A Study of the Collections from the Trenton and Black River Formations of New York.*

By H. N. Coryell.

The Trenton limestone in general is a formation made up of thin bedded, dark bluish gray, compact limestone separated by thin shaly layers, except the upper 25 to 35 feet which consist of a coarse crystalline, thick bedded limestone with thin shaly partings. This formation is everywhere very fossiliferous.

The type locality for the Trenton limestone is in the southwest part of the Remsen quadrangle, along West Canada creek, at Trenton Falls. A detailed section of the formation shown here is given by Prosser and Cummings, who have measured the entire thickness of 270 feet with great care. The upper portion does not appear in the Trenton Falls section, yet the work of W. J. Miller shows that there is only a few feet omitted, since the crystalline beds are at no place more than 35 feet thick upon which rest the Canajoharie shale.

The bottom of the Trenton formation is not shown in the Trenton Fall gorge, still the dip of the strata and the presence of the Lowville limestone a few miles to the southeast makes it seem very probable that the lowest beds in the gorge are not far from the base of the Trenton formation. Thus allowing for the necessary addition to the top and the bottom, the thickness of the complete section is at least 280 to 300 feet. The measurements taken at Rome and at the Globe Woolen Mills at Utica show a greater thickness of the Trenton to the southward and southwestward.

The formations during the early Paleozoic were deposited upon a sinking ocean bottom. The coast line receded to the northward. Younger formations overlap the older ones everywhere along the cost line and lay upon the precambrian rocks. The Trenton is 510 feet in the Globe Woolen Mills well at Utica, 575 feet in the Chittenango well, and 435 feet (including the Lowville) in the well at Rome. In the vicinity of Trenton Falls it has a maximum thickness of 300 feet. Along the Precambric boundary there are indications that it is much less. Considering the slope of the Precambric floor and differ-

*A summary of the literature is given by Prof. E. R. Cummings in the Bulletin of the New York State Museum, No. 34, Vol. 7, May, 1900.

ence of elevation between Bardwell Mill where the upper Trenton is shown, and the mouth of Little Black creek where the Precambrian outcrops, no such great thicknesses can be present. The Trenton at Bardwell Mill is probably not more than 150 feet.

To the south of Trenton Falls there is an increase in the thickness of about 20 feet per mile southwestward. Between the Globe Woolen Mills and Trenton Falls there is a difference in thickness of 210 feet in the distance of 14 miles. In the well at Rome the Trenton is 375 feet, and 20 miles to the northeast it is from 200 to 250 feet. The general fact drawn from these indicates a sloping floor on which the Trenton was deposited, of 6 to 20 feet per mile to the southwestward; the slope being less in the northwestern part.

The narrow gorge cut by the West Canada river extends for two and one-half miles up the river from Trenton Falls to the village of Prospect. Its walls are nearly vertical, varying in height from 100 to 200 feet. Throughout the entire course there are six waterfalls: the Sherman fall, near the southern end of the gorge, is about 30 feet high and a short distance above the power house; High falls is one-fourth mile south of the railroad bridge; it consists of an upper and a lower part with a total of 128 feet; the fall at the dam, just north of the railroad bridge, is about 40 feet high; and the Prospect falls at the upper end of the gorge is 25 or 30 feet high. The total fall of the stream within the two- and one-half miles is about 360 feet, according to the topographic map. In spite of the steep slope of the stream bed the southward dip of the strata permits an exposure of only 270 feet of the formation.

Two systems of joints predominate in the Trenton, which are distinctly indicated by the appearance of the walls of the gorge. Nearly everywhere the joints are vertical, at least at a very high angle, and extend in an east-west and a north-south direction. The east-west system can be seen extending across the gorge, especially at the falls, which are caused by the existing joints. When large blocks of stone are removed by the current during high water, a new perpendicular surface is exposed over which the water falls. Thus the falls recede. This is especially seen in the case of Sherman Falls. During high water, the water falls over one joint plane on the east and another on the west, while during low water the entire stream falls over the rear joint on the west. The block of limestone between them will eventually be removed.

The vertical walls of the gorge are maintained by the breaking off of large blocks of limestone along the north-south joints.

In the bed of the Cincinnati creek the joints are enlarged and forms an underground course. The stream disappears for several hundred yards.

The contorted layers in the Trenton Falls section are in two distinct horizons. The lower one is from 4 to 6 feet thick and lies at the crest of the lower part of High Fall. It outcrops also in the upper end of the gorge near Prospect. According to the measurements of Prosser and Cummings it lies 144 feet below the top of the Trenton.

