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The Glacial Geology of Northern Vermont : Part II: Elmore Mountain, Stowe Valley and Smugglers Notch

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TRIP C-2

The Glacial Geology of Northern Vermont --

Part II

Elmore Mountain, Stowe Valley and Smugglers Notch

Leader: D.P. Stewart

LUNCH: Box lunches will be needed for this trip. Arrangements for a lunch should be made at the registration desk.

MAPS: The trip includes areas in the Montpelier and Hyde Park quadrangles. A copy of the surface geology map of the Montpelier Quadrangle is included in the Field Trip Guide. The Hyde Park Quadrangle has not been mapped. Since there are five stops in the Hyde Park Quadrangle those attending the field trip may wish to bring this topographic sheet.

START: The party will depart from the Pavilion Hotel in a car caravan at 7:45 a.m., Sunday, October 15, 1961.

MILES The car caravan will leave the hotel heading east on State Street and turn north on Elm Street and proceed north out of Montpelier. The road continues north through the valley of the North Branch of the Winooski River to Lake Elmore.

The terraces along the valley wall as we leave the Montpelier city limits are built of lacustrine clays and sands. Varved clay can be noted in the base of the exposure about one-half mile north of the intersection of State and Elm streets.

The lake terraces give way to kame terraces approximately three miles north of Montpelier. The road climbs to the top of the terraces and continues over the terraces for two and one-half miles to Putnamville.

At the top of the gravel terraces, the Wrightsville Dam can be seen on the right. This is an earth-fill, flood control dam that controls the water of the North Branch.

Beyond Putnamville, there are several small sand and gravel terraces in the North Branch Valley that are believed to be delta deposits that were built into a lake, or a series of lakes, that once occupied the valley. It is now the opinion of the writer that these were built into small ice-contact lakes that existed during the melting of the last glacier. The road crosses the first and largest of these deposits at Worcester. Note the level top of the deposit. It is probable that a part of this deposit is outwash but no pits exist that allow an examination of the deeper materials. A small pit in delta gravel is opposite the cemetery in Worcester. Elevation 780 feet.

The striations on this side of the Worcester Mountains trend N 10°E to N 20°E and therefore the last ice in this section was probably the Shelburne glacier of a pre-Mankato substage, probably Cary. It is therefore believed that these lake deposits may antedate those of the western part of the Winooski Valley.

From Worcester we proceed 2.8 miles north to STOP I (Gravel pit on the left side of road).

12.0 STOP I -- Gravel pit in lacustrine gravel (30 minutes)

This deposit exemplifies the small deposits found in the North Branch valley. Delta structure is not too well developed here, but beach characteristics are quite obvious. Elevation 830 feet.

From STOP I continue north to Elmore Lake. Several small patches of lake sand can be noted along the road for five miles. At the time of the writing of this guide (August, 1961), road construction was in progress in this area and several openings were to be made in the lacustrine materials. The terraces four miles north of STOP I are at an elevation of approximately 1000 feet. This level seems to be the best developed in the North Branch valley and three small deltas of tributary streams occur three to six miles north of Montpelier at elevations of 1010 to 1030 feet.

Six and one-half miles north of STOP I two beaver dams can be seen on the left. A beaver house can also be seen.

23.5 STOP II -- Elmore Lake State Park (15 minutes)

Elmore Lake is a scenic example of a kettle lake. Note: Elmore Lake is located in the Hyde Park Quadrangle. This area has not been mapped and, therefore, no map is included in the guide. Stops III, IV, V, and VI are in this quadrangle.

From Elmore Lake the caravan will continue north and northwest on the road to Morristown. One mile from Elmore Lake turn right onto a graveled road and STOP III is one-half mile.

25.7 STOP III -- Frontal Moraine (15 minutes)

As all New England geologists know, frontal moraines are rare in this region. The small ridge seen here is the best developed moraine yet found in this section of Vermont. It is believed that this will prove to be the terminal moraine of the Burlington glacial lobe from the northwest.

From STOP III continue on the road to Morrisville. The morainic ridge can be seen to the right of the highway.

Note the round barn about one mile beyond STOP III.

