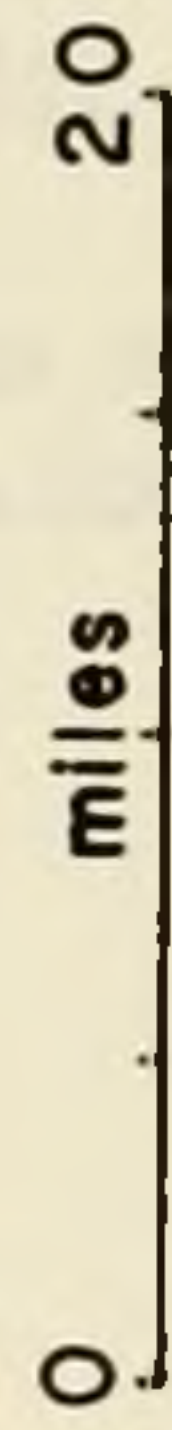


Itinerary of Excursion 13





Utica and Canajoharie Shales in the  
Mohawk Valley

Leader: John Riva

INTRODUCTION

In Middle Ordovician time carbonate deposition in the Appalachian miogeocline, from Pennsylvania to the island of Anticosti in the Gulf of St. Lawrence, was gradually replaced by an influx of black shale commonly referred to as the "Utica" shale. The "Utica" entered the miogeosyncline from the east or southeast and progressively moved westward attaining the cratonal margins in Ontario (Manitoulin Island) and well overlapping the Precambrian Shield (Lake St. John area in Quebec) in late mid-Ordovician time. This black shale invasion was followed by coarse clastic sediments, first represented by the Schenectady beds in the lower Mohawk valley, northwestern New York, and parts of Ontario and Quebec.

The "Utica" consists essentially of grey-black shale and thin limestone interbeds; lithologically, shales in the upper Mohawk valley are indistinguishable from those, much older, in the lower Mohawk. The combined thickness of the "Utica" is probably close to 2000 feet in the Mohawk valley and, possibly, as much as 3000 feet at the northern end of Lake Champlain in southern Quebec. The fauna of the Utica consists of brachiopods, trilobites (especially various forms of Triarthrus), various types of nautiloids, and abundant graptolites. The latter evolved rapidly throughout the "Utica" shales of all northeastern North America and afford us a sure measure of biostratigraphic, as well as stratigraphic, control which, otherwise, would be entirely lacking in a unit made up of black, brownish-weathering shale.

Ruedemann (1912, 1925a) divided the "Utica" into two broad biostratigraphic units: the Canajoharie Shale and the Utica proper, or the "true Utica". The Canajoharie comprises the older "Utica" shale in the lower Mohawk valley, where it can be recognized as far east as Ballston Spa and extends as far west as Dolgeville, East Canada creek, and Indian Castle. The Utica proper, as redefined by this writer (1968, 1969), includes most of the younger "Utica" shales in the upper Mohawk valley where they replace westward upper Trenton (Cobourg) limestone, and a thin sheet of uppermost Utica continues over the Trenton into the Black River valley, northwestern New York and Ontario. Basal Utica shale also occurs in the lower Mohawk valley (its most easterly outcrop is that along the Northway cut, 20 miles north of Albany) but the middle and upper Utica is replaced by the sandstone and shale of the Schenectady Formation. Thus the "Utica" is a classic time-transgressing unit which becomes progressively younger as one moves westward, to be superseded, in turn, by coarse clastics forming a number of units also time-transgressive.

The graptolite faunas of the "Utica" were only given a passing notice by early New York and Canadian geologists who believed them to be identical to those--now known to be much older-- of the Normanskill beds of the Hudson River valley,



although Lapworth (1886), basing himself on the British graptolite succession which was then in the process of erecting, thought otherwise. It remained to Ruedemann (1900) to show that Normanskill faunas had little in common with, and were much older than, those of the "Utica". Subsequently, he recognized (1912, 1925a & b) not less than nine graptolite zones in the Canajoharie-Utica succession of the Mohawk valley. Not all these zones, however, were based on clearly distinct faunas; for some tended to accentuate the sudden appearance of new graptolites or the local abundance of others; for these and other reasons Ruedemann's zones have not gained general acceptance in eastern North America.