The second layer is from 8 to 15 feet thick and shown along the path opposite High Fall and may be traced to Prospect. It lies 65 to 70 feet below the top of the Trenton.

Such contortion of strata does not appear in the outcrop of Trenton exposed along Mill Creek.

Vanuxem suggested that as the folded layer was more crystalline than the layers above or below, the expansion of crystallization was manifested in the contortion of the crystalizing layer.

T. G. White discovered overturned fold, cross-bedded, channel filling structures that must be explained by other means which would yield a considerable expansion in excess of the crystallization.

W. J. Miller states that it is thought that the folded structure at Trenton Falls was in reality caused by a differential movement within the mass of the Trenton limestone. That the whole body of the limestone has been moved is clearly demonstrated by the existence of the thrust fault at Prospect. It is easy to see how when the force of compression was brought to bear in the region there would be a tendency for the upper Trenton beds on the upthrow side to move more easily and consequently faster than the lower Trenton beds. A similar explanation would apply to the lower folded zone. The folded zones thus indicate horizons of weakness along which the differential movement has taken place. As thus explained it is evident why the strike of the minor folds, the strike of the fault, and the strike of the large low folds of the region should be parallel, and why the contorted strata should be so local in occurrence, because all the phenomena were produced by the same local pressure. The differential movement would also readily account for the rubbed or worn character of the upper and lower sides of the contorted zone.

The topography of the limestone region, underlain by the Trenton, Black river, Tribes Hill and Little Falls dolomite is given by E. R. Cummings, who states in describing the Mohawk valley near Amsterdam, that the limestone region is characterized by a low, rolling relief and shallow stream val-

leys, except where the streams have been forced to cut new courses through morainic material or because of the obstructions offered by such material have been turned aside to make new rock cuts. The latter is probably the case with the lower courses, at least of the north Chuctanunda and Evakill, for while they are at present making rock cuts, their banks show deep cuts through boulder clay, and their beds are in no respect those of mature streams, both from the abdundance of water-falls and the irregularity of their slope. The northwestern portion of this region is heavily covered with drift and the topography is more angular on this account. The limestone area is sheard off by the Hoffman ferry fault, along a line running nearly straight from the western central part of Charlton township to a point about one mile southwest of Pattersonville. The topography is also distinctly different upon the adjacent shales (Canajoharie and Schnectady) that abut the entire east face of the fault as shown on the Amsterdam sheet, except at the north where a small area of Trenton is found east of and adjacent to the fault.

Trenton Falls Section.

1. *Sherman Fall.*

The lowest strata that outcrop in the Trenton Falls gorge are those at the water level of the pool at the base of the Sherman Fall. They are compact, bluish grey, thin bedded limestones interstratified with coarser-grained layers containing numerous well preserved specimens of Prasopora simulatrix. The Prasopora beds form the entire fall. The upper layers of this fall are thin strata, 3 to 5 inches thick, which form a somewhat clearly defined band $2\frac{1}{2}$ feet thick. About the middle of the breast of the falls the Prasopora are much larger than elsewhere, forming a distinct layer. The second Prasopora zones are the fossiliferous layers just above the crest of Sherman Fall and forming the base of High Falls.

The lists of fossils below were identified from the collections made by Prof. E. R. Cummings in the summer of 1914.

a = abundant
c = common
r = rare

1. Calymene senaria Conrad.....c
2. Corynotrypa inflata (Hall).....r
3. Crinoid segments.....a

4. Dalmanella testudinaria (Dalman) ..... a
5. Hemiphragma tenuimurale Ulrich ..... r
6. Isotelus gigas deKay c
7. Orthoceras junceum Hall ..... r-c
8. Plectambonites sericeus (Sowerby) ..... a
9. Prasopora simulatrix Ulrich ..... aaa
10. Rafinesquina alternata (Emmons) c
11. Schizocrania filosa Hall ..... r
12. Stigmatella n. sp ..... r
13. Trematis terminalis (Emmons) ..... r

2. *Below crest of the lower portion of High Fall.**

The strata, thin and shaly, lies at the base of the contorted layer. The following species were collected:

1. Crinoid segments ..... a
2. Dalmanella testudinaria (Dalman) ..... r-c
3. Eridotrypa aedilis minor (Ulrich) ..... r-c
4. Prasopora simulatrix orientalis Ulrich ..... aaa

