STRUCTURAL AND STRATIGRAPHIC FEATURES OF THE TACONIC FORELAND, NW VERMONT

By

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INTRODUCTION

This trip will focus on some of the spectacular structural and stratigraphic features exposed in NW Vermont at the Highgate Gorge, and at Lessor's Quarry, and the outcrop known as "The Beam", on South Hero Island. The last two are Rolfe Stanley Memorial outcrops. The trip will cover the nearly continuously exposed upper Cambrian to Ordovician section in the Highgate Gorge. This section exposes the shelf to basin transition including bedded limestone and massive dolomite, a spectacular shelf slope limestone breccia, as well as basinal slates containing likely turbidite-transported carbonate shelf beds. The out-of-sequence cataclastic Highgate Falls Thrust is well-exposed, as well as a number of other Taconic-aged structures including folds, axial plane cleavage, and rotated en echelon fractures. The "Beam" is a superb meso-scale illustration of duplex faulting in thin-skinned foreland belts, while Lessors Quarry exposes fault-bend fold structures as well as a number of fault zone features, and an excellent example of an out-of-sequence thrust. This trip is highly recommended for students to see a number of well-exposed and instructive stratigraphic and structural features. Part of this material has appeared in a previous NEIGC field trip (Schoonmaker and Kidd, 2009).

Walking in the gorge can be treacherous and difficult both on the boulder field in the channel and the outcrop; both may be very slippery if wet. Care should be observed, and adequate footwear is advised.

Regional Geology

The Highgate area exposes rocks that were previously correlated to the Stanbridge Nappe of Southern Quebec and include shelf and shelf edge rocks on the west, passing upward and eastward in the exposed section to basinal shales including carbonate shelf-derived beds. Similar changes from shelf to basin have been mapped in a generally north-south direction (Shaw, 1958; Mehrtens and Dorsey, 1987) leading to the proposal of a small depositional basin ("Franklin Basin" and "St. Albans Reentrant, respectively) in northwestern Vermont. In Quebec, the overlying shales (now slates) of the Stanbridge Group are interpreted to be part of an allochthon (Stanbridge Nappe) that is in fault contact with the underlying carbonate shelf units along a tectonically significant thrust fault (Charbonneau, 1980; Globensky, 1981). In Vermont, the slates are in depositional contact with the underlying shelf and slope section. The Highgate Gorge exposes an excellent section of shelf slope deposits overlain by deeper water shales.

Stanbridge Nappe of Southern Quebec. Adjacent to the International Border, in southern Quebec (Figure 1), the east-dipping Ordovician-aged Stanbridge Nappe has previously been interpreted to be an allochthonous group of carbonates and argillaceous slates derived from the Laurentian continental rise, which was detached and thrust over the upper Cambrian Milton Dolomite, part of the imbricated, parauthochthonous Laurentian shelf, along a major, structural boundary (St. Julien and Hubert, 1975; Charbonneau, 1980; Globensky, 1981). Although it is not exposed, the western boundary of the Stanbridge Complex comprises the southernmost section of Logan's Line in Quebec.

The Stanbridge Nappe is the southernmost of the Quebec Allochthons, part of the larger belt of allochthons that extend discontinuously from Newfoundland, across to the Gaspé and southwards to just across the International Border in northwestern Vermont; the allochthons reappear in west-central Vermont and continue southwards as the Taconic Allochthons. They are generally composed of far-traveled low-grade metamorphosed deep-marine mud-rocks and clastics originally deposited on the Laurentian continental lower slope and rise, and thrust westward, up and over the Laurentian shelf. The two belts are separated by parauthochthonous carbonate and siliciclastic rocks deposited on the Laurentian shelf and upper slope, that were subsequently imbricated during the Taconic Orogeny (e.g. the Champlain Thrust). While these parauthochthonous rocks have undergone transport along thrust faults, they are still in structural contact with related rocks deposited in a similar setting (e.g. the continental shelf), This contrasts with the allochthons that have seen significant transport from an original lower slope and rise setting and are now structurally emplaced against shelf rocks. All of the Quebec allochthons are structurally emplaced on top of younger rocks, and many are floored by flysch that in places contains olistostromal units.

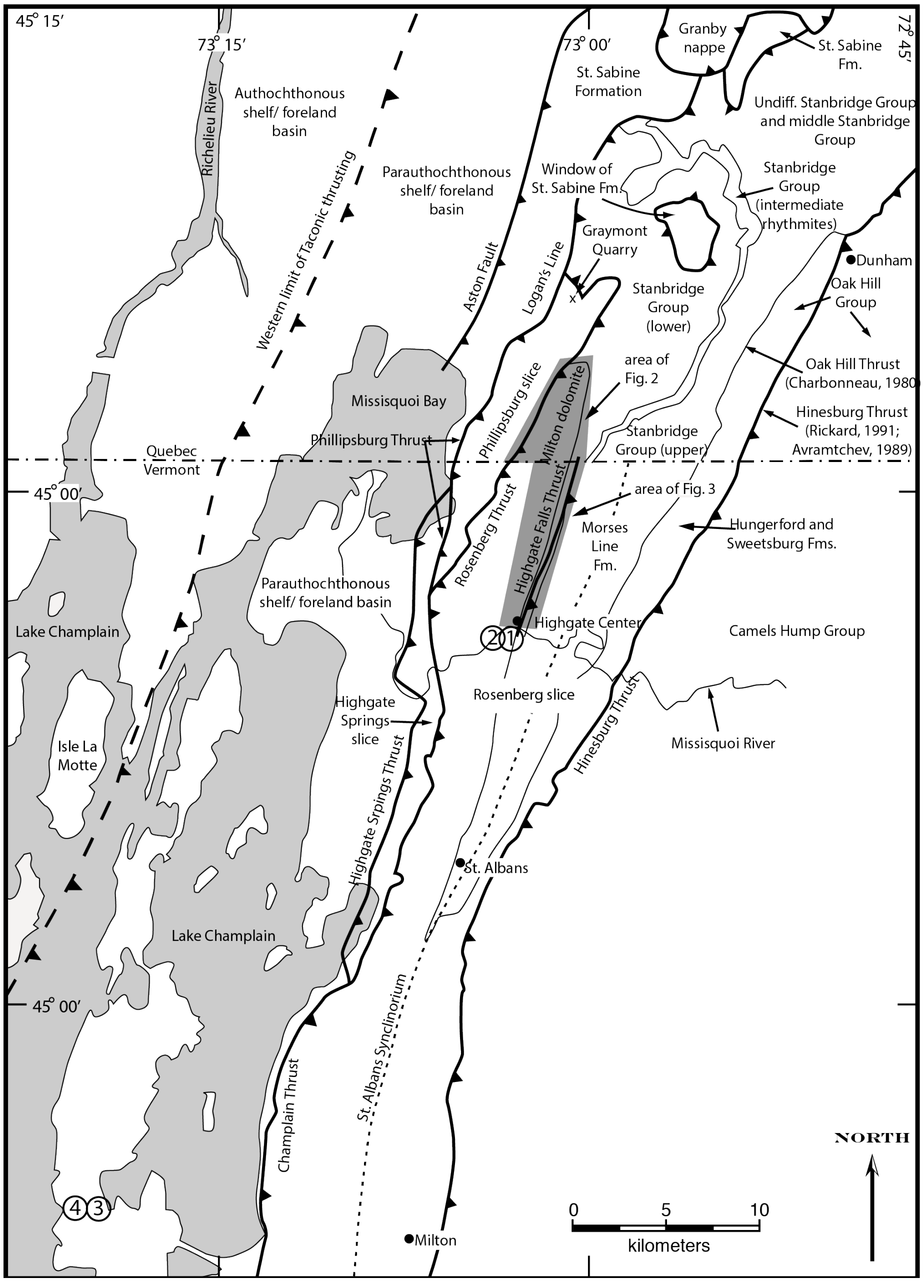

Figure 1. Regional map of significant structures and lithologic units in northwestern Vermont and southern Quebec. Based in part on Doll et al. (1961), Fisher (1968), Charbonneau (1980), Globensky (1981), and Avramtchev (1989).

