

TRIP A: SILURIAN STRATIGRAPHY OF WESTERN N. Y.

LEADERS: Edward J. Buehler and William J. Kilgour

DATE: April 30, 1966, 8:30 A.M.

ROAD LOG

Time: approximately 10 hours · Total mileage: 115

TIME SCHEDULE: The large enrollment for this trip will probably necessitate two sections, the second of which will follow a different schedule.

Leave Treadway Inn 8:30 A.M.
 Arrive Decew Generating Station. 9:30 A.M.
 Leave Decew Generating Station 10:30 A.M.
 Arrive Power Vista 11:30 A.M.

Lunch and View exhibits

Descent into gorge 12:45 P.M.
 Leave Power Vista. 2:00 P.M.
 Arrive Lockport. 3:00 P.M.
 Leave Lockport 3:45 P.M.
 Arrive Akron 4:15 P.M.
 Leave Akron. 5:00 P.M.
 Arrive Treadway Inn 6:30 P.M.

MILEAGE SCHEDULE:

<u>Miles from last point</u>	<u>Description</u>
0.0	Leave Treadway Inn; turn left at Buffalo Avenue.
0.2	Left on Robert Moses State Parkway.
4.3	Arrive Niagara Falls; Continue on Parkway.
1.6	Pass Whirlpool park.
1.6	Pass Power Vista; follow road marked South-Canada.
1.1	Take route marked Canada.
0.7	Cross New Queenston Bridge; toll gate and customs; straight ahead on #405; toll gate on bridge over Welland Canal.
9.6	Turn off (left) at Ontario St. exit.
1.9	Cross St. Paul St. (Rt. 8); continue on South Drive.

<u>Miles from last point</u>	<u>Description</u>	
0.1	Turn right on Glen Ridge.	
1.7	Turn right at Brock University; continue to DeCew Generating Station	
1.0	STOP 1. Refer to papers by Fisher (p. 1), Kilgour (p. 10), and Zenger (p. 19). The following stratigraphic column for DeCew Falls is taken from Bolton, 1949.	
0 - 12	<u>Dolomite</u> , light grey dense nodular, weathering buff to white.	Lockport
12 - 25	<u>Dolomite</u> , as above, but with abundant nodules of chert.	Ancaster
25 - 56	<u>Limestone</u> , coarsely crystalline and porous, or sandy, with thin shale interbeds.	Gasport
56 - 64	<u>Dolomite</u> argillaceous to sandy, calcareous, dark grey, weathering buff to tan.	DeCew
64 - 120	<u>Shale</u> , fissile, green-grey to dark grey.	Rochester
120 - 127.5	<u>Limestone</u> , pink to dark grey, coarsely crystalline, crinoidal.	Irondequoit
127.5 - 134	<u>Limestone</u> , <u>dolomitic</u> , dense, light grey; top 0.5' sandy.	Reynales
134 - 142	<u>Limestone</u> , dense, light grey, massive, with thin sandy partings	Reynales
142 - 143	<u>Shale</u> , greenish grey to dark grey.	Neahga
143 - 148	<u>Sandstone</u> , fine grained, massive, white to light grey, with a few thin shale partings.	Thorold
148 - 148.5	<u>Shale</u> , dark grey.	Grimsby
148.5 - 152	<u>Sandstone</u> , as above	Grimsby
152 - 183	<u>Sandstone</u> , fine grained, red mottled with green, with interbedded red shale.	Grimsby

Miles from
last point

Description

183 - 194	Shale, red and green, with minor beds of red sandstone.	Grimsby
194 - 242	Shale, dark grey to green, calcareous, with beds of sandy shale and light grey calcareous sandstone.	Power Glen
242 - 254	Sandstone, quartzose, white to light grey, massive to thick bedded with small scale cross-bedding. Thin zones of grey shale pebbles (intraformational conglomerate).	Whirlpool
254 -	Shale, brick-red with 0.3' of light green shale at top.	Queenstone

Leave DeCew Generating Station.

- 1.0 Turn left at Brock University (Glen Ridge Ave.).
- 1.7 Turn left at South Drive.
- 0.1 Turn right at St. Paul Street; left at William Street; left again.
- 0.2 Right onto Ontario Street, follow QEW signs.
- 1.7 Turn right onto QEW.
- 5.6 Take Rt. 405 - Queenstone Bridge to U.S.A.
- 5.0 U.S. Customs at Bridge; turn right at #104; follow #104 west.
- 1.2 Turn left at Power Vista.

STOP 2. Lunch. Examination of exhibits at Power Vista. Following is the stratigraphic section here. See papers by Fisher (p. 1), Kilgour (p. 10), and Zenger (p. 19), for details.