3. *A collection at the crest of High Falls yielded the following species:*

1. Bythopora sp ..... r
2. Crinoid segments c
3. Dalmanella testudinaria (Dalman) ..... a
4. Hallopora ampla (Ulrich) ..... r-c
5. Hallopora goodhuensis (Ulrich) ..... a
6. Plectambonites sericeus (Sowerby) ..... r-c
7. Prasopora simulatrix orientalis Ulrich ..... aa
8. Rhinidictya exigua Ulrich ..... r

4. *Upper High Fall.*

The rocks are thin bedded both in the upper and lower portion of upper High Fall. The contorted stratum lies at the base. The following species were collected:

1. Arthoclema cornutum Ulrich ..... a
2. Calymene senaria Conrad c
3. Corynotrypa delicatula (James) ..... r

*From a collection made by Mr. T. F. Sayer, five feet below the crest of the lower portion of High Falls.

4. Crinoid segments ..... aaa
5. Dalmanella testudinaria (Dalman) ..... aaa
6. Hemiphragma tenuimurale Ulrich ..... a
7. Isotelus gigas de Kay c
8. Mitoclema? mundulum Ulrich ..... r-c
9. Nematopora ovalis Ulrich ..... r-c
10. Pachydictya acuta (Hall) c
11. Pachydictya fimbriata Ulrich ..... r
12. Platystrophia trentonensis n. sp c
13. Plectambonites sericeus (Sowerby) ..... r-c
14. Prasopora simulatrix orientalis Ulrich ..... a
15. Rafinesquina alternata (Emmons) ..... r
16. Rhinidictya exigua Ulrich ..... r
17. Rhinidictya paupera Ulrich ..... r-c

5. *Mill Dam Falls.*

The Mill Dam Falls or Fourth Falls is formed of thin bedded, rather coarse-grained and fossiliferous limestone. The following species were identified:

1. Chasmotopora reticulata (Hall) c
2. Crinoid segments ..... a
3. Dalmanella testudinaria (Dalman) ..... a
4. Plectambonites sericeus (Sowerby) ..... a
5. Rhinidictya paupera Ulrich ..... r-c

6. *Power Dam Interval.*

The Power Dam Interval includes almost all of the division of the Prosser and Cummings report except the upper few feet, which were collected from separately. The base of this interval is marked by a heavy stratum of limestone. Above this lies thin-bedded compact lime-stone, part of the strata somewhat crystalline, separated by shaly layers. At the upper end of the gorge the layers show the greatest amount of folding visible anywhere in the Trenton Falls section. The strata are very fossiliferous and the following species were collected:

1. Calymene senaria Conrad ..... a
2. Ceramoporella distincta Ulrich c
3. Chasmotopora reticulata (Hall) ..... aaa

4. Corynotrypa delicatula (James) ..... a
5. Corynotrypa inflata (Hall) ..... a
6. Corynotrypa turgida Ulrich ..... a
7. Crinoid segments ..... aa
8. Dalmanella testudinaria (Dalman) ..... aaa
9. Diploclema trentonense Ulrich ..... r
10. Eridotrypa cf exigua ..... r
11. Gastropod fragments ..... r-c
12. Hallopora angularis (Ulrich) ..... r
13. Hemiphragma tenuimurale Ulrich ..... r-c
14. Isotelus gigas de Kay ..... r-c
15. Leptaena charlottae W. & S. ..... a
16. Leptaena unicostata (M. & W) ..... aa
17. Lioclema vetustum (Bassler) ..... r
18. Mitoclema? mundulum Ulrich c
19. Nematopora ovalis Ulrich ..... r-c
20. Orthoceras fragments ..... r
21. Ostracod fragments ..... r-c
22. Pachydictya acuta (Hall) ..... r-c
23. Pachydictya pumila Ulrich ..... r
24. Pianodema subaequata conradi (Winchell) ..... r
25. Platystrophia trentonensis n. sp c
26. Plectambonites sericeus (Sowerby) ..... a
27. Prasopora n. sp. c
28. Prasopora conoidea Ulrich ..... r-c
29. Prasopora insularis Ulrich ..... aa
30. Prasopora simulatrix Ulrich ..... a
31. Rafinesquina alternata (Emmons) c
32. Rafinesquina deltoidea (Conrad) ..... a
33. Rhinidictya sp 2
34. Rhinidictya paupera Ulrich c
35. Rhynchotrema increbescens (Hall) ..... r
36. Stigmatella n. sp ..... aa

7. *Interval from top of High Falls to top of Mill Dam Falls.*

From these thin-bedded fossiliferous strata were collected the following species:

1. Arthoclema cornutum Ulrich c
2. Calymene senaria Conrad ..... r-c
3. Chasmotopora reticulata Hall ..... r-c
4. Crinoid segments c
5. Dalmanella testudinaria (Dalman) ..... aaa
6. Escharopora recta (Hall) ..... r
7. Hemiphragma tenuimurale Ulrich ..... r
8. Leptotrypa sp ..... r
9. Mitoclema? mundulum Ulrich ..... a
10. Nematopora ovalis Ulrich ..... r-c
11. Pachydictya acuta (Hall) c
12. Platystrophia trentonensis n. sp ..... a
13. Pleetambonites sericeus (Sowerby) c
14. Prasopora conoidea Ulrich c
15. Rafinesquina alternata (Emmons) ..... r-c
16. Rhinidictya exigua Ulrich ..... r-c
17. Rhinidictya mutabilis (Ulrich) ..... r-c

8. *Prospect Quarry, below the crystalline layers.*

Below the heavy gray crystalline layer that caps the Trenton limestone and in a very thin parting of 8 to 10 inches, that outcrops on the east side of the gorge at Prospect in an old abandoned quarry opposite the large crusher quarry, bryozoa are exceedingly abundant and are weathered out from the matrix. A small Prasopora is very abdunant.

The crystalline layers above contain a few bryozoa, but difficult to prepare for study.

The species collected from the weathered parting are as follows:

1. Corynotrypa inflata (Hall) ..... r
2. Crinoid segments ..... a
3. Dalmanella testudinaria (Dalman) c
4. Eridotrypa exigua Ulrich c
5. Hallopora goodhuensis (Ulrich) ..... a
6. Hemiphragma tenuimurale Ulrich ..... a
7. Isotelus gigas de Kay c
8. Pachydictya acuta (Hall) c
9. Platystrophia trentonensis n. sp c
10. Pleetambonites sericeus (Sowerby) ..... r-c

11. Prasopora n. sp.....c
12. Proboscina tumulosa Ulrich.....r
13. Stigmatella n. sp.....aa
14. Zygospira recurvirostris (Hall).....r-c

9. *In the collection from the Quarry in the crystalline layers at Prospect were the following species:*

1. Cyrtodonta obtusa (Hall).....r
2. Arthoclema sp.....r
3. Arthoclema cornutum Ulrich.....r
4. Calymene senaria Conrad.....r-c
5. Chasmotopora reticulata (Hall).....c
6. Crinoid segments.....a
7. Dalmanella testudinaria (Dalman).....r-c
8. Hallopora goodhuensis (Ulrich).....c
9. Helopora quadrata Ulrich.....r
10. Isostelus gigas de Kay.....c
11. Mitoclema? mundulum Ulrich.....r
12. Pachydictya acuta (Hall).....c
13. Pianodema subaequata (Conrad).....r-c
14. Platystrophia trentonensis n. sp.....c
15. Plectambonites sericeus (Sowerby).....r-c
16. Prasopora n. sp.....c
17. Prasopora sewyni (Nich.).....c
18. Rafinesquina alternata (Emmons).....r-c
19. Rhinidictya sp.....c
20. Rhynchotrema increbescens (Hall).....r-c

Trenton and Black River of the Patterson Quarries.

At the east end of the quarries, about forty rods from the house of Joe Jeffers, is the following section in descending order:

6. Mesotrypa-Plectambonites bed, thin limestone. Trenton.
5. Strophomena bed, crystalline, massive limestone.

Amsterdam ls.

4. Massive crystalline bed with some Strophomena, and containing numerous light grey pebble-like masses of Stromatocerium and Solenopora. The layer rests directly with a sutured contact upon the Black river. Amsterdam ls.

3. About like No. 2 but even darker, more fossils, and containing numerous large fragments of a yellowish, sandy limestone...1 ft. 3 in.
2. More massive than No. 1 and lighter colored. Very hard. Few fossils, some gastropods separated by rather uneven contact from No. 1.....1 ft. 6 in.
1. Drab, hard limestone, fine grained, light, weathering to rather thin layers. Columnaria abundant throughout. Batostoma varium abundant.

The Trenton in this section lies below the base of the Trenton of the Trenton Falls gorge, and is known as basal Trenton. The beds are massive, crystalline and contain light weathering "pebbles," (Solenopora and Stromatocerium). The Black river also contains similar pebbles and many angular masses of hard, blue, unfossiliferous limestone. The Lowville (Birdseye) is either absent or represented by a thin layer only. The Black river contains a large branching Batostoma (Batostoma varium) in considerable abundance, together with Tetradium and Columnaria. The latter is sometimes in very large masses.