The Stanbridge Nappe is composed of the dominantly argillaceous Stanbridge Complex of Charbonneau (1980; Figures 1and 2). The complex is divided into three sequences: 1) the lower sequence, composed of bedded slaty limestone and limestone conglomerates, overlain by thick sequences of bedded calcareous slate with sparse individual limestone beds and ribbon limestone bed sequences (usually not more than a few meters thick); 2) an intermediate rhythmite unit, composed of thinly laminated siltstone-argillite-mudstone beds; and 3) an upper sequence of calcareous slate, slaty limestones and calcareous conglomerates. The entire complex is an internally coherent package that structurally overlies massive dolomites, chert-bearing and sandy dolomites, and dolomitic conglomerates of the Milton Dolomite along an unnamed (and unobserved) thrust fault. The Milton Dolomite (a term abandoned south of the International Border) is the northern extension of the Dunham Dolomite, and Saxe Brook and Gorge formations of northwestern Vermont, and is part of the imbricated carbonate-siliciclastic shelf sequence. The inferred structural relationship between the slaty Stanbridge Complex and underlying non-slate-bearing shelf carbonates is first reported in St. Julien and Hubert (1975) who include the bedded limestones of the lower sequence of the Stanbridge Complex as part of the transported Stanbridge Nappe. Significantly, the Stanbridge Complex does not contain flysch or olistostromes, and structurally overlies older, or approximately coeval rocks of the Rosenberg and Phillipsburg slices (Figure 1).

Correlative rocks in Northwestern Vermont. In Vermont, the lower slaty limestones and overlying calcareous slates of the lower unit of the Stanbridge Nappe are correlated with the Highgate and Morses Line Formations, respectively (Figure 4; Charbonneau, 1980; Globensky, 1981; Schoonmaker, 2007). The intermediate rhythmite and upper sequence correlate with higher sections of the Morses Line Formation above the Corliss Conglomerate, an internal member of the Morses Line Formation. Underlying the Highgate Formation are a series of massive dolomites, sandy dolomites, and dolomite breccias, including the Dunham, Saxe Brook, and Gorge Formations (in ascending order), all part of the Rosenberg Slice of Clark (1934) and equivalent to the Milton Dolomite in Quebec (Figure 3). These dolomitic units beneath the Highgate Formation have long been assigned to the imbricated shelf sequence of the Champlain Thrust slice (e.g. Stanley and Ratcliffe, 1985).

Previous workers in Vermont are divided on the presence of a major structural boundary in this section. Mehrtens and Dorsey (1987), and Schoonmaker and Kidd (2007) have interpreted the contacts between the Gorge and Highgate, and Highgate and Morses Line Formation to be conformable, and it is similarly shown on the Centennial Map of Doll et al. (1961) and the more recent bedrock Geological Map (Ratcliffe et al, 2011). Shaw (1958) and Pingree (1982) placed a thrust fault at the contact between the Highgate Formation and Morses Line Slates, while Haschke (1994) placed a normal fault at that same position. However, all these workers concluded that that bedded limestones and limestone breccias of the Highgate Formation were deposited on top of the dolomites and dolomitic breccias of the Gorge Formation. This contrasts with the interpretation in Quebec where the base of the bedded limestones and limestone breccias (Highgate Formation) is interpreted to be in thrust fault contact with the underlying dolomites and dolomitic breccias of the Milton Dolomite (Gorge Formation).

We will observe the contact relationships between the dolomitic units of the Gorge Formation and overlying bedded limestones and limestone breccias of the Highgate Formation (Stop 2), as well as the overlying partly calcareous slates, previously referred to as the Highgate Slate (e.g. Keith, 1923), but which we reclassify as the lower part of the Morses Line Formation. These are beautifully exposed in the Highgate Falls Gorge (Stop 1; Figures 3 and 5). The relationships we will observe show that the Highgate and Morse Line formations are internally conformable (with the exception of minor thrusts, and the younger, out-of-sequence Highgate Falls Thrust) and depositionally overlie the shelf-derived dolomitic Gorge Formation.

Thin-skinned imbrication of the continental shelf. At stops 3 and 4 we will observe excellent examples of imbricate duplexes formed in the thin-skinned Taconic foreland fold-thrust belt. The structures that can be observed include roof and floor faults, flat and ramp sections, horses, variably rotated en echelon fractures, slickenlines and slickensides, and fault-bend folds.