Eramosa	20'
Goat Island	19
Gasport	27.5'
DeCew	8'
Rochester	68'
Irondequoit	26'
Reynaies	8'
Neahga	6'
Thorold	7'
Grimsby	52'

Miles from
last point

Description

Cabot Head, etc.	36'
Whirlpool	25'
Queenston	100' exposed

Leave Power Vista; turn right on #104 East.

1.6 Descend Niagara escarpment; follow 104E.

1.0 Turn left; continue of 104.

13.5 Arrive at junction with #93 (Warrens Corners); turn right.

2.0 Ascend Niagara escarpment.

0.6 Lockport dolomite outcrop.

0.5 Intersection; continue straight on 270.

1.6 Cross Rt. 31.

0.4 Turn left on Hinman Road.

2.1 Junction with Bear Ridge Road.

0.3 Enter Frontier Crushed Stone Quarry.

STOP 3. The following units of the Lockport are exposed here. See paper by Zenger (p. 19) for details.

Goat Island	24'
Gasport	29.5'
DeCew	8.5'

Leave Frontier Crushed Stone Quarry; turn left; bear right over bridge.

0.8 Cross Transit Road #78; continue ahead on Lincoln Road.

2.2 Turn right on Rt. 93; continue on 93 through Akron.

15.7 Turn left at Akron Park (Parkview Drive).

0.4 Turn right.

0.6 Park at Akron Falls.

Miles from
last point

Description

STOP 4A. The following members of the Bertie dol. are exposed at the falls. See paper by Rickard (p. 24) for further details.

Scajaquada	8'
Falkirk (the massive Member)	20'
O-atka	20'

The reentrant of the base of the falls is identified as the top of the Camillus Shale.

STOP 4B. About 1/4 mile upstream from the falls. The Units here are:

Nedrow member of Onondaga	about 6'	exposed
Edgecliff member of Onondaga	5'	
Siluro-Devonian unconformity		
Akron dolostone	8'	
Williamsville member of Bertie	6'	

See papers by Rickard (p. 26), and Oliver (p. 32) for details.

Leave Akron Falls

- | | |
|-----|--|
| 0.6 | Turn left on Parkview Drive. |
| 0.5 | Turn left on #93. |
| 1.0 | Turn right on Rt. 5. |
| 8.0 | Junction with 324 (Sheridan Dr.); straight ahead on Rt. 5. |
| 6.2 | Right turn on Youngman Highway, (290); Use through traffic rt. (290). |
| 8.0 | Take 190 North - Niagara Falls. |
| 0.8 | Grand Island Bridge toll booth; Cross East River onto Grand Island. |
| 5.3 | North end of Grand Island; cross bridge onto mainland; bear right (N. Y. 384). |
| 0.5 | Arrive Treadway - End of trip. |

TRIP B: UPPER DEVONIAN N.Y.S.G.A. FIELD TRIP

LEADER: Dr. Irving H. Tesmer

DATE: April 30, 1966

See papers by Tesmer (p. 47) and Buehler (p. 44) for stratigraphic details.

ROAD LOG

Time: approximately 9 hours

Total mileage: 136.5

MILEAGE SCHEDULE:

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
0.0	0.0	Leave Treadway Inn, Niagara Falls, New York at 8:30. Turn left on Buffalo Avenue, west on N.Y. 384.
0.4	0.4	Turn left on Interstate 190; south on Interstate 190 over North Grand Island Bridge.
6.5	6.1	Cross South Grand Island Bridge.
8.1	1.6	Junction with Interstate 290 (Youngman Highway); continue south on Interstate 190.
10.5	2.4	Enter city of Buffalo
12.7	2.2	Junction with N.Y. 198; continue south on Interstate 190.
14.1	1.4	Observe Onondaga Limestone to left (Buffalo NW quad)
14.3	0.2	Drive under Peace Bridge to Canada.
16.7	2.4	Junction with N.Y. 5; south on N.Y. 5 over Skyway Bridge.
19.5	2.8	Cross Father Baker Bridge
20.3	0.8	Leave city of Buffalo, enter city of Lackawanna.
22.3	2.0	Leave city of Lackawanna, enter village of Woodlawn.
24.2	1.9	Junction with N.Y. 75; continue southwest on N.Y. 5.