The Strophomena is especially abundant in the massive lower part of the Trenton.

There is a disconformity between Nos. 1 and 2 and between 3 and 4.

The upper layers of the quarry are thin, very dark colored, with black shaly partings. They are very fossiliferous, containing especially Plectambonites, Mesotrypa and Cryptolithus. Small Bryozoa are abundant.

The dip of the rock is variable but is generally about two degrees southwest.

The Amsterdam limestone of Cushing includes the massive beds of the so-called Trenton and the Black river at this outcrop. The following species were collected:

1. Batostoma? decipiens Ulrich.....r
2. Batostoma varium Ulrich.....r
3. Bythopora herricki (Ulrich).....c
4. Calymene senaria Conrad.....c
5. Chasmotopora reticulata (Hall).....a
6. Columnaria halli Nicholson.....c
7. Crinoid segments.....a
8. Cryptolithus tessellatus Green.....c

9. Dalmanella testudinaria (Dalman) ..... r-c
10. Escharopora confluens Ulrich c
11. Escharopora? limitaris Ulrich ..... r-c
12. Escharopora recta Hall c
13. Escharopora subrecta (Ulrich) c
14. Liospira subtilistriata (Hall) ..... r
15. Mesotrypa whiteavesi (Nicholson) ..... a
16. Mitoclema? mundulum Ulrich ..... r-c
17. Nematopora ovalis Ulrich ..... r-c
18. Pachydictya acuta (Hall) c
19. Pachydictya fimbriata Ulrich ..... r-c
20. Pachydictya pumila Ulrich c
21. Phaenopora incipiens Ulrich ..... r-c
22. Platystrophia trentonensis n. sp ..... r-c
23. Plectombonites sericeus (Sowerby) ..... a
24. Prasopora simulatrix Ulrich ..... r-c
25. Rafinesquina alternata (Emmons) ..... rr
26. Rhinidictya mutabilis (Ulrich) c
27. Rhinidictya paupera Ulrich ..... r-c
28. Rhynchotrema increbescens (Hall) ..... r-c
29. Solenopora compacta (Billings) ..... aa
30. Stictoporella cribrosa Ulrich c
31. Stromatocerium canadense Nicholson and Murie c
32. Strophomena incurvata (Shepard) ..... aa

The collection from the Black river of the Pattersonville section (Lower Amsterdam) formation, contains the following species:

1. Batostoma supberbum (Foord) ..... a
2. Batostoma varium Ulrich ..... aa
3. Calymene senaria Conrad ..... a
4. Ceramoporella interporosa Ulrich ..... r
5. Columnaria halli Nicholson ..... a
6. Crinoid segments ..... a
7. Eridotrypa aedilis minor (Ulrich) ..... r
8. Escharopora subrecta (Ulrich) c
9. Isotelus gigas de Kay ..... r
10. Lichenalia sp ..... r

11. Leperditia fabulites (Conrad) ..... r
12. Rhynidictya mutabilis (Ulrich) ..... aa
13. Rhinidictya mutabilis senilis Ulrich c
14. Rhynchotrema increbescens (Hall) ..... r-c
15. Solenopora compacta (Billings) ..... aa
16. Streptelasma (Petraia) profundum (Conrad) ..... a
17. Strophomena incurvata (Shepard) ..... a
18. Zygospira recurvirostris (Hall) ..... r-c

The Trenton B^{6}* in the Pattersonville section contains well preserved fossils from which were collected the following species:

1. Batostoma? decipiens Ulrich ..... r
2. Batostoma varium Ulrich ..... r
3. Kloedenia initialis (Ulrich) ..... r
4. Bollia subaequata Ulrich c
5. Bythopora herricki (Ulrich) c
6. Halloporina n. sp ..... r
7. Calymene senaria Conrad c
8. Ceramoporella distincta (Ulrich) ..... r-c
9. Ceramoporella interporosa Ulrich ..... r-c
10. Ceraurus pleurexanthemus Green c
11. Chasmotopora retuculata (Hall) ..... a
12. Chasmotopora sublaxa (Ulrich) c
13. Coelodema trentonensis (Ulrich) ..... r-c
14. Cornulites flexuosus (Hall) ..... r
15. Crinoid segments ..... a
16. Cryptolithus tessellatus Green c
17. Dalmanella testudinaria (Dalman) c
18. Dinorthis pectinella (Emmons) ..... r
19. Escharopora angularis Ulrich c
20. Escharopora confluens Ulrich c
21. Escharopora? limitaris Ulrich ..... r-c
22. Escharopora recta Hall ..... a
23. Escharopora subrecta (Ulrich) c
24. Graptodictya proava (Eichwald) ..... r
25. Homotrypa subramosa Ulrich ..... r

*B^{6} New York State Museum No. 34, Vol. 7.