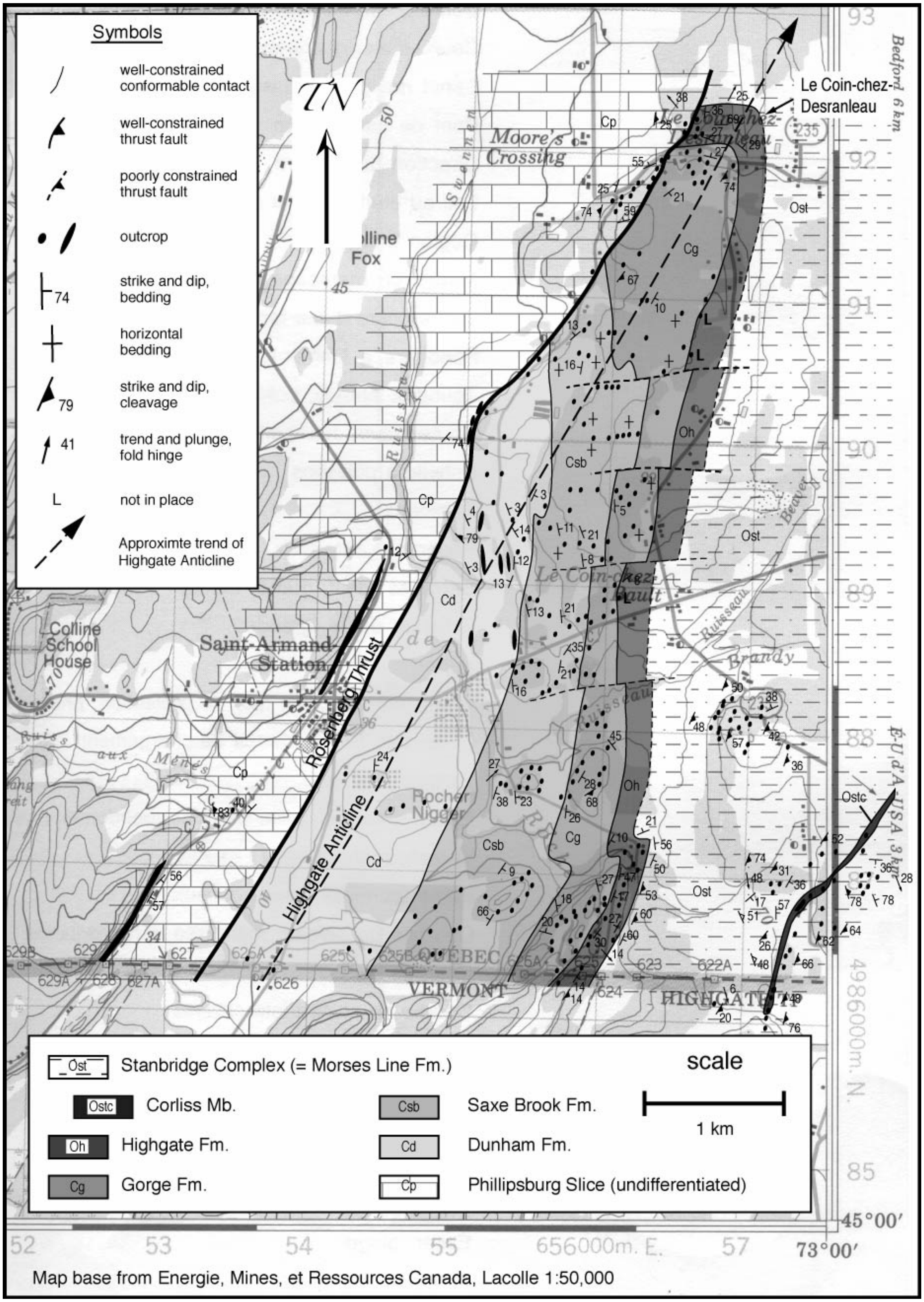

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Figure 2. Geologic map, St. Armand Station area, southern Quebec. (Schoonmaker and Kidd, 2007)

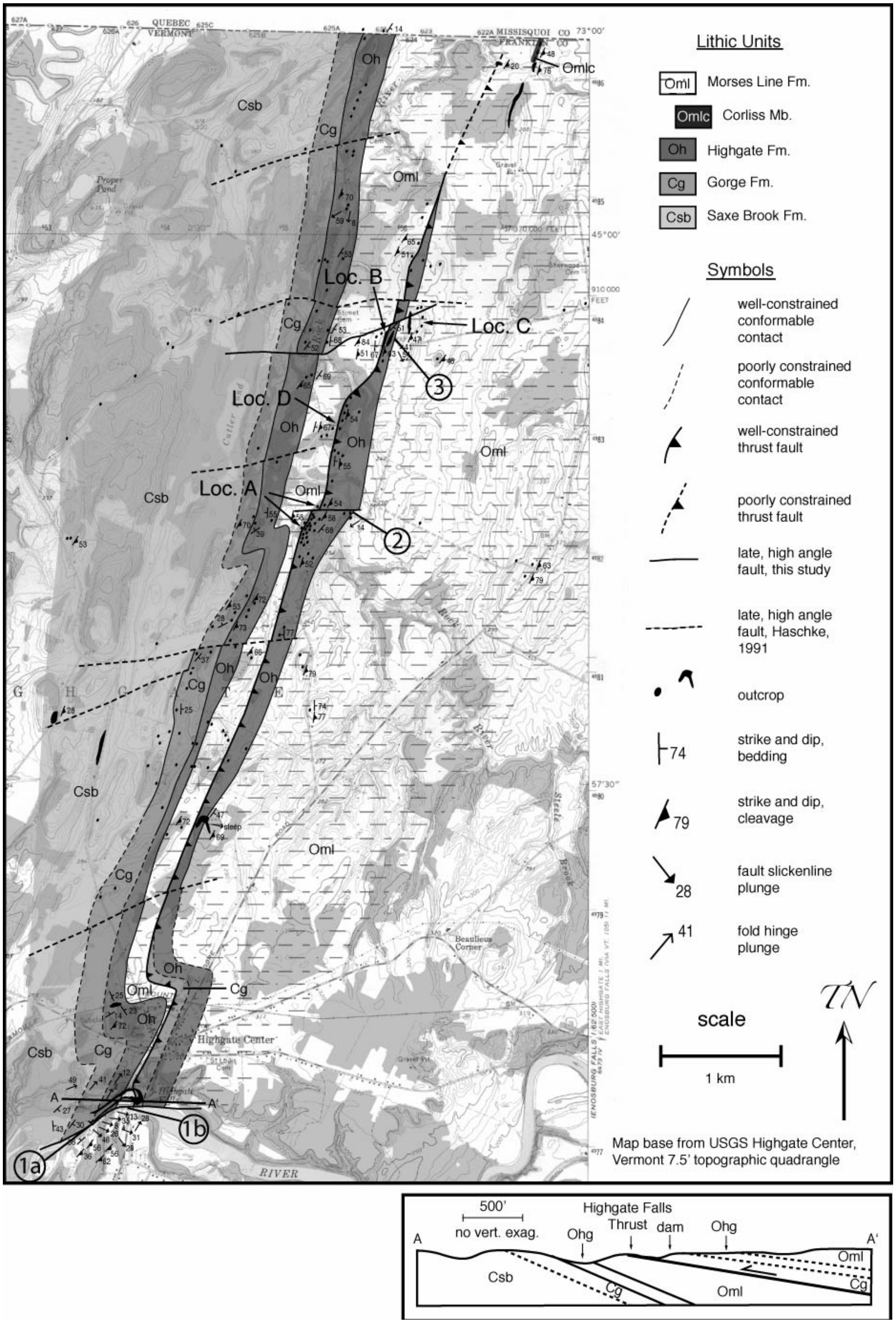

Figure 3. Geologic map, Highgate Center area, Vermont. (Schoonmaker and Kidd, 2007)