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
25.8	1.6	STOP 1. Hamburg Park (Buffalo SE quad); exposures of Ledyard and Wanakah; depart 9:45.
28.5	2.7	Turn right on Lakeshore Rd.; southwest on Lakeshore Road.
31.7	3.2	Bridge over Eighteen-mile Creek.
31.9	0.2	Turn right at Home of Piarist Fathers STOP 2. Arrive 10:00. Home of Piarist Fathers (Eden quad); exposures of Wanakah, Tichenor, Windom, Genundewa and West River; depart 11:00. Return northeast on Lakeshore Road.
32.3	0.3	Junction with N.Y. 5; continue east on Eighteen-mile Creek Road.
33.1	0.8	New York Central Railroad Bridge. STOP 3. Arrive 11:15. Follow path to left along west side of railroad to banks of Eighteen-mile Creek (Eden quad); observe exposures of Cashaqua and Rhinestreet; depart 11:30.
33.9	0.8	Church Parking Lot STOP 4. Walk 0.2 miles further east along Eighteen-mile Creek Road to U.S. 20 and then to bridge over Eighteen-mile Creek (Eden quad); observe exposure of Rhinestreet; depart 12:00. Return west on Eighteen-mile Creek Rd. to Lakeshore Road.
35.8	1.9	Turn left on Lakeshore Road; continue southwest on Lakeshore Road.
37.8	2.0	Junction with Sweetland Road; continue straight ahead on Lakeshore Road.
40.3	2.5	Junction with Dennis Road; continue straight ahead on Lakeshore Road.
41.8-43.0	1.5	Observe prominent sand ridge to right (Angola quad).
46.5	4.7	Turn right into Evangola State Park.

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
47.1	0.6	Evangola Parking Lot STOP 5. Arrive 12:30. Evangola State Park (Farnham quad); lunch and rest stop; exposures of Angola Shale; depart 1:30. East on Evangola Park Road
48.7	1.6	Turn right on N.Y. 5; southwest on N.Y. 5.
49.3	0.6	Junction with N.Y. 249, Farnham, N.Y.; continue on N.Y. 5.
51.4	2.1	Junction with U.S. 20. STOP 6. Arrive 1:45. Niagara Trading Post and bridge over Cattaraugus Creek (Farnham quad); observe Angola Shale and preglacial course of Allegheny River; depart 2:00. Continue southwest on U.S. 20 and N.Y. 5.
54.1	2.7	Continue straight ahead on U.S. 20.
54.5	0.4	Enter village of Silver Creek, New York
55.1	0.6	Turn left at stop light in center of village; continue on U.S. 20.
55.4	0.3	Junction with N.Y. 428; continue on U.S. 20.
55.5	0.1	Bear right on Main Street.
55.6	0.1	Turn right on Ward Avenue.
55.7	0.1	Turn right on Parkway.
55.8	0.1	STOP 7. Arrive 2:15. Walnut Creek (Silver Creek quad); exposures of Angola, Pipe Creek and Hanover; depart 2:45. Return to center of Silver Creek village via same roads.
56.5	0.7	Turn left on Central Avenue at stoplight in center of village of Silver Creek; this becomes N.Y. 5. Southwest on N.Y. 5.

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
57.7-62.4	1.2	Observe various exposures of Hanover Shale Lake Erie cliffs to right (Silver Creek and North of Dunkirk quads).
64.6	6.9	Enter city of Dunkirk.
65.9	1.3	Junction with N.Y. 60; continue west on N.Y. 5.
67.0	1.1	Turn right on Point Drive North.
67.9	0.9	Point Gratiot Park (Dunkirk quad). STOP 8. Arrive 3:15. Exposures of Dunkirk Shale; depart 3:30. Continue along Point Drive to N.Y. 5.
68.5	0.6	Turn left on N.Y. 5; return east on N.Y. 5.
69.6	1.1	Turn right on N.Y. 60; south on N.Y. 60.
71.8	2.2	Turn left, enter Interstate 90 (Dewey Thruway) at Interchange #59; northeast on Interstate 90 toward Buffalo.
76.1	4.3	Observe abandoned lake beach to right, associated with glacial Lake Warren at Sheridan, New York (Dunkirk and Forestville quads)
83.9	7.8	Silver Creek Interchange #58; observe Hanover-Dunkirk contact (Farnham quad).
85.3	1.4	Bridge over Cattaraugus Creek.
97.4	12.1	Bridge over Eighteen-mile Creek.
102.9	5.5	Hamburg Interchange #57.
104.4-104.7	1.5	Observe exposures of Rhinestreet Shale (Buffalo Se quad).
106.9	2.5	Blasdel Interchange #56.
112.8	5.9	Interchange #53, junction with Interstate 190 (Niagara Section) to downtown Buffalo; continue straight ahead on Interstate 90 (Dewey Thruway).
118.5	5.7	Exit at Interchange #50, north and west on Interstate 290 (Youngman Highway).

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
128.5	10.0	Junction with Interstate 190; north on Interstate 190 toward Niagara Falls.
129.3	0.8	Cross South Grand Island Bridge.
135.2	5.9	Cross North Grand Island Bridge.
136.0	0.8	Turn right on N.Y. 384.
136.5	0.5	Arrive at Treadway Inn, Niagara Falls, New York at 5:00.