26. Isotelus gigas de Kay ..... r-c
27. Mesotrypa regularis (Foord) ..... a
28. Nematopora ovalis Ulrich ..... r-c
29. Pachydictya sp ..... r
30. Platystrophia trentonensis n. sp ..... r-c
31. Plectambonites sericeus (Sowerby) ..... a
32. Plectorthis plicatella (Hall) ..... r
33. Prasopora simulatrix Ulrich c
34. Primitia mammata Ulrich ..... r-c
35. Protocrisina exigua Ulrich ..... a
36. Rhinidictya mutabilis (Ulrich) ..... a
37. Rhinidictya mutabilis major (Ulrich) c
38. Rhinidictya paupera Ulrich c
39. Rhynchotrema increbescens (Hall) ..... r-c
40. Schizocrinus nodosus Hall c
41. Stictoporella cribrosa Ulrich c
42. Stictoporella angularis Ulrich c
43. Strophemna incurvata (Shepard) ..... aa
44. Tetradella subquadrans Ulrich ..... r-c
45. Trematis terminalis (Emmons) ..... r
46. Turrilepas canadensis Woodward ..... r-c
47. Zygospira recurvirostris (Hall) ..... r-c

Morphy Creek Section.

About one and one-half miles down the Mohawk river from Port Jackson on the south side of the river is an outcrop of the Trenton, Black river and Calciferous (Tribes Hill and Little Falls dolmite).

The basal Trenton resting on the Black river in this outcrop contains the pebble-like masses of Stromatoporoids (Stromatocerium canadense Nicholson and Murie) as at Pattersonville, and consisting of compact beds of dark crystalline limestone in which Strophomena abound. The difference in appearance of this section and that at Pattersonville quarries is chiefly due to weathering.

The Black river is underlain by a compact, nearly unfossiliferous blue limestone, which is probably the Birdseye (Lowville).

Collections were made only from the thin-bedded Trenton above the crystalline bed. Mesotrypa and Prasopora are most abundant about ten feet be-

low the Canajoharie shale contact, but are common throughout the upper 10 feet. In the layers of hard limestone just below the Canajoharie (Utica) shale Cryptolithus is common and about the only fossil. Plectambonites is common in the upper thin Trenton.

At the Amsterdam waterworks just north of the city of Amsterdam, Mesotrypa whiteavesi (Nicholson) and Cryptolithus tessellatus Green are very abundant 10 feet or more below the top of the exposed Trenton. The portion outcropping extends almost to the top of the Trenton formation, but the contact with the Canajoharie shale is not shown. The creek flows in a syncline for some distance below the dam.

At the Barge canal dam across the Mohawk river just above Amsterdam station, there is a quarry, mentioned by Prof. E. R. Cummings, in the New York State Museum Bulletin No. 34, as showing a splendid section of the Birdseye, Lowville and Black river. The latter is of the same general character as at Pattersonville, being black, fossiliferous and thin-bedded. The most abundant fossils are Streptelasma (Petraia) profundum Conrad and Stromatocerium canadense Nicholson & Murie.

The following species were collected at Morphy's creek from the Trenton layers:

1. Bollia subaequata Ulrich ..... r-c
2. Calymene senaria Conrad c
3. Chasmotopora reticulata (Hall) ..... r-c
4. Chasmotopora sublaxa (Ulrich) ..... r-c
5. Crinoid segments ..... a
6. Cryptolithus tessellatus Green ..... r-c
7. Cytherella? rugosa (Jones) ..... r
8. Dalmanella testudinaria (Dalman) c
9. Eridotrypa aedilis minor (Ulrich) c
10. Eridotrypa exigua Ulrich ..... r-c
11. Isotelus gigas de Kay c
12. Leperditia fabulites (Conrad) c
13. Mesotrypa whiteavesi (Nicholson) ..... aa
14. Mitoclema? mundulum Ulrich ..... r-c
15. Monotrypa n. sp ..... aa
16. Nematopora ovalis Ulrich ..... r-c
17. Pachydictya acuta (Hall) c
18. Pachydictya pumila Ulrich c

19. Plectambonites sericeus (Sowerby) c
20. Prasopora simulatrix Ulrich c
21. Rafinesquina alternata (Emmons) ..... r-c
22. Rhinidictya paupera Ulrich c
23. Rhynchotrema increbescens (Hall) ..... r-c
24. Turrilepas sp ..... r
25. Zygospira recurvirostris (Hall) ..... r-c

Sections in the Vicinity of Lowville.