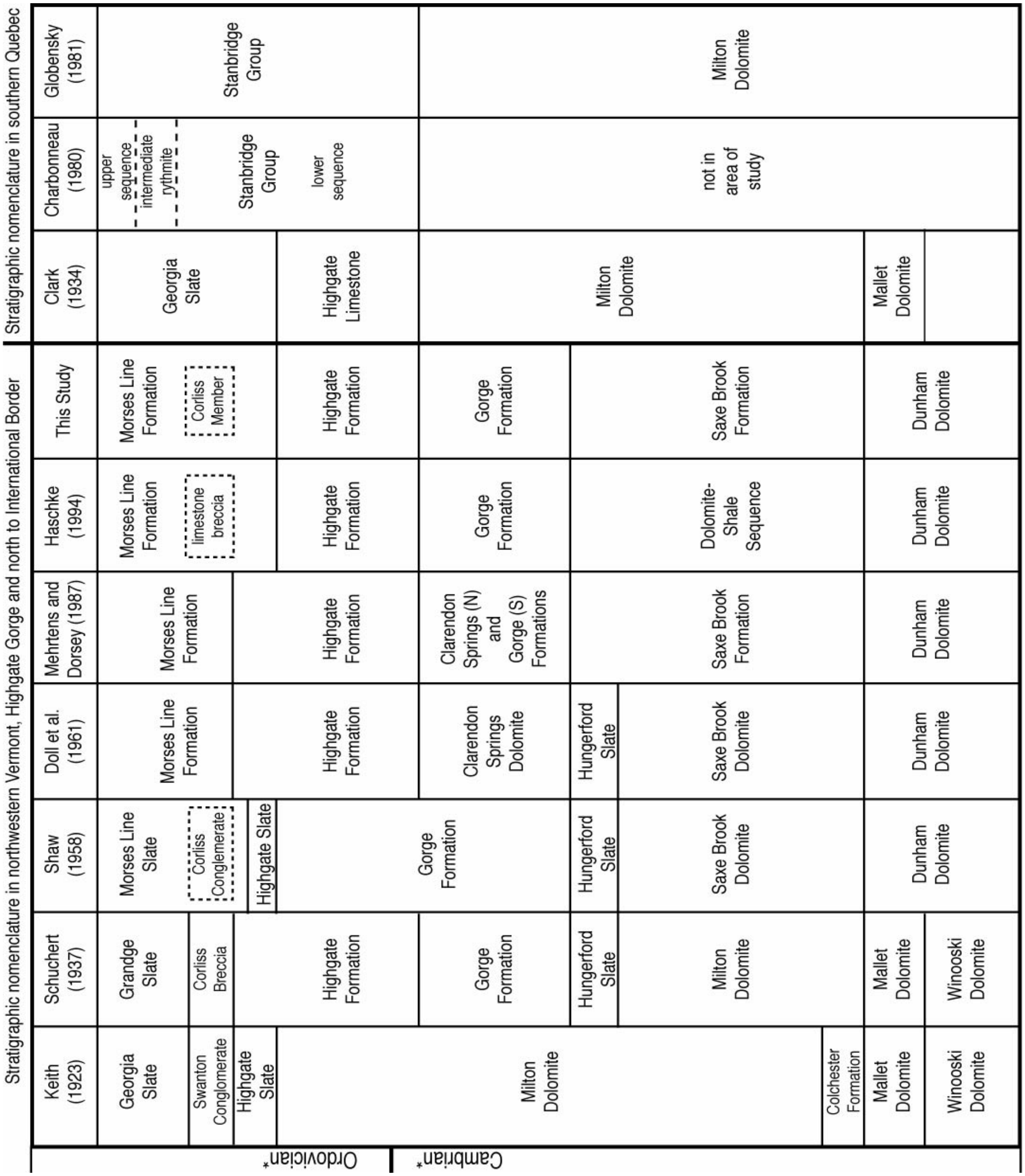

Figure 4. Lithostratigraphic correlation chart of the Cambrian through Middle Ordovician formations of the Rosenberg slice (Schoonmaker and Kidd, 2007). * Cambrian-Ordovician boundary located after Landing (1983) as it applies to our study and does not necessarily represent placement of this boundary by other workers.

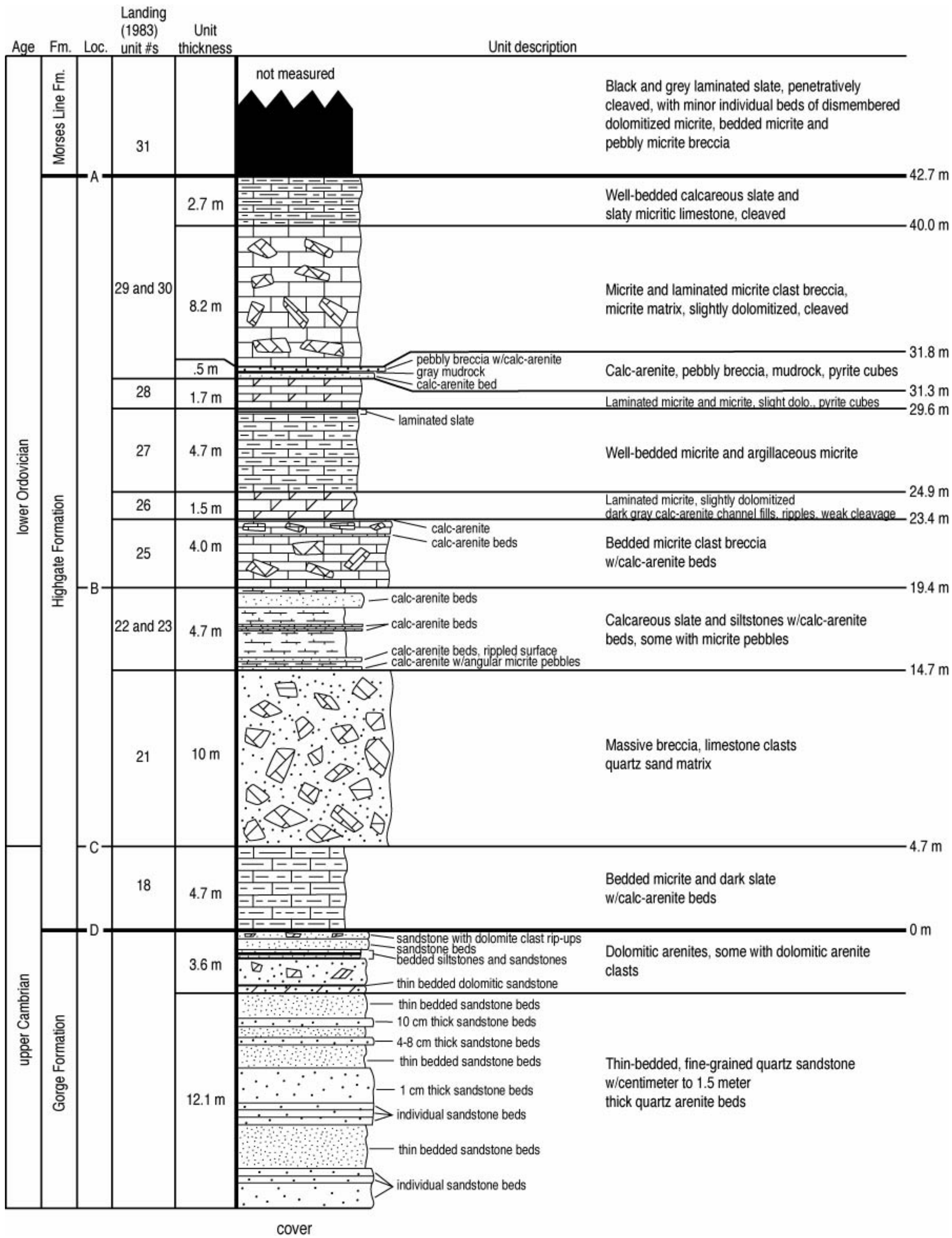

Figure 5. Measured detailed lithostratigraphy of part of the continuously exposed section on the north shore of the Mississquoi River gorge at Highgate Center (Schoonmaker and Kidd, 2007). Cambrian-Ordovician boundary from Landing (1983).

ROAD LOG

Assembly Point – Price Chopper Parking Lot, Prosser Road (off of Rt. 9), Warrensburg. We will consolidate vehicles and proceed to the village green at Highgate Center VT, approximately 2.5 hours travel time via Interstate 87 North.

For some, it may be more convenient to meet in Highgate Center. Those folks can meet us at the village green in Highgate Center at about 10:30 am.

Time: 8:00 am, Friday, October 12th, 2018.