TRIP C: LATE PLEISTOCENE GEOLOGY AND GEOMORPHOLOGY OF NORTHWESTERN
NEW YORK

LEADERS: Parker E. Calkin and Charles J. Cazeau

DATE: April 30, 1966

ROAD LOG

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
(Quadrangle Maps)		
0.0	0.0	<u>Assembly point:</u> Parking lot, Treadway Inn Buffalo Avenue, Niagara Falls, Near North Grand Island Bridge.
<u>Departure time:</u> 8:15 A.M. All travel by bus.		
(Tonawanda 15' Tonawanda W. 7 1/2')		Turn left (W) out of parking lot onto Buffalo Ave. and proceed west to North Grand Island Bridge entrance.
0.4	0.4	Turn left (S) immediately after passing under bridge ramp and proceed across Niagara River (east fork) onto Grand Island following U.S. Rt. 190, Niagara Expressway.
4.1	3.7	Pass south over very subdued Niagara Falls Moraine; 20-30 feet of relief at stream cuts on otherwise very flat plain of Lake Tonawanda. This is the lowland of Upper Silurian, Salina Group.
6.5 (Buffalo 15' Buffalo N.W. 7 1/2')	2.4	Proceed again across Niagara River (east fork) to Tonawanda.
7.8 (Buffalo NE 7 1/2')	1.3	Turn right at Exit N-16 onto U.S. Rt. 290, Youngman Expressway, and proceed east over plains of former Lake Tonawanda.
17.1	9.3	Rise south over Onondaga Limestone (M. Dev.) Escarpment. Exposure here in roadcut as you pass under Main Street.
17.5	0.4	Keep right at Thruway fork to remain on Thruway--"West Bound".

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
24.0 (Buffalo SE 7 1/2')	6.5	Pass beneath Niagara Expressway ramp and cross Buffalo River .6 miles beyond.
25.6	1.6	Turn right (W) at Exit 54 to N.Y. Rt. 16.
27.1	1.5	Turn left (E) at T onto N.Y. Rt. 16 and immediately bear to right (S) off Rt. 16 at fork .2 miles beyond. Cazenovia Creek, a tributary of the Buffalo River at your right.
28.1	1.0	Turn left (E) onto Main St. and proceed along well defined morainal ridge at 660-670' through Ebenezer. Ridge is a probable westward extension of Leverett's (1902) Alden Moraine.
DeCew 15' Orchard Park 7 1/2'		It has been mistaken for a Lake Dana beach ridge but has probably been altered by Lake Dana waters (680-700'). Cellar cuts reveal a dense till, rich in large, striated boulders of Onondaga Limestone.
30.2	2.1	Join Seneca St. and proceed along subdued morainal ridge.
31.7	1.5	Turn right (SE) onto N.Y. Rt. 16, still continuing on Seneca Rd. At right, lateral migration of Cazenovia Creek has caused collapse of paved road.
33.6	1.9	Turn right (S) onto Northrup Rd. and cross Cazenovia Creek .2 miles beyond. Note at left the falls formed by resistant and fossiliferous Tichenor Limestone Member.
34.3	0.7	Beyond intersection with Kingsley Rd., Northrup crosses shaley gravel of glacial Lake Warren beaches, 800-830'. At left, 7 miles beyond is gravel beach ridge, 830', behind green house.
35.2	0.9	Intersection with N.Y. Rt. 187, Transit Rd. (BE CAREFUL, BLIND CORNER) Proceed left (S) on Transit Rd. rising up to glacial Lake Whittlesey features, 900'.

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
36.1	0.9	STOP 1. Cancer Prevention Research Center. View postulated, (Fairchild, 1906) Lake Whittlesey, wave-cut beach and scarp at left and right on north side of hill. Ridge appears to be largely shale, but its north side is partly flanked by well sorted sand.
36.3	0.2	Turn left (E) onto Mile Strip Rd. Cross ridge crest (880') after .3 miles. Cellar of Barren house at right, was dug in Lake Whittlesey (?) gravel. Bear right (S) beyond ridge onto Willardshire Rd.
37.0	0.7	Proceed past probable kame moraine gravel ridge at right on north side, Hamburg Moraine.
37.5	0.5	Cross Cazenovia Creek and proceed on Willardshire Rd. across typical hummocky topography of Hamburg Moraine.
40.0	2.5	Turn left (N) onto Seneca Rd.
42.0	2.0	Proceed through intersection of Jamison and Conley Roads with Seneca Rd. which overlies a Lake Whittlesey beach and split at 900'. Beach topography is now nearly obscured except for minor sand ridges on grounds of Moog Plant at right (N). Descend from split, .3 miles west of Moog Plant.
43.4	1.4	Turn right (E) beyond Church onto Rice Rd. which follows beaches of glacial Lake Warren (lower or second Lake Warren). Observe prominent beach ridge at left of intersection with Dellwood Dr. An abandoned gravel pit 1.3 miles beyond Seneca Rd. cut in the beach exposes 20' of well sorted gravel.
45.6	2.1	Turn left (N) onto Bowen Rd.
46.2 (East Aurora 7 1/2')	0.6	Pass under R.R. tracks and turn right (E) onto Woodward Rd. Note again at least two prominent ridges of Second Lake Warren (Blackmon, 1956) left, .7 miles from Bowen Rd.
48.0	1.8	Turn left (N) onto Girdle Rd. and .1 miles beyond turn right onto Bullis Rd.