The Lowville limestone capped by the Black river is exposed in a quarry near Mill creek at the corner of Church and Water Streets. It is exposed also in the bed and banks of Mill creek both above and below this point for some distance. This is the type section of the Lowville. Up stream just below where the exposure is covered by the heavy drift, the basal Trenton, with immense numbers of Dalmanella and Bryozoa, is exposed. The collections were made at this place. In several layers the Bryozoa are abundant. The following are the species collected:

1. Aparchites fimbriatus (Ulrich) ..... r
2. Bythopora sp ..... aa
3. Calymene senaria Conrad c
4. Conularia sp ..... r
5. Crinoid segments c
6. Ctenobolbina ciliata (Emmons) ..... r
7. Dalmanella testudinaria (Dalman) c
8. Escharopora recta (Hall) ..... r
9. Hallopora ampla (Ulrich) ..... aa
10. Hallopora splendens (Ulrich) ..... aa
11. Helopora sp ..... r
12. Pachydictya acuta (Hall) ..... r
13. Plectambonites sericeus (Sowerby) c
14. Prasopora simulatrix Ulrich ..... a
15. Rafinesquina deltoidea (Conrad) c
16. Rhinidictya sp ..... r
17. Stictopora elegantula Hall ..... r
18. Tentaculites sp ..... r
19. Trematis terminalis (Emmons) ..... r

The best exposure of the Lowville with overlying Black river and underlying Pamelia is on the State Road about one mile northeast of Lowville and in the several quarries nearby in the field along the limestone scarp. The country from here slopes southwest exactly with the dip of the rocks. Nothing higher than Black river is exposed. The Lowville weathers to a light drab or dove color, but some of the layers are darker and occasionally almost as dark as the Black river. The calcite tubes are always present in the Lowville except towards the base. In most of the layers they are extraordinarily abundant; usually perpendicular within the strata and lying horizontally at the surface. They are probably plants.

Fossils other than plant tubes are rare. Some of the thinner layers are ripple marked.

The whole mass of the Lowville must be 30 or 40 feet thick. Very little of the underlying Pamelia is seen.

The low country to the east and north of the exposure shows bosses of the Pre-Cambrian, and several of these are very near the bottom of the limestone scrap, so that the base of the limestone cannot be far below the lowest exposure on the State Road locallity.

The Black river (Leray) is dark colored and lumpy, thick-bedded, weathering to a light color but not so light as the Lowville limestone. It is massive in fresh exposure, showing the characteristic yellow streaks and blotches.

Columnaria, Tetradium and Stromatocerium are abundant. Silicified Bryozoa of large size are present. Near the base Strophomena is common. Leperditia is usually common throughout. In fact, the characterisites are practically the same as in the Mohawk Valley and at Valcour Island. The contact between the Black river and Lowville is usually very even and in unweathered masses appears merely as a slight change of color accompanied by the disappearance of the calcite tubes. Sometimes the contact is somewhat uneven. It is evidently a disconformity.

Species from the Watertown Section.

A short distance up the river from Watertown a collection was made from the lower Trenton, containing the following species:

1. Batostoma winchelli spinulosum Ulrich c
2. Dalmanella testudinaria (Dalman) c
3. Hallopora ampla (Ulrich) . . . . . a

4. Hallopora goodhuensis (Ulrich) ..... a
5. Hallopora splendens Bassler ..... a
6. Homotrypa callosa Ulrich c
7. Prasopora simulatrix orientalis Ulrich ..... a

The similarity of the New York fauna to that of upper Mississippi basin as given by Ulrich is shown by the following lists. Of the 108 species identified, 68 appear in the Trenton and Black river of the upper Mississippi Valley. The collections were made with special reference to the Bryozoan fauna, which accounts for the small number of species reported from the other classes. It is interesting to note the small number of new species found, especially among the Bryozoa, notwithstanding the fact that very little work had been done on that class from collections of the Trenton and Black river of New York. A description of these will be given in a successive paper.

Species from Trenton and Black River of New York.