The writer has for some time been conducting a painstakingly detailed study of the "Utica" graptolite succession both in the St. Lawrence Lowlands and in the Mohawk valley, and the results, although not yet in definite form, are shown graphically in Figure 1. "Utica" faunas in eastern Canada are identical to those in New York. To the left of Figure 1 is Ruedemann's zonal succession; to the right a much simpler one proposed by the writer (1968, 1969) which preserves all valid Ruedemann zones, but proposes new ones to replace or amalgamate those which were not based on actual faunas. Two distinct faunas have been recognized in the Canajoharie, and two, but strongly overlapping, faunas in the Utica proper. The lower limit of the Utica has been lowered to coincide with the beginning of the Climacograptus spiniferus zone (Fig. 1).

The purpose of the excursion is to show some of the most typical outcrops of Canajoharie-Utica shales and their characteristic faunas in the lower and upper Mohawk valley. The contact with the underlying or interdigitating Trenton limestone will be studied in the most classical localities. A total of six (possibly seven) stops are planned, beginning with the lower Canajoharie shale (and the Canajoharie-basal Trenton contact) opposite Amsterdam.

#### REFERENCES CITED

- Lapworth, Charles, 1886, Preliminary report on some graptolites from the Lower Paleozoic rocks on the south side of the St. Lawrence from Cape Rosier to Tartigo river, from the north shore of the island of Orleans, one mile above Cap Rouge, and from Cove Fields, Quebec: Royal Soc. Canada Trans., vol. , p. 167-184.
- Riva, John, 1968, Graptolite faunas from the Middle Ordovician of the Gaspé north shore: Nat. Canadien, vol. 95, p. 1379-1400.
- \_\_\_\_\_, 1969, Middle and Upper Ordovician graptolite faunas from the St. Lawrence Lowlands and Anticosti: in Am. Ass. Petroleum Geologists Mem. 12, M. Kay, editor (in press).
- Ruedemann, Rudolf, 1901, Hudson River beds near Albany and their taxonomic equivalents: N.Y. State Bull. 42, v.8, p. 485-587.
- \_\_\_\_\_, 1912, The Lower Siluric shales of the Mohawk valley: N.Y. State Bull. 162, 145p.
- \_\_\_\_\_, 1925a, The Utica and Lorraine Formations of New York, part I: Stratigraphy: N.Y. State Museum Bull. 258, 175p.
- \_\_\_\_\_, 1925b, The Utica and Lorraine Formations of New York, part II: Systematic paleontology: N.Y. State Museum Bull. 262, 171p.