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
48.5	0.5	Cross Buffalo Creek. Pipeline trenches adjacent to creek here revealed 2' of gravel over blue shaley till.
48.8	0.3	Turn left onto Stille Rd. noting well formed beach ridge of Lake Warren on right. Cross at least 3 NE-SW trending ridges of Second Lake Warren 835'-800'.
50.0	1.2	Turn right onto Clinton Rd. and pass across delta of Buffalo and Little Buffalo Creeks formed in Lakes Whittlesey and/or Warren.
50.8	0.8	STOP 2. Turn right into Huber and Huber sand pit. Observation and discussion of exposed Lake Warren beach and delta structures. On leaving, turn right (E) onto Clinton Rd.
51.0	0.2	Turn left (N) onto Town Line Rd. and pass across beaches of Second Lake Warren, possible Lake Wayne 800' (.4 miles), and Lake Grossmere, 790';, (0.8 miles) beyond Clinton Rd.
52.8 (Clarence 7 1/2')	1.8	Cross unidentified beach ridge, 760', and Cayuga Creek, the eastern most river draining into Erie Basin. Proceed south over very subdued remnants of Alden Moraine. Borrow pits and cellar cuts reveal red, stony silts and normal clay till in this general region.
57.8	5.0	Cross Ellicott Creek and turn left (W) onto N.Y. St. 33, Genesee St. Pass gravel pits in ice-contact deposits on right.
59.7 (Lancaster 7 1/2')	1.9	STOP 3. Pine Hill Concrete Co. sand and gravel pit. Over 45' of ice-contact, stratified drift is exposed on the northeast corner. Thin layers of flow (?) till occurs at some horizons and the deposit is overlain by 7-10' of cobbly till in the northwest corner. This together with cross-bedding data suggest a possible (a) kame delta or (b) ice margin! stream origin. These and adjacent deposits may be related to the Buffalo Moraine of Kindle and Taylor (1913).

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
64.6	4.9	Cross Ellicott Creek and turn right (N) onto N.Y. Rt. 78, Transit Rd. Proceed north under Thruway, .8 mile, and across Main St., 2.0 miles beyond Genesee St.
67.4 (Lockport 15' Clarence Center 7 1/2')	2.8	Proceed under Sheridan Dr. overpass and down Onondaga Escarpment to Lake Tonawanda plain, 630' t. This area is largely underlain by lacustrine red silts and clays overlying Camillus Shale (U. Silurian). Scattered till ridges and drumlins project above its surface.
69.2	1.8	Cross over crest of Niagara Falls Moraine.
75.5	6.3	Proceed north across Tonawanda Creek and from Erie into Niagara County.
76.3	0.8	Turn right (E) onto Branz Rd. and proceed up onto NE-SW trending drumlin. This and next drumlin have no more than 35' of relief but stand out clearly from flat Lake Tonawanda plain.
78.4	2.1	Turn left (NW) onto Raymond Rd. (formerly Rapids Rd.) and immediately (.3 mile) left again onto Rapids Creek Rd.
79.1	0.7	Crest of NE-SW trending drumlin.
80.2 (Lockport 7 1/2')	1.1	Turn right onto N.Y. Rts. 78 and 263, Transit Rd.
82.4	2.2	Pass up over hummocky ridges of Barre Moraine with good crests 1 mile beyond, near stop light at Lincoln Ave., City of Lockport.
84.2	1.8	Cross N.Y.S. Barge Canal/Erie Canal at Lockport. Canal leads NE through one of Lake Tonawanda outlet spillways. Continue north on Transit Rd.
85.1	0.9	STOP 4. Turn left onto Outwater Dr. and proceed to Outwater Park for lunch. The park lies on the Lockport Dolostone (M. Sil.) forming the prominent Niagara Escarpment overlooking glacial Lake Iroquois plain to north. Lake Ontario lies 11 miles to the north.