(Those marked with an asterisk appear in the Trenton and Black River of the upper Mississippi Valley. T-Trenton. B-Black River.)

Bryozoa.

1. Arthoclema sp. (T)
*2. cornutum (T, B)
*3. Batostoma? decipiens (T, B)
*4. varium (T, B)
*5. supberbum (B)
*6. winchelli spinulosum (T, B)
7. Bythopora sp. (T, B)
*8. herricki (T, B)
*9. Halloporina n. sp. (T)
*10. Ceramoporella distincta (T, B)
*11. interporosa (T, B)
*12. Chasmatopora reticulata (T, B)
*13. sublaxa (T)
*14. Corynotrypa delicatula (T)
*15. turgida (T)
*16. inflata (T)
*17. Coeloclema trentonensis (T, B)

*18. Diploclema trentonense (T)
*19. Eridotrypa exigua (T)
*20. aedilis minor (T, B)
*21. Escharopora angularis (T, B)
*22. confluens (T, B)
*23. ? limitaris (T, B)
*24. recta (T)
*25. subrecta (T, B)
26. Graptodictya proava (T)
*27. Hallopora ampla (T, B)
*28. angularis (T, B)
*29. goodhuensis (T)
30. splendens (T)
31. Helopora sp. (T)
*32. quadrata (T)
*33. Homotrypa callosa (T)
*34. subramosa (T, B)
*35. Hemiphragma tenuimurale (T)
36. Leptotrypa sp. (T)
37. Lioclema vetustum (T)
38. Mesotrypa regularis (T)
39. whiteavesi (T)
*40. Mitoclema? mundulum (T)
41. Monotrypa n. sp. (T)
*42. Nematopora ovalis (T)
43. Pachydictya sp. (T)
*44. acuta (T)
*45. fimbriata (T, B)
*46. pumila (T, B)
*48. Phaenopora incipiens (T)
49. Prasopora n. sp. (T)
*50. conoidea (T, B)
*51. insularis (T)
*52. selwyni (T)
*53. simulatrix (T, B)
*54. simulatrix orientalis (T, B)
*55. Proboscina tumulosa (T, B)

56. Protocrisina exigua (T)
*57. Rhinidictya exigua (T, B)
*58. mutabilis (T, B)
*59. mutabilis major (T, B)
*61. mutabilis senilis (B)
*62. paupera (T, B)
63. Stictopora elegantula (T)
*64. Stictoporella cribrosa (T, B)
*65. angularis (T, B)
66. Stigmatella n. sp. (T)

Brachiopoda.

*67. Dalmanella testudinaria (T, B)
*68. Pianodema subaequata (T, B)
*69. Pianodema subaequata conradi (T, B)
*70. Dinorthis pectinella (T, B)
*71. Leptaena charolottae (T, B)
72. unicostata (T)
74. Platystrophia trentonensis (T)
*75. Plectambonites sericeus (T)
*76. Plectorthis plicatella (T, B)
*77. Rafinesquina alternata (T, B)
*78. deltoidea (T, B)
*79. Rhyncotrema increbescens (T, B)
80. Schizocrania filosa (T)
*81. Strophomena incurvata (T, B)
82. Trematis terminalis (T)
*83. Zygospira recurvirostris (T, B)

Crinoidea.

*84. Crinoid segments (T, B)
85. Schizocrinus nodosus (T)

Pelecypoda.

86. Ambonychia cf obtusa (T)

Ostracoda.

87. Aparchites fimbriatus (T)
*88. Kloedenia initialis (T, B)
*89. Bollia subaequata (T)
90. Ctenobolbina ciliata (T)
*91. Cytherella? rugosa (T)
*92. Leperditia fabulites (T, B)
*93. Primitia mammata (T, B)
94. Tetradella subquadrans (T)

Trilobita.

*95. Calymene senaria (T, B)
*96. Ceraurus pleurexanthemus (T, B)
97. Cryptolithus tessellatus (T)
*98. Isotelus gigas (T, B)

Cirripedia.

99. Turrilepas canadense (T)
100. Cornulites flexuosus (T)

Gastropoda.

101. Liospira subtilistriata (T)
102. Tentaculites sp. (T)
*103. Conularia sp. (T)

Coelentrata.

*104. Columnaria halli (T, B)
105. Solenopora compacta (T, B)
*106. Streptelasma (Petraia) profundum (B)

Stromatoporoidea.

107. Stromatocerium canadense (T)

Cephalopoda.

*108. Orthoceras junceum (T, B)