MILEAGE

Miles	Incr.	Directions
0.0	0.0	Exit parking lot and take right onto Prosser Road.
0.1	0.1	Turn left onto Bakers Crossing.
0.2	0.1	Turn left onto US 9.
0.3	0.1	Turn right onto Diamond Point Road (crosses over I-87).
0.5	0.2	Turn left onto entrance ramp for Interstate 87 North.
115.5	115	Take Exit 42 (Rouses Point and US Rt. 11).
115.6	0.1	Turn right onto US Rt. 11.
120.3	4.7	Turn left staying on US Rt. 11 and State Rt. 9B.
121.5	1.2	Turn right onto Bridge Road (US Rt. 2). Cross bridge into Vermont.
128.5	7.0	Turn left onto VT Rt. 78.
143.1	14.6	Turn right onto Lamkin St. Pull over next to village green for a bathroom/coffee break.
143.4	0.3	Continue straight and immediately bear right onto Mill Hill Road. Park at bottom of hill at terminus of pedestrian bridge and hydroelectric dam. A nice view of the gorge can be seen from the pedestrian bridge including the Highgate Falls Thrust. Proceed by foot along canoe portage westward through the woods along the north side of the gorge for about 50 feet. Find trail on the left that leads down to the gorge floor below the dam.

CAUTION!

ACCESS TO GORGE FLOOR WILL REQUIRE SCRAMBLING DOWN STEEP ROCKS AND ONCE ON THE GORGE FLOOR, WALKING ON THE BOULDER FIELD CAN BE TREACHEROUS, ESPECIALLY WHEN WET.

PLEASE ALSO NOTE THAT IF HORN SOUNDS, EXIT GORGE AS QUICKLY AS POSSIBLE IN THE EVENT OF AN UNLIKELY, BUT POSSIBLE DAM RELEASE.

STOP 1: UPPER HIGHGATE FALLS GORGE.

(N 44.93540°, W 73.04866°; NAD 83)

The Mississquoi River laps against the walls in part of the gorge, so it is cut into upper (Stop 1) and lower (Stop 2) sections with different access points.

The entire (both upper and lower) east-west oriented Highgate Falls Gorge on the Mississquoi River continuously exposes a cross-section (Figure 3) of upper Cambrian to lower Ordovician rocks that include the upper section of the Gorge Formation (dolomitic arenites and quartz sandstones), the entire Highgate Formation (a variable unit containing bedded micrite, limestone clast breccias, calcareous slate, and argillaceous micrite), and the lower part of the Morses Line Formation (argillaceous slates with dolomitized, boudinaged micrite beds, bedded micrite, and limestone breccias;). The Highgate Falls Thrust repeats part of this section (Gorge Fm.) in the part of the gorge nearest the dam. In the upper gorge we can see the upper part of the Highgate Formation, lower section of the Morses Line Formation, and part of the Gorge Formation above the Highgate Falls Thrust.

Once in the gorge, the Highgate Falls Thrust is clearly visible in the north wall, approximately 200' downstream from the point where the path descends (Figure 6E). A dolomite clast breccia with dolomitic matrix of the Gorge Formation is thrust over dark slates and a bedded argillaceous micrite and carbonate breccia interval within the Morse Line slates along a shallowly east-dipping surface characterized by phyllonitic fault zone cleavage (cataclastic breccia- to gouge-sized material); beds and cleavage in the lower block are bent in the direction of transport of the upper block. In the lower block, directly beneath the thrust, regional cleavage in the slates and bedded micrite can be seen to be bent as it approaches the fault zone indicating a westward sense of motion of the upper block. Because the regional cleavage is deformed by the motion of the upper block, the Highgate Falls Thrust is inferred to be an out-of-sequence thrust fault.

To the west and slightly downstream from the highway bridge that can be seen high above the gorge and upstream from the powerhouse and tailrace visible on the south bank, the contact between calcareous slates of the uppermost Highgate Formation are overlain by black slates of the Morses Line Formation (Loc. A, Figure 5). The contact on the north bank is mesoscopically folded and marked by a minor thrust fault containing a slickenlined and stepped calcite vein on the north limb (Figure 6C). On the south bank, the south limb is an observable depositional contact. Landing (1983) interpreted the micrite clast breccia (unit 29, Figure 5) that occurs beneath the calcareous slate as a tectonic breccia and the base of the black slates as an unnamed thrust. In contrast, Haschke (1994) suggested the slickensided surface on the north limb was a detachment that cut out a major thrust between the Highgate and Morses Line Formations, similar to relationships described by Hayman and Kidd (2002) for the northern part of the Taconic Allochthon. The observable conformable contact relationships on the south bank in the Highgate Falls Gorge do not support either of these hypotheses. Further, minor thrust faults are observed in the Morse Line slates (Figure 6D) and cleavage can also be seen in the Highgate Formation limestones, suggesting that a significant structural boundary is not present within this section, which contrasts to the Quebec and Taconic allochthons where deformation and cleavage deformation occurred prior to final emplacement (Rowley and Kidd, 1981; St. Julien, 1977; Lebel and Kirkwood, 1998).

Within the Morses Line Formation, dismembered dolomitized micrite beds can be observed, wrapped by the regional cleavage. Some of these beds are cut by small pre-cleavage faults with a normal sense of displacement. These normal faults are interpreted to be from passive continental margin downslope slumping. Similar dolomite beds in slate are observed further north in Vermont and in Quebec, well east of the strike of these beds, where they form part of the upper block of the Highgate Falls thrust and are mapped as Stanbridge Slates (Figure 3).

Structurally just below the Highgate Falls Thrust, there is a small fold of bedding in slate and thin limestone beds whose axial plane is parallel to the regional cleavage in the slates; this can be seen in the outcrop close to the river channel.

Return to canoe portage on north bank of river and proceed westward (away from vehicles).
Proceed approximately 250 yards and cross VT Rt. 207.
Continue west along canoe portage.
Follow canoe portage signs, descend to the riverbank. CAUTION! ABUNDANT POISON IVY ALONG SHORELINE.
Walk upstream to the outcrop starting at a point slightly downstream from the turbine building of the Highgate Center Hydroelectric Plant on the far bank.