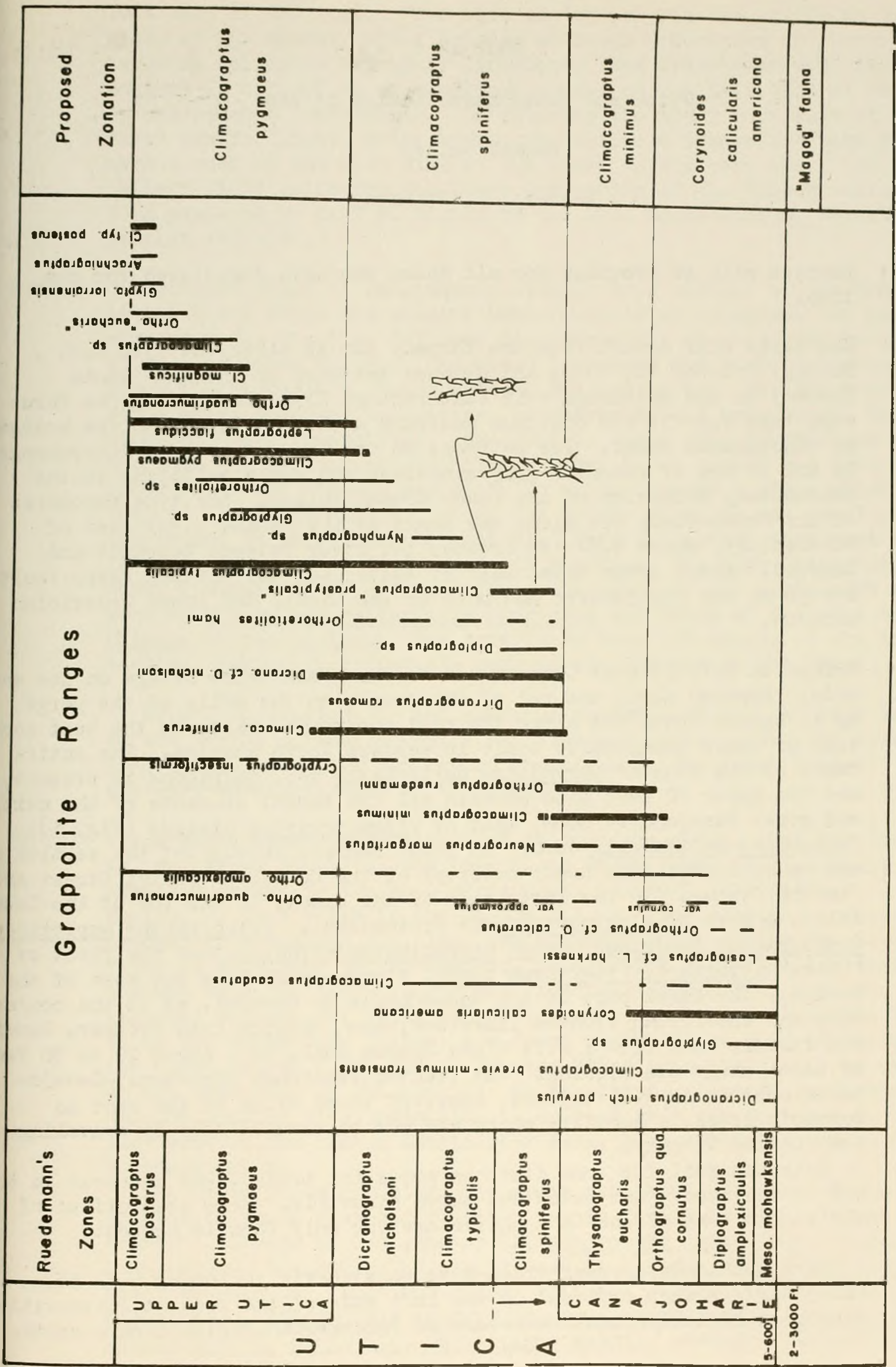


Fig.-1. Canajoharie-Utica graptolite faunas and their proposed zonation.



## TRIP 13

Utica and Canajoharie Shales in the  
Mohawk Valley

Leader: J. F. Riva

**LUNCH:** Lunches will be provided for all those who have registered for the trip.

**START:** The party will depart from the Thruway Inn at Albany at 8:00 A.M. , Sunday, October 12, 1969, and proceed westward on the N.Y. State Thruway to the Amsterdam exit (Interchange 27). On leaving the Thruway, take N.Y. 5S and continue westward a short distance to the bridge on Chuctanunda creek. The outcrops on the Thruway between Interchanges 25 and 27 are of greenish-grey sandstone and shale belonging to the Schenectady Formation of the lower Mohawk valley. The type exposures of the Schenectady are along the banks of the Mohawk river east of Schenectady, where N.Y. 146 crosses the river between Aqueduct and Rexford. About seven miles east of Amsterdam, the Hoffman Ferry Fault brings up the Canajoharie and most of the Middle and Lower Ordovician section.

**STOP 1:** Bridge on N.Y. 5S over Chuctanunda creek. Park below bridge on the east side. Exposed along the bed of the creek, on the walls of the gorge up to bridge level and along the road cut to the west, is the best section of Lower Canajoharie shale in eastern North America. The entire fauna of the zone of Corynoides calicularis var. americana is present, and the upper 20 feet also contain all the faunal elements of the next, and upper Canajoharie zone, that of Climacograptus minimus (Fig. 1). Corynoides calicularis occurs in great numbers throughout the section and can be collected from handy outcrops at the corner of Daniel Street and Florida Avenue. In the lower beds of the creek, to the top of the lower falls, a form of Glyptograptus is predominant. Orthograptus amplexicaulis, Orthograptus quadrimucronatus approximatus-cornutus, and the first of the "Utica" Triarthri, Triarthrus becki, first appear in a cut west of the bridge. The basal part of the Canajoharie is covered, as is the contact with the underlying Trenton limestone. Here, judging from Prosser, Cummins, and Fishers' map (1900, N.Y. State Museum Bull. 34), about 20 to 30 feet of basal shale are missing. The Trenton (Shoreham Limestone)-Canajoharie contact is well exposed, however, three miles to the east on Morphy's creek, a locality which can now be reached only by traveling east on the Thruway.

Outcrops fail for some distance above the bridge, but reappear in the bed of the creek just below and above Minaville. Here graptolites of the second zone of the Canajoharie are the only fossils present.

