITTLETON QUADRANGLE (33)

Littleton Formation, main body (Dt)—Brachiopods, pelecypods, gastropods, and Tentaculites found in weakly metamorphosed gray sandstone and slate at six localities, all at least 600 m above the lower contact of the formation (Billings and Cleaves, 1934; Boucot and Arndt, 1960; Boucot and Rumble, 1978, 1980; Early Devonian, Emsian (Schoharian). No paleontologic evidence of earlier Early Devonian in this area (Harris and others, 1983, p. 736).

Fitch Formation (S?f)—Complex shelly fauna found at six localities, and coralloids at two of these localities, in weakly metamorphosed limestone, calcareous and noncalcareous slate, graywacke, and pectinites (Billings and Cleaves, 1934; Harris and others, 1983; Siluran; latest Ludlovian and Pridolian.

LONG POND QUADRANGLE (5)

Tomhegan Formation (Dtm)—Complex shelly fauna at one locality in qd and at more than 45 localities in Moose River synclinorium to the east (Boucot and Heath, 1969, p. 20, 24); Early Devonian; Emsian (early Schoharian)

LONG POND (S), SPENCER LAKE (9), AND PIERCE POND (10) QUADRANGLES

Tomstone Formation (Dmt), *main part*.—Complex shelly fauna at approximately 80 localities in the listed qds and at approximately 65 other localities in the Moose River synclinorium to the east; characterized by the presence of Leptocoelia flabellites (Boucot and Heath, 1969, p. 34); Early Devonian; early Siegenian (Oriskanian).

Shale and sandstone of Seboomook Group (Dsa)—Complex shelly fauna found at several localities, mainly near the upper contact of the formation; also at one locality at the lower contact, near Back Pond in Spencer Lake qd (Boucot and Heath, 1969, p. 34); Early Devonian; mainly late Siegenian (Oriskanian), but fauna from basal beds near Back Pond are suggestive of a late Gedinnian (New Scotland) age.

MOOSELAUKEE QUADRANGLE (41)

Littleton Formation, limy sandstone lens (Dltk)—Brachiopods found in one of several beds of calc-silicate rock interstratified with gray, slitmarks mica schist (Moench and Rumble, 1973, 1983); Early Devonian; probably late Siegenian (Oriskanian), although an early Emsian (Koopmanian) age cannot be ruled out.

Tomstone Formation, McKenney Ponds Limestone Member (Dmtmp).—Shelly fauna and conodonts found at three localities near the McKenney Ponds, which are shown on the 15-minute quadrangle map (Boucot and Heath, 1969, p. 27); Lower Devonian; late Siegenian (Oriskanian).

QUEBEC, CANADA

Compton Formation (Dco).—Land plant remains found in metagraywacke at one locality near La Patrie, and at three other localities about 10 km north of Megantic (Fraser and others, 1990); Early Devonian; Emsian.

SECOND CONNECTICUT LAKE QUADRANGLE (12)

Fitch(?) Formation (S?f).—Corals, brachiopods, and crinoid columnals in a small outlier of clastic limestone (Green, 1968); Siluran; Ludlovian(?).

SPENCER LAKE QUADRANGLE (9)

Back Pond Limestone (Dbl)—Brachiopods and corals found at three localities (Boucot and Heath, 1969, p. 33). Early Devonian; late Gedinnian (Helderbergian).

Hubbleson Formation—Sparse (of the formation, Siluran (Pridolian?) fossils found at a few localities in the main part of the formation. Siluran (Pridolian?) fossils also occur in the lower conglomerate member, because these fossils might be a death assemblage carried down the underlying Hardwood Mountain Formation (Boucot and Heath, 1969). In Early Devonian (late Siegenian) age is forced by the Hubbleson Formation.

Hardwood Mountain Formation (Chm)—Complex shelly fauna as well as ostracodes and trilobites found at several localities, tentatively dated in accord with the alternative discussed by Boucot and Heath (1969, p. 50–51) that the Hardwood Mountain of the Spencer Lake qd is slightly younger than the Hardwood Mountain of Camp Ebenezer and slate at Little Big Wood Pond, Sltbw, and conglomerate at Wood Pond, Swp) of the Attean qd (Boucot and Heath, 1969; Albee and Boudette, 1972). Siluran; Wenlockian and Ludlovian(?).

SPENCER LAKE (9) AND PIERCE POND (10) QUADRANGLES

Parker Bog Formation (Dpb).—Shelly fauna found at two localities in limestone associated with felsite (Boucot and Heath, 1969); Early Devonian; late Gedinnian (Helderbergian).

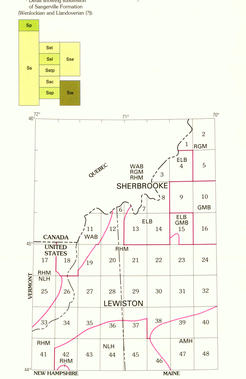
STRATTON QUADRANGLE (15)

Impure limestone at Flagstaff Mountain (Sflm).—Shelly fauna and trilobites found in calcareous hornfels at one locality north of Flagstaff Lake (Boucot and Heath, 1969, p. 46). Siluran; late Llandoverian C3–C6 to early Wenlockian(?). Although conglomerate is absent, these beds may be equivalent to impure limestone and quartz conglomerate (Srcl) of member C of Rangeley Formation in the Kennebago Lake qd.

WHITEFIELD QUADRANGLE (34)

Littleton Formation, sandstone and conglomerate at Dalton Mountain (Dtd).—Shelly fauna at two localities on Dalton Mountain, in weakly metamorphosed slaty sandstone overlying basal polymictic conglomerate of the Littleton. Depending upon which of two interpretations discussed by Boucot and Arndt (1964) is correct, the fossiliferous beds are either 20 m or about 50 m (55–60 m preferred by Moench) above the lower contact of the formation, which in this area is an unconformity (Boucot and Arndt, 1960; Boucot and Rumble, 1978; Early Devonian; Emsian (Schoharian).

[1] Detail showing subdivision of Sangerville Formation Silurian(Siluian and Llandoverian (?)).



EXPLANATION

SHERBROOKE QUADRANGLE

[Quebec from Chene (1978, 1990) and St. Julien and Slivitsky (1987), modified by W.A. Bothner, R.G. Marvinney, and R.H. Moench. Mount Megantic pluton from Reid (1976)]

1. **Sandy Bay:** Marvinney (1982 and unpub. mapping, 1983–85)
2. **Pensobscot Lake:** Marvinney (1982, and unpub. mapping, 1983–85)
3. **Skinner:** E.L. Boudette and G.M. Boone (unpub. mapping, 1965–70); Skinner pluton (index 6) and roofpendants of Chain Lakes massif mapped by R.M. Goldsmith (unpub. mapping, 1982–83). Thrasher Peaks fault mapped in detail by Marvinney
4. **Attean:** Albee and Boudette (1972); later revised by E.L. Boudette.
5. **Long Pond:** Boucot and Heath (1969); Carbonate Member of Seboomook Group, Lake Harwood, 1973, locality 5–3, p. 23; Siluran; Pridolian.

Rangeley Formation, quartz-rich polymictic conglomerate facies of member B (Srbc).—Fragments of brachiopods and small horn corals found in the matrix of conglomerate, and corals found in boulders (Harwood, 1973, localities 5–1 and 5–2). Not age-diagnostic,