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
		Proceed to Trow bridge and make a U turn, returning (E) on Outwater Dr. to Transit Rd. Turn left (N) onto Transit Rd.
86.3	1.2	Turn right (E) onto Glenwood Ave.
86.6	0.3	Turn sharp left (NW) onto Gooding St. and in .2 mile bear left after crossing tracks at fork onto W. Jackson St. After .5 miles at fork, bear right along creek onto Plank Rd. You are passing down from Niagara Escarpment through one of many spillways cut by water draining from Lake Tonawanda to Lake Iroquois.
88.1 (Tonawanda 15' Cambria 7 1/2')	1.5	Turn left (W) at intersection across Eighteen-mile Cr. onto Old Niagara Rd./Stone Rd.
91.3	3.2	At Warrens Corners (Junction of Stone Rd. with U.S. Rt. 104, Ridge Rd.) turn right and immediately left (W) proceeding west on U.S. Rt. 104 and N.Y. 93, Ridge Rd. Ridge Rd. follows the Lake Iroquois beach ridge, 390'+; Lake Ontario stands at 246'.
93.7	2.4	Bear right following N.Y. Rt. 93 at fork onto bar of Lake Iroquois.
94.1	0.4	STOP 5. Abandoned gravel pit exposes shingled gravel of Iroquois bar, lightly cemented with secondary calcium carbonate as to preserve details of imbrication, bedding, and cut-fill structure. Continue west on Rt. 93.
95.1	1.1	Turn left (S) onto N.Y. Rt. 425 Cambria-Wilson Rd.
95.9 (Ransomville 7 1/2')	0.8	Turn right (W) onto Rt. 104 Ridge Rd. and proceed along Iroquois beach to Lewiston. Note Niagara Escarpment prominently displayed at left is reached at Dickersonville, where rise begins from Iroquois plain, 400' to Tonawanda Plain at 600'+.

<u>Cumulative Miles</u>	<u>Miles from Last point</u>	<u>Description</u>
106.6 (Lewiston 7 1/2')	10.7	Turn left (S) onto N.Y. Rt. 18, Creek Rd. at outskirts of Lewiston and proceed up Niagara Escarpment. After .4 mile note exposure of Lockport Dolostone at left and view to right of Escarpment, and the broad Lower Niagara River. Emerging from the Gorge at Cataract Basin, the river spreads out to a width of 2,000', flowing with a gradient of less than 0.16' per mile to Lake Ontario 6 miles to the north.
109.1	2.5	Turn right at exit immediately after passing beneath highway ramp, following signs to CANADA. After .4 miles take left fork, then .2 miles beyond take right fork to Lewiston-Queenston Bridge entrance.
110.3 (Niagara, 30 m/3)	1.2	Cross Niagara River into Canada with Old Narrow Gorge and power projects at left, Lewiston Branch Gorge Section and Cataract Basin at right.
110.6	0.6	Turn right (S) at first exit after paying toll, and after .4 mile turn right again at intersection with Niagara Park Commission, "River" Road. Brock Monument, and Niagara Escarpment are at your left (N). Proceed south over Barre Moraine represented by hummocky relief .5 mile from the bridge toll stop.
111.3	0.7	Pass Sir Adam Beck Niagara Generating Station No. 2, a facility of Ontario Hydro. From this area to the Whirlpool (Stop 7) we pass through a shallow channel of the Niagara R. from Lake Tonawanda to Lake Iroquois. The deposits are red silts with grey clay layers overlying bouldery till.
111.6	0.3	STOP 6. Vista overlooking Gorge and Robert Moses Niagara Power Plant. Both Canadian and American Power Stations take their water from the Upper Niagara River.

A clear view of the Niagara stratigraphic section is revealed here from Queenston Shale to the Lockport Dolostone at the top. Proceed south along River Rd.

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
112.9	1.3	Pass Wintergreen Flats and Niagara Glen at left. Large talus blocks, some 20' in diameter and cut by giant potholes, lie below massive dolostone cliffs which remained when the retreating former Falls narrowed and gorge cutting resumed to the east.
113.4	0.5	<p>STOP 7. Turn left off main road to the Whirlpool parking area. The Whirlpool is a basin 1,700' by 1,200' with a maximum depth of 125'. The water enters the Whirlpool at high velocities after moving up to 30' per second through the Whirlpool Rapids upstream. Most of the flow rushes past the outlet to the far side of the Pool, makes a complete circuit counter-clockwise, and escapes through the narrow outlet by passing under the incoming stream. Below the Whirlpool, there is another two miles of rapids with a drop of 40'.</p> <p>The feature responsible for the Whirlpool is the buried St. David's Gorge, intersected here by the Niagara Gorge. It is observed trending northwest from the opposite side of the Whirlpool and extends to the village of St. David on the escarpment west of Lewiston. Various excavations for road, canal, and power projects reveal that it has steep sides and a depth approximate to that of parts of the Niagara Gorge. It has been filled by till, mantled with red lacustrine silts and gray clays probably related to the former Lake Tonawanda.</p> <p>The Middle and Lower Silurian section is clearly revealed here. The Whirlpool Sandstone is at the river level.</p> <p>Continue south along River Road</p>
114.0	0.6	Cross Bowman River which has partially excavated St. David's Gorge.
114.6	0.6	Bear left at road fork and pass Whirlpool rapids observation area .8 miles beyond. Proceed beneath Lower Arch R.R. bridge .1 mile beyond fork and begin passage along Upper Great Gorge.
115.9	1.3	Continue south beneath Rainbow Bridge.