Two and one-half miles west of STOP III the caravan will turn left (onto the only hard surfaced road that turns left), then immediately to the right (follow hard surfaced road) and follow this road to the Morrisville Armory. A gravel road immediately east of the armory leads into a large gravel pit.

29.6 STOP IV -- Gravel pit in beach (delta?) gravel (30 minutes)

The gravel here is definitely lacustrine. The elevation of the surface is approximately 775 feet. Although the deposit has not been traced down the river, it is suspected that this will prove to be a delta that was built into the Quaker Springs Stage of Lake Vermont. The level surface of the gravel extends northward through the area of the Country Club.

From STOP IV, we will return (toward Elmore Lake) to the Elmore Mountain Road. This road is gravel and is the first right after returning to the Elmore Lake-Morrisville road. The mountain road follows the top of a kame terrace. The caravan will turn right six-tenths mile after entering the gravel road and go into a gravel pit.

32.1 STOP V -- Gravel pit in kame gravel (15 minutes)

This kame terrace is one of three large terraces that are found on the east side of the Stowe Valley between Morrisville and Waterbury. It is believed that these terraces were formed at the terminus of the Burlington ice lobe as it began melting back from Elmore and Worcester mountains.

From the gravel pit, continue south on the Elmore Mountain Road for two and one-half miles, turn right on Delano School road. STOP VI is four-tenths mile.

35.0 STOP VI -- Lacustrine off-shore bar (20 minutes)

Here is a gravel bar built by the wave action of a high-level lake in the Stowe Valley. The highest point on the bar is just above the 1140 foot contour. The deposit was no doubt made off-shore. Shore phenomena of this same lake level will be seen at STOPS VIII and IX. This is undoubtedly the lake level that C.H. Hitchcock(1908) correlated with one of the stages of Lake Memphremagog but whether or not it can be traced into the Memphremagog basin is yet to be determined. Merwin(1908) and Hitchcock(1908) suggested that this lake had an outlet through the divide between the Dog and White rivers at Roxbury and Fairchild(1916) assumed it drained southward through Williamstown Gulf. The present survey has found no evidence of such a high-level lake in the Winooski or Dog river valleys or Williamstown Gulf. The data collected to date indicates that the Stowe Valley was dammed by ice (Burlington lobe) south of Stowe and that the water probably drained into the Winooski valley via Middlesex Notch.

After STOP VI continue west on the Delano School Road to its end and turn left on the hard surfaced road. This road intersects Route 100 and the caravan will follow Route 100 into Stowe.

41.0 STOP VII -- Lunch (45 minutes)

Following lunch the caravan will continue on Rt. 100 to the north end of Stowe. Turn right on West Hill Road at the Chicken Farm and follow the gravel road two miles to STOP VIII.

44.6 STOP VIII -- Gravel pit in beach gravel (30 minutes)

The gravel here, at elevation 1110 feet, marks the same lake level as the bars at STOP VI. The size of this deposit seems to indicate that the lake existed for a rather long period of time and does not support a conclusion that it was made by a small, local, ice-contact body of water.

From STOP VIII, continue on the West Hill Road, keeping left at the next two road intersections, for one mile and turn right at third intersection. STOP IX is one-tenth mile up the hill.

45.7 STOP IX -- Beach ridges (15 minutes)

The highest beach ridge in this group is 1170 feet. Same lake as STOP VI and VIII.

After STOP IX, we turn around and descend the hill to Stowe. Turn right on Route 108 and continue to Smugglers Notch.

Lake sediments can be noted on the right four miles after the Route 108 intersection. These deposits are at an elevation of approximately 900 feet and have not been correlated with lake levels in the Stowe Valley.

Kame terrace gravels are rather common on this side of the mountain. They can be seen at points five miles and eight and one-half miles beyond the intersection where the caravan entered Route 108.

Near the summit of Smugglers Notch, the road is winding and "winds" around large ice-riven boulders from the almost-vertical sides of the mountain. Undoubtedly the riving by the ice dates from the Pleistocene but a definite estimate of what percentage of the boulders are post-glacial cannot be made.

Note the Big Spring near the top of the mountain. We will stop for a drink (of water).

57.0 STOP X -- Smugglers Notch -- End of trip.