From Chuctanunda creek proceed to Canajoharie following N.Y. 5S. Canajoharie shales crop out on the left side of the road to Fultonville. Just past Randall, a small exposure of Precambrian gneiss occurs on the



left side of the road. From here to Canajoharie the cliffs on both sides of the Mohawk valley consist of Lower Ordovician and Upper Cambrian dolomites and minor limestone. The Ordovician-Cambrian contact is exposed in an abandoned quarry on the left side of the road as one reaches Canajoharie. On entering the town, turn left at the first traffic light, drive across the railroad tracks and take the narrow road on the west side of the creek to the very end. (An excellent field guide for the Lower Ordovician of the Mohawk valley has been prepared by Dr. D.W. Fisher of the N.Y. State Museum, Educational Leaflet 18, 1965.)

STOP 2: Canajoharie shale at Canajoharie creek. Type section of the Canajoharie. At the lower falls are massive Lower Ordovician dolomites and limestone, with very few fossils, followed disconformably at about dam-level by 17 feet of lower Trenton (Shoreham) limestone and shaly interbeds. Black River limestones are absent between the two units. The Shoreham Limestone bears abundant trilobites, brachiopods, and bryozoans; the shaly interbeds have graptolites. Canajoharie shale abruptly follows the Shoreham and the contact—visible at foot level around the bend of the creek above the dam—is marked by an uneven, rusty surface which in the "Utica" always denotes a hiatus, the extent of which can usually be determined by strict faunal control. Here it appears that part of the lower Canajoharie at Chuctanunda is missing. The type Canajoharie is about 250 feet thick and contains graptolites of the upper part of the zone of Corynoides calicularis americana and those of the zone of Climacograptus minimus. The true Utica does not appear at the top of the section, making it incomplete both at the top and at the base.

Return to Canajoharie and continue westward on N.Y. 5S past Fort Plain to the hamlet of Indian Castle and Nowadaga creek. Take the paved Creek Road on the west side and ascend the creek to the first bridge. Stop and park on either side of the bridge.

STOP 3: Utica shale proper. Well exposed in Nowadaga creek, from the first bridge to, and above Newville, and then along Ohisa creek (a tributary of Nowadaga creek). is the most continuous, although incomplete, section of true Utica in the Mohawk valley. The section is closely matched by a similar one along the northern shore of the St. Lawrence river at Newville, which, however, is accessible only at low tide. The contact with the underlying middle Trenton limestone is covered, but isolated outcrops of transitional limestone-shale beds (usually referred to as the Dolgeville facies) are found on the right bank of the creek below the first bridge. The actual Trenton-Utica transition will be examined at the next stop at Dolgeville; an excellent, although inaccessible, outcrop showing this transition is exposed in a cut on the N.Y. Thruway just west of the Indian Castle rest stop, a short distance west of Nowadaga creek.

The Utica exposures along the creek are about 600 feet thick. The graptolite fauna from the first bridge to just below the village of Newville, belongs to the zone of Climacograptus spiniferus. Basal Utica graptolites, including the predecessor to Climacograptus typicalis, occur between the first and second bridge. Dicranograptus cf. D. nicholsoni, Orthograptus quadrimucronatus approximatus, Climacograptus spiniferus, C. typicalis, Thriarthrus eatoni, straight nautiloids,



ostracods, and various brachiopods occur through the exposure to Newville. At Newville, at and above the bridge, there is a distinct change in fauna, and graptolites are those of the upper Utica zone of Climacograptus pygmaeus. Common here is a form of Glyptograptus, a short form of Corynoides (not yet identified in the St. Lawrence Lowlands), C. typicalis, and Leptograptus flaccidus.

From Newville drive back to N.Y. 5S and proceed west, taking the turn-off to Little Falls. At the first traffic light at the east edge of town, turn east on N.Y. 167 to Dolgeville. Go through Dolgeville and cross East Canada creek at the first available bridge. Continue south on the road on the east side of the creek for about one mile. Park, and take a footpath to the creek.

STOP 4: Dolgeville beds and transition into the true Utica. Exposed below the falls, on the east side of East Canada creek, are what have long been referred to as the Dolgeville beds, or facies, which continue westward for more than 25 miles to West Canada creek and show the interfingering of the "Utica" with the Trenton limestone. The Dolgeville beds have been correlated with middle Trenton Denmark limestone of Trenton Falls. Lithologically, they consist of platy limestone alternating with shale beds of equal thickness. Graptolites from the shales, although few in number, are those of the upper Canajoharie zone of Climacograptus minimus. The Canajoharie shale apparently extends no farther west than East Canada creek and Nowadaga creek, a few miles to the south. Above the Dolgeville beds, the shale at the falls, above the dam, and through Dolgeville, contains lower Utica graptolites very much like those in the beds between the first and second bridge on Nowadaga creek.