Cumulative Miles	Miles from last point	<u>Description</u>
116.6	0.7	<p>STOP 8. Refectory view of Upper Great Gorge, American Falls, Goat Island, and Horseshoe (Canadian) Falls at right.</p> <p>Goat Island divides the Upper Niagara River into two channels, one leading to the American Falls and the other to the Horseshoe Falls. In each channel the water flows over resistant ledges of the southerly dipping Lockport Dolostone Caprock to form rapids and cascades with a drop of about 50'. Before construction of a submerged weir above the Cascades (Horsehoe Rapids), only five per cent of the total flow went over the American Falls; a little more than one half the present percentage. The relatively small flow is distributed evenly along the 1,100 foot crest of the American Falls so that the discharge per foot rarely exceeds 20 cubic feet per second compared to a maximum of 200 at the Horseshoe.</p> <p>At the 2,500' wide crest of 510-520' above sea level, there is a straight drop of about 160'. The crest has been lengthened as much as 100' in the past 100 years because the central portion recedes faster than the ends. In some places along the crest, there are depths from 6 to 12' but there are several small islands and shoals. In particular, there is a large central shoal dividing the flow into two main channels, which converge toward the central part of the crest.</p> <p>The massive Lockport caprock of the falls is clearly shown beneath the observer and between the two falls. It is some 80' thick here, thickening to 130' south at the Cascades head. The black Rochester Shales beneath are hidden by the falls and the blocky dolostone talus. The latter is not removed from beneath the American Falls because of the low discharge. The recession of these shales has caused undermining and consequent joint block by joint block retreat of the Falls from Lewiston.</p> <p>The river in the Upper Great Gorge below the Falls, drops only five feet in its two and one quarter mile length.</p>

<u>Cumulative Miles</u>	<u>Miles from last point</u>	<u>Description</u>
		Soundings show maximum depths of from 100' to 187'.
116.9	0.3	STOP 9. Horseshoe Falls and Scenic Tunnels. Proceed south, passing the Cascades and Canadian Niagara and Toronto Power Plants successively on the left, and the river-cut cliff and shelf in the Niagara Falls Moraine at right. This latter cut, now occupied by Queen Victoria Park was probably made (Taylor, 1932) after the Falls had retreated past the high point of land just north of Stop 7. At this time the curved course of the river in the rapids threw a powerful current against the bank west and south of the fall.
117.7	0.8	Turn right (W) encircling Dufferin Is. and skirting 60' cliff of Niagara Falls Moraine. Return north toward Rainbow Bridge past Falls.
119.9	2.2	Bear left at fork across traffic light to Rainbow Bridge entrance.
120.2	0.3	Turn right (E) at Bridge and cross Niagara Gorge to the U.S.
120.6 (Niagara Falls 7 1/2')	0.4	Pass through American Customs. Turn left (E) to Rt. 625 and almost immediately left again (N & W) onto Robert Moses Parkway - Grand Island Bridge route. Pass Niagara Frontier State Park with observation tower, American Rapids, and Goat Island at right. Exit for Goat Island is on left .8 mile from American Customs.
123.8	3.2	Pass Niagara River and Power Intakes for Robert Moses Power Project. Twin conduits, each 46' by 66', carry water four miles beneath the city of Niagara Falls. The concrete bulkheads held the closing doors for these conduits.
125.0 (Tonawanda 15' Tonawanda W 7 1/2')	1.2	Keep right (S) at exit for INN and turn right .3 mile beyond at intersection with Buffalo Avenue.
125.3	0.3	Turn right (S) into Treadway Inn, Niagara Falls.

TRIP D: ONONDAGA LIMESTONE IN WESTERN NEW YORK

LEADER: Dr. Edward J. Buehler

DATE: May 1, 1966 8:30 A.M.