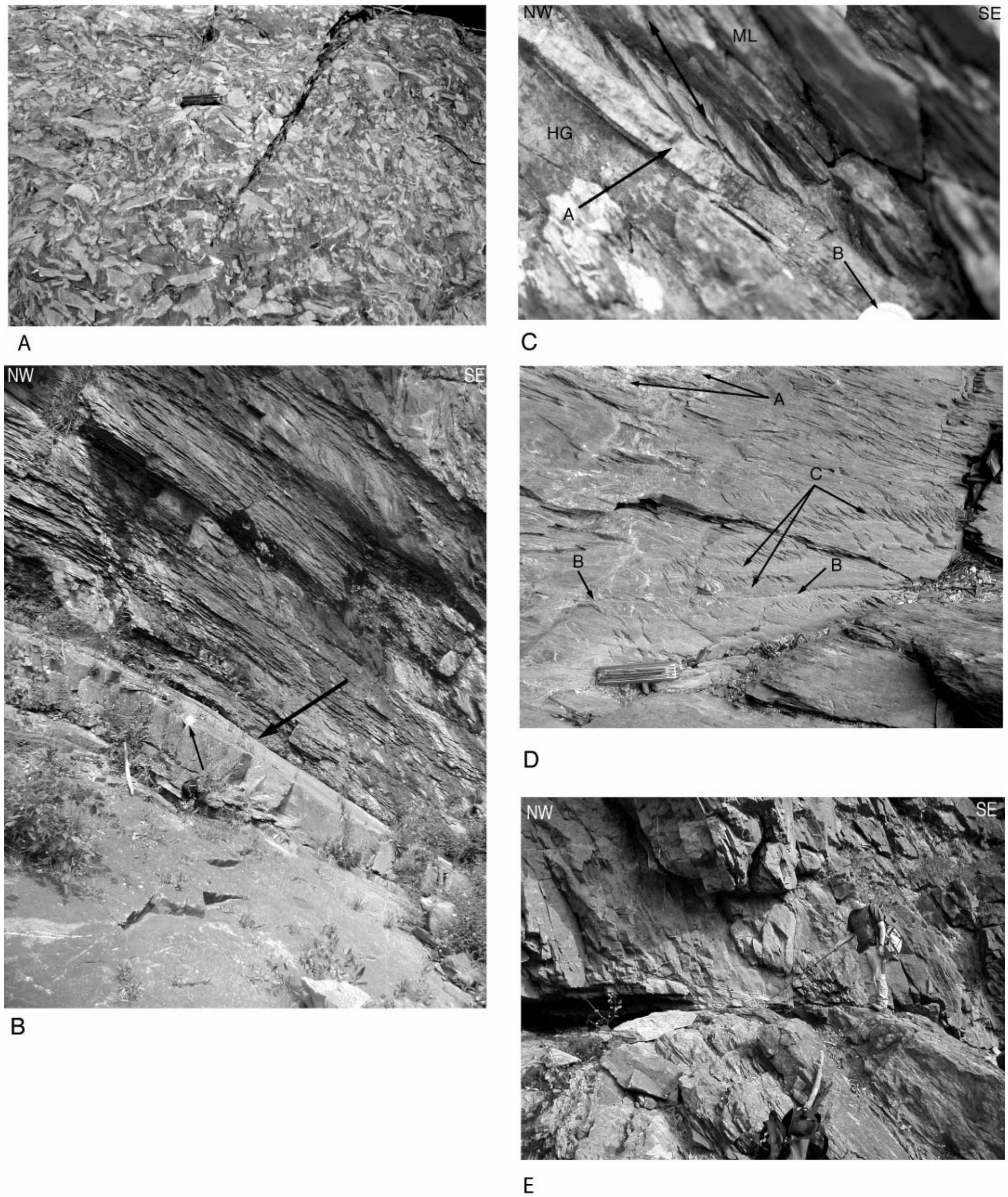

Figure 6. Field photos are all from the north bank of the Mississquoi River in the gorge at Highgate Center. A) The sedimentary breccia identified as “fault breccia” by Schuchert (1937). Pocketknife is 9 cm long. B) Large arrow indicates contact between the lowest beds of the Highgate Formation, above, and the uppermost sandstone bed of the Gorge Formation, below (Loc. D, Figure 5). Small arrow points to 15 cm tall notebook. C) Minor, locally impersistent thrust fault at contact between Highgate and Morses Line Formations. Arrow (A) = calcite slickenfiber vein, approximately 1 cm thick. Arrow (B) = dime for scale, only partially visible. Large bi-directional arrow indicates cleavage orientation. D) Minor thrust faults and en echelon fractures in Morses Line Formation. Arrow (A) points to deformed fault, slip surface parallels ground surface in photo. Arrows (B) indicate relatively undeformed planar thrust that cuts oblique to ground surface. Both faults are surrounded by extension fractures (arrows C). Pocketknife is 9 cm long. E) Highgate Falls Thrust exposed in the Mississquoi River Gorge. Geologist (A.S.) points to slip surface. Upper block moved to the west (left in photo). Photo courtesy of Marjorie Gale.

STOP 2: LOWER HIGHGATE FALLS GORGE.
(N 44.93372°, W 73.05165°; NAD 83)

The lower gorge displays the contact between the Gorge and Highgate Formations, slightly below the Cambrian-Ordovician boundary (Figures 3 and 4). Here, the depositional contact the Gorge Formation and the overlying Highgate Formation can be observed (Figure 3, Loc. D). In contrast, Landing (1983) placed the contact at Loc. B (Figure 3). Very similar argillaceous limestones and limestone breccias are present both below and above this level. We prefer to define the contact at the lower horizon (Figure 3, Loc. D; Figure 6B), which separates dolomitic sandstones below (Gorge Formation) from the argillaceous limestones and limestone breccias above (Highgate Formation), as a much more readily identifiable contact in the field and likely representing a significant change in depositional environment from sand-dominated carbonate deposition to shale-dominated carbonate deposition. Regardless of the placement of the Gorge-Highgate contact (Figure 3. Loc. D vs. Loc. B) within the Highgate Falls Gorge, no major structural boundary is observed in this section, up to the position of the out-of sequence Highgate Falls Thrust.

The contact is readily identifiable in the gorge by the abrupt change from thick-bedded dolomitic arenites of the Gorge Formation below, to thinner bedded argillaceous micrites and limestone breccias of the Highgate Formation above (Figure 6b). In Quebec, this contact is inferred to be a major fault boundary between the autochthonous shelf platform rocks (Milton Dolomite) and allochthonous, deep marine rocks (Stanbridge Complex).

Return along canoe portage to vehicles. Proceed back up hill along Mill Hill Road.

143.7	0.3	Turn left onto VT Rt. 78.
143.9	0.2	Turn left onto VT Rt. 207.
150.9	7.0	Turn left onto Interstate 89 South entrance ramp.
170.5	19.6	Take exit ramp 17 for US Rt. 2.
170.6	0.1	Turn right onto US Rt. 2.
179.8	9.2	Park on right side of Rt. 2 at McBride Lane (private drive).

STOP 3: "THE BEAM", A ROLFE STANLEY MEMORIAL OUTCROP.
(N 44.65130°, W 73.31649°; NAD 83)

NO HAMMERS, PLEASE. "The Beam" is one of two Rolfe Stanley Memorial Outcrops visited on this trip. Over the years, many thousands of introductory geology students, as well as undergraduate and graduate students in Rolfe's structural geology courses have visited these sites. Both beautifully expose important features of foreland deformation, including thrust faulting, fault duplexes, fault bend folds, ramps and ramp faults, en echelon fractures and rotation, and pressure solution cleavage. Detailed descriptions and interpretation for both of these outcrops can be found in Stanley (1988).

"The Beam" occurs in the Cumberland Head Formation, and is a ~1 foot thick micrite bed sandwiched between calcareous shale, and is bounded by bedding parallel thrust faults that display slickensided and stepped calcite veins, and fault zone cleavage (Figure 7). The micrite bed is relatively uncleaved while the surrounding shale displays a strong, steeply east-dipping spaced pressure solution cleavage, similar to that seen throughout the region, containing clay selvedges. Along the thin fault zones, a fault zone cleavage dips more shallowly to the east. Near the fault zone, the spaced cleavage in the shale is rotated towards parallelism with the fault zone cleavage indicating westward transport along the thrust faults. This is consistent with fiber orientation and slickenside fracture steps developed within veins in the fault zones.