Return to Dolgeville, take the upper bridge and drive northwest on the Military Road to Salisbury. Turn west on Route 29 to Middleville. Here take route 28N and pass through Newport, Poland, and Gravesville to West Canada creek. Shortly after the bridge over West Canada creek take the turn-off (not to be missed) to the hamlet of Trenton Falls. Go through the hamlet into the property of Niagara Mohawk Power and park at the fountain. Continue on foot to the highest tower and the pipelines. Walk west on the pipelines (if provided with rubber shoes, and at your own risk) until the High falls of Trenton Falls come into view, below.

STOP 5: Type section of the Trenton at Trenton Falls. The middle Trenton (Denmark) limestone appears just above the base of the upper High falls, comprises the lower falls, and continues eastward down to, and through Sherman falls, out of view to the right. The beds just below Sherman falls contain many three-dimensional Orthograpti amplexicaules, one of the most common graptolites of the upper part of the lower graptolite zone of the Canajoharie, the zone of Corynoides calicularis americana (already seen on Chuctanunda creek). The basal part of the Trenton, corresponding to the Shoreham Limestone, is not exposed at Trenton Falls. The uppermost seven feet of Denmark limestone begin at the platform above the lower falls and include the basal portion of the upper High falls. They consist of alternating platy limestone and shaly interbeds, similar to those at Dolgeville, and could be considered the most western extension of these beds. No graptolites have yet been collected from these beds, although trilobites, brachiopods and other fossils



abound; the proposed correlation with the beds at Dolgeville is based purely on lithologic similarity.

Most of the upper High falls, the beds in the creek all the way up to dam, those at the spillway, and those forming the walls of the gorge are of upper Trenton (Cobourg) limestone. This limestone is highly fossiliferous and contains a characteristic brachiopod, Rafinesquina deltoidea, which is widely distributed in the Cobourg of northeastern North America. At the next stop, eleven miles west as the crow flies, the Cobourg beds will be, in turn, overlain by uppermost Utica shale, albeit disconformably. (For comprehensive and detailed studies of the Trenton of the Mohawk valley, consult the following papers by Marshall Kay: a. Geology of the Utica Quadrangle, New York: N.Y. State Museum Bull. 347 1953; and b. Stratigraphy of the Trenton Group: Geol. Soc. America Bull., vol. 53, p. 233-302, 1937.)

Drive back to Trenton Falls and turn right. When the road splits take the left branch, continue on through an underpass, and across U.S. 12 to the village of Trenton-(Barneveld). At Trenton turn right and take county Route 274 towards Frenchville. About two miles east of Frenchville (and the intersection with Route 43), the road descends into a low gorge, the walls of which are formed of brown-black Utica shale. Exposed in the bed of the creek, locally known as Big brook, is Cobourg limestone. Stop and park at a handy turn-off on the left side of the road (proceeding west). Walk across the creek bed to the Utica-Trenton contact.

STOP 6: Uppermost Utica shale on Cobourg limestone. An excellent contact is on the left bank of Big brook. The Cobourg limestone is in massive beds with no trace of shaly interbeds. The Utica shale that abruptly follows the Cobourg rests, as at Canajoharie and most other localities in northwestern New York, Ontario, and the upper St. Lawrence Lowlands, on a surface of disconformity, the vertical extent of which can be determined only where graptolites are present above and below it. The surface of the upper Cobourg bed is covered in part by a rusty layer caused by the weathering of a thin pyrite layer at the base of the Utica shale. In the writer's experience, pyritic layers within the "Utica" or at the Trenton-Utica contact indicate a hiatus of variable length and extent.

Graptolites in the black shale are those of the upper Utica zone of Climacograptus pygmaeus. Interbedded with the black shale are dark grey, micaceous shale and siltstone typical of the basal beds of the onlapping Lorraine beds.

End of the excursion. Participants returning to Albany should take Route 46S to Rome, Utica and the Thruway, or return to Trenton and take Route 12S to Utica and the Thruway. Participants heading for Canada should take Route 46N to Boonville, Route 12 to Watertown, and then Interstate 81 to the Thousand Islands Bridge and Ontario.