ROAD LOG

Time: approximately 5 hours Total mileage: 125

MILEAGE SCHEDULE:

<u>Miles from last point</u>	<u>Description</u>
0.0	Leave Treadway Inn at 8:30 A.M.; turn left on Buffalo Ave.
0.5	Turn left on 190 (bridge access); cross North Grand Island Bridge.
1.1	Toll booth.
5.3	Cross South Grand Island Bridge; continue on 290.
1.5	Exit on N-16 (Youngman Highway)
10.2	Take N.Y.S. Thruway - East Bound - Albany.
1.0	Toll booth.
2.3	Take exit 49; toll booth
0.7	Turn left on Rt. 78.
0.7	Turn right on Wehrle Drive.
1.2	Arrive Buffalo Crushed Stone Quarry, Onondaga limestone. STOP 1. 9:00 A.M. See paper by Oliver (p. 32) for stratigraphic details. Leave Quarry at 10:00 A.M. Turn left on Wehrle Drive.
1.2	Turn left on Transit Road (78).
0.7	Take Thruway entrance; toll booth; Take Thruway Albany - East.
27.7	Take exit 48.
0.4	Turn left on 98.

<u>Miles from last point</u>	<u>Description</u>
1.1	Turn left on Rt. 5.
6.5	Turn left on 237.
2.2	Turn right on Britt Road
2.7	Turn left onto dirt path at end of Britt Road.
	STOP 2. Arrive at Quarry at 11:15 A.M. This quarry exposes an Onondaga Bioherm. See paper by Oliver (p. 32) for details. Leave quarry at 12:15 P.M. Return via Britt Road.
2.7	Turn left onto 237.
2.2	Turn right onto Rt. 5
6.5	Turn right on Rt. 98 to Thruway.
1.1	Right onto Thruway.
0.2	Toll booth; take Buffalo Lane.
29.5	Toll booth at Buffalo
0.3	Take Youngman Highway exit; use thru Traffic route 290.
8.5	Take 190 North - Niagara Falls.
1.0	Toll booth at South Grand Island Bridge.
5.3	Cross North Grand Island Bridge.
0.5	Arrive Treadway; end of trip; 1:45 P.M.

TRIP E: HAMILTON FOSSIL LOCALITIES

LEADER: Harvey Hambleton - Buffalo Museum of Natural Sciences
(See paper by Tesmer (p. 47) and Buehler (p. 44) for detailed
description and sections).

DATE: May 1, 1966

ROAD LOG

Time: approximately 5 hours

Total mileage: 66

MILEAGE SCHEDULE:

<u>Miles from last point</u>	<u>Description</u>
0.0	Leave Treadway Inn 8:30 A.M.; turn left on Buffalo Rd.
0.4	Turn left on 190; Cross North Grand Island Bridge.
6.0	Cross South Grand Island Bridge.
1.6	Exit on N-16 (Youngman Highway).
13.2	Exit Thruway at Walden Avenue. Proceed east on Walden.
0.5	Turn right onto Union Road.
1.0	Turn left on Como Park Blvd.
4.5	Pass Como Park School and turn left at Lake Avenue.
0.15	Bridge crossing Cayuga Creek. Park adjacent to bridge or on road trending east along the creek. Disembark. STOP 1. Oatka Creek shale and Stafford Limestone. Return to Como Park Blvd.
0.15	Turn right. Proceed west to Aurora Street.
0.4	Turn left. Proceed south on Aurora Street.
2.4	Turn right onto Clinton Road.
0.7	Turn left onto Blossom Road
0.25	Bridge over Buffalo creek. Park in front of house just east of bridge on north side of bridge. Disembark.

Miles from
last point

Description

- STOP 2. Centerfield Limestone. This is the most western outcrop of Centerfield.
- 0.0 Continue southwest, bearing right along Blossom Road and passing Blossom Center. Proceed, crossing Transit Road, and approach Lein Road after traversing a rather sharp S curve in Blossom Road.
- 1.1 Turn left on Lein Road.
- 1.15 Junction with Rte. 16 (Seneca Rd.) and Bullis Rd. at East Seneca. Turn right onto Bullis Rd. and proceed west.
- 0.3 Turn left onto Leydecker Rd. which swings sharply left and crosses Cazenovia Creek. Park in area to west of bridge on north side of bridge. Disembark.
- STOP 3. Wanakah Shale and Ledyard Shale.
- 0.0 Return to Bullis Road. Turn right.
- 0.3 Junction with Rte. 16 (Seneca Rd.). Turn right onto Seneca Road and proceed southeast.
- 1.8 Turn right onto Northrup Road in Springbrook.
- 0.2 Bridge crossing Cazenovia Creek. Park in area on north side of bridge. Disembark.
- STOP 4. Tichenor Limestone and Wanakah Shale.
- 0.0 Return to Rte. 16.
- 0.2 Turn left on Rte. 16.
- 6.5 Turn onto Thruway - North - Albany. Continue north on Youngman Highway (290).
- 16.0 Take 190 North - Niagara Falls.
- 1.0 Toll booth at South Grand Island Bridge.
- 5.3 Cross north Grand Island bridge.
- 0.5 Arrive Treadway Inn; end of trip.