Several ramps have been cut through the micrite bed, merging with the bounding bedding-parallel floor and roof faults, creating several horsts. Ramp faults show progressive development from initial slight buckle folding, en echelon fracture formation along the west-dipping limb, and subsequent rotation and failure through the trace of the fractures. Some fractures show diachronous development where older fractures are rotated and cut by younger, unrotated ones. Fracture arrays dominantly dip to the east (west-climbing), parallel and are cut by ramps, but a few dip to the west (east-climbing) and are not cut by through-going faults.

Deformation in "the Beam" contrasts with that in the surrounding calcareous shale. "The Beam" has shortened through rigid body displacement along thrust faults with little cleavage development within the bed, and minor folding over the ramps (~13%), while shortening in the shale is accommodated by pressure solution development (~11-16%), with some minor bedding parallel faults present in the shale. Stanley (1988) interpreted the development of ramp faults to be time transgressive, from east to west across the outcrop. This diachronous shortening in "the Beam" was accompanied by a concurrent progressive pressure solution cleavage development from east to west in the surrounding shale (Figure 8).

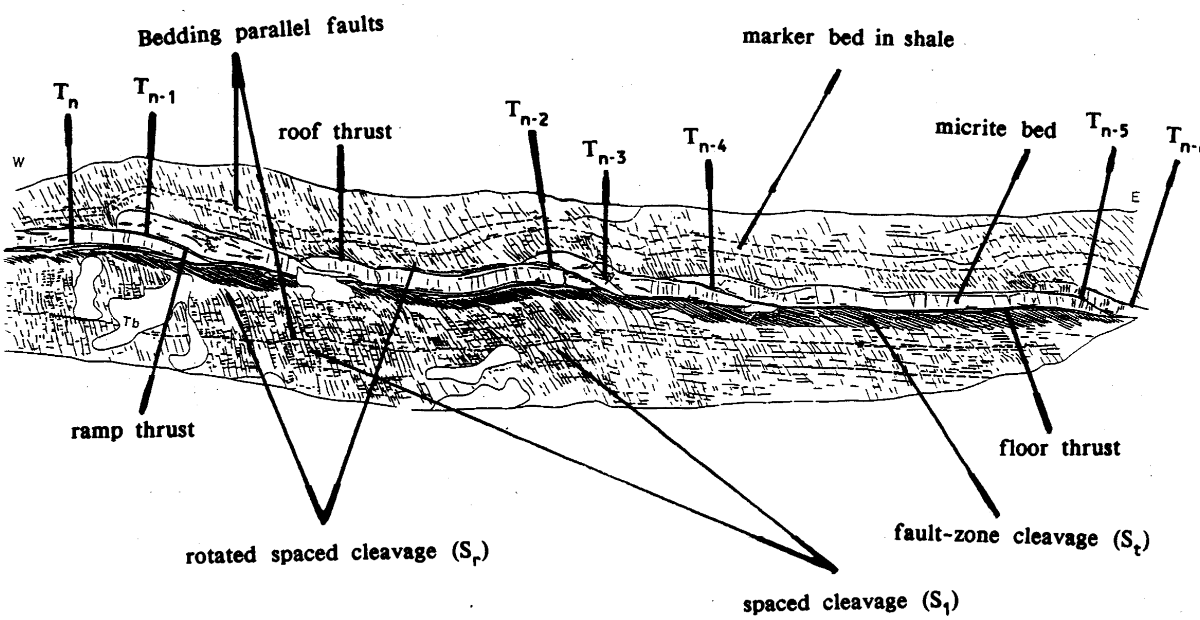

Figure 7. "The Beam" (view looking north). Duplex-faulted micrite bed surrounded by calcareous, cleaved shale. Modified from Stanley (1988). Ramp thrusts evolved from east to west, based on crosscutting fabrics in ramp, roof, and floor thrusts.

When traffic permits, turn out and continue north on US Rt. 2. Be prepared to make an immediate left.

179.9	0.1	Turn left onto Sunset View Road.
180.5	0.6	Turn left onto dirt track; this turn is just before high voltage power lines cross the road.
180.6	0.1	Park in small dirt area adjacent to old gravel quarry.

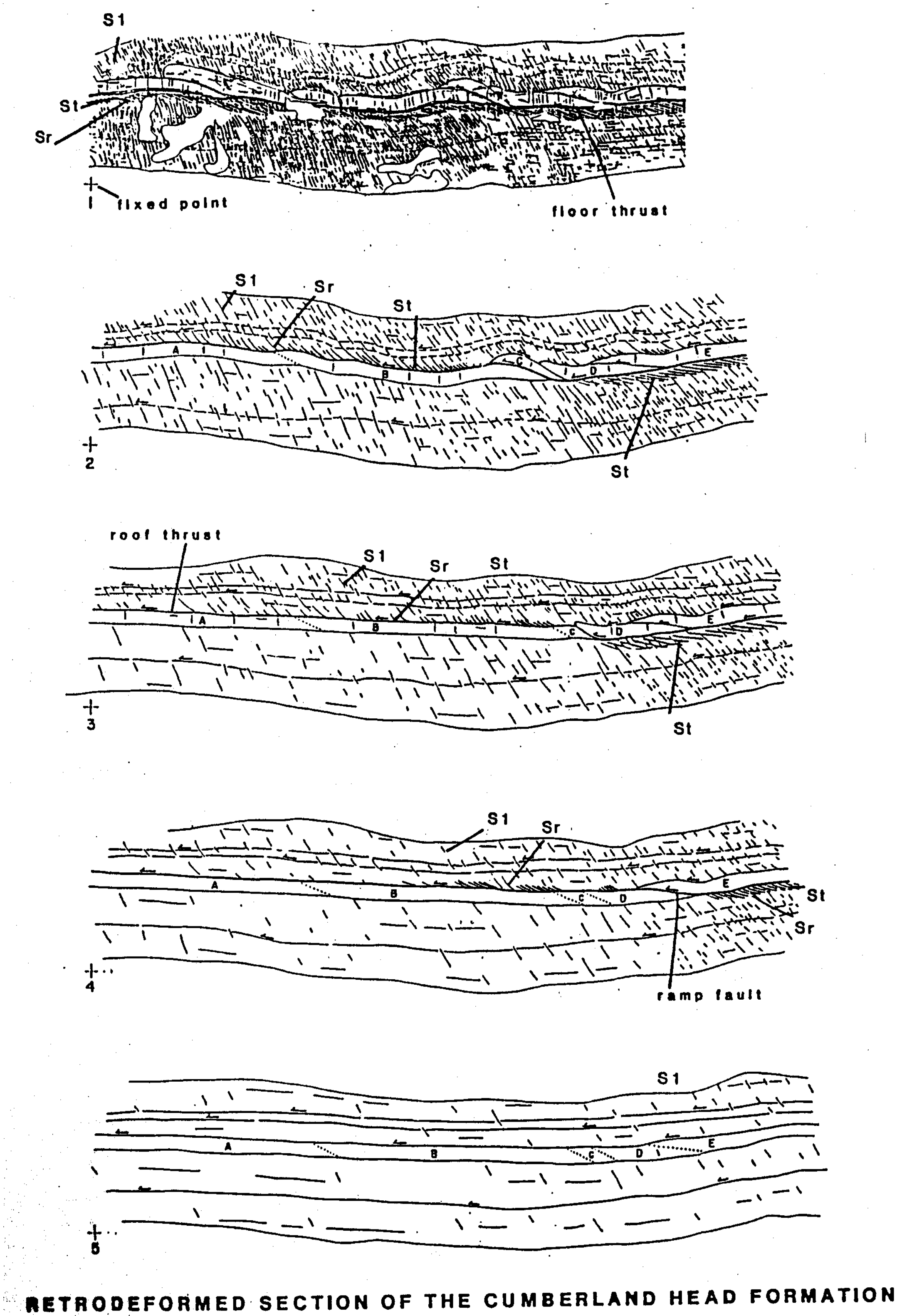

Figure 8. Retrodeformation of the beam. Progressive pulling back of ramp thrust occurs from west to east accompanied by progressive decrease in cleavage development. From Stanley (1988).

STOP 4: LESSOR'S QUARRY, A ROLFE STANLEY MEMORIAL OUTCROP.
(N 44.64938°, W 73.32899°; NAD 83)

NO HAMMMERS PLEASE. There is plenty of loose material on the quarry floor to collect. Abundant fossils can be seen both in the walls of the quarry and in the loose debris. This is the second of two Rolfe Stanley Memorial Outcrops we will be visiting.

Lessor's Quarry exposes several bedding parallel and bedding cutting faults in the Glens Falls Limestone. The north wall displays several interesting features (Figure 9) including an out-of-sequence thrust that is both bedding parallel and bedding-cutting indicating that is preserves parts of its initial ramp and flat sections (labeled "Thrust Fault" in figure 9). It cuts an earlier folded thrust with fault splay and tip (labeled "Synformal Thrust Fault" in figure 9). The folding of the earlier thrust is thought to be the result of an unseen ramp beneath the quarry (Stanley, 1988); e.g. a fault bend fold similar to those seen in the roof thrusts at the "Beam". Since the younger through-going thrust cuts the earlier folded thrust, the younger thrust must be an out-of-sequence fault.

Also related to the younger out-of-sequence fault is the orientation of bedding in the block above the thrust. In the eastern part of the wall, bedding parallels the thrust, while in the middle parts of the north wall, bedding is truncated by the thrust. Then, in the western part of the wall, bedding returns to a parallel position (Figure 9). This suggests that the currently flat thrust in the middle of the wall, initially developed as a ramp, cutting bedding in the upper block. This part of the upper block was then transported off the ramp and onto a nearby flat section of fault, resulting in counterclockwise rotation of the upper block in this section. Note also, the spaced pressure solution cleavage in the upper block is rotated in a counterclockwise manner in the middle part of the wall, over the "ramp" section. Because the cleavage was rotated during movement, the fault must have evolved subsequent to cleavage development, consistent with its interpretation as an out-of-sequence fault (recall that the Highgate Falls Thrust also rotates cleavage).

Along the western wall, next to the entrance, is a steeply dipping fault surface decorated with smeared calcite where the upper block has been removed by quarry operations. It is abundantly lineated with slickenfibers; well-developed steps indicate an east-over-west sense of transport for the removed upper block.

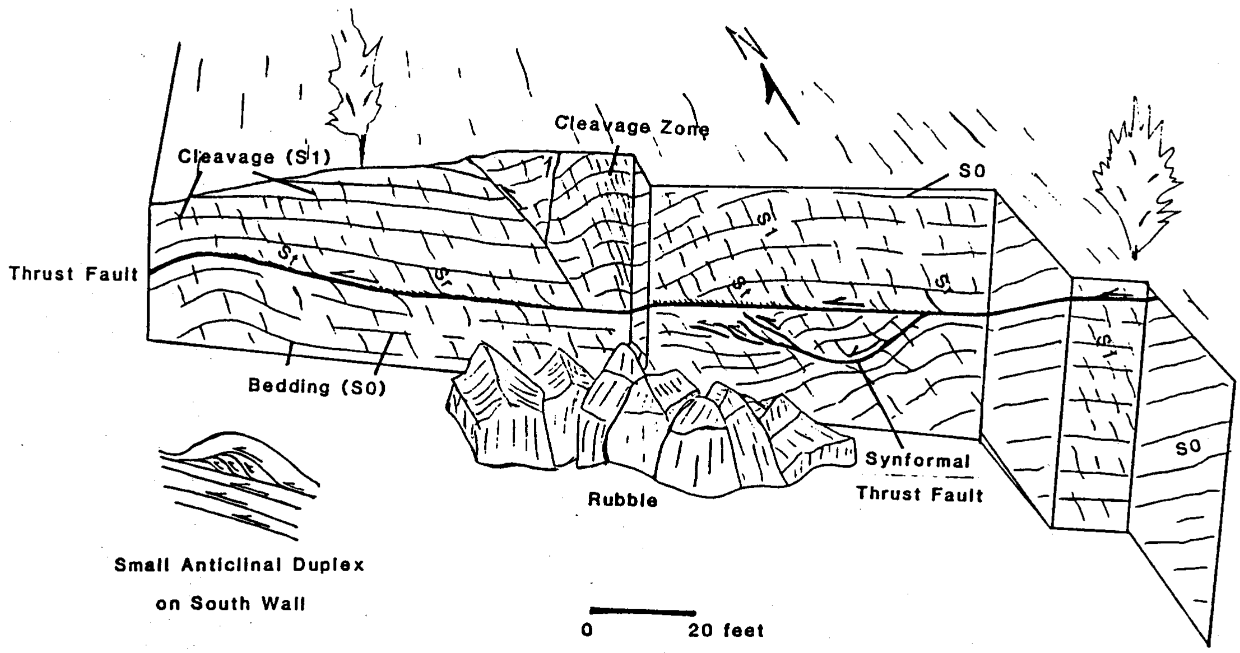

Figure 9. Lessor's Quarry, north wall. From Stanley (1988).

END OF TRIP.

To return to Price Chopper Parking lot from Lessor's Quarry:

		Return to Sunset View Road.
180.7	0.1	Turn right onto Sunset View Road.
181.3	0.6	Turn right onto US Rt. 2 East.
190.6	9.3	Turn right onto I-89 South entrance ramp
201.0	10.4	Take Exit 13 to I-189 West
202.2	1.2	Take exit ramp to US Rt. 7.
202.3	0.1	Turn left onto US Rt. 7 South.
221.3	19.0	Turn right onto VT Rt. 22A South.
229.1	7.8	Turn right onto VT Rt. 17 West.
237.5	8.4	Cross bridge to NY. Continue on NY Rt. 185.
241.6	4.1	Turn left on to NY Rt. 9N South.
246.2	4.6	Turn right. Stay on Rt. 9N South.
253.7	7.5	Turn right onto NYS Rt. 74.
271.1	17.4	Turn left onto I-87 South entrance ramp.
300.2	29.1	Take Warrensburg Exit 23.
300.5	0.3	Turn right onto Diamond Point Road.
300.6	0.1	Turn left onto US Rt. 9 South.
300.7	0.1	Turn right onto Bakers Crossing.
300.8	0.1	Turn right onto Prosser Road.
300.9	0.1	Turn left into Price Chopper parking lot.

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