

THIRTY-SIXTH ANNUAL REPORT

ON THE

NEW YORK STATE MUSEUM OF NATURAL HISTORY,

BY THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE JANUARY 12, 1883.

ALBANY:
WEED, PARONS & COMPANY.
1883.

BRYOZOA

(FENESTELLIDÆ)

OF THE

HAMILTON GROUP.*

By JAMES HALL.

FENESTELLA MULTIPLEX, *n. sp.*

See 6th Annual Rep of State Geologist. Pl. Fig 12-16.
Bryozoan, occurring only in fragments; the shape of the frond is uncertain, but probably is infundibuliform; fragments of six centimetres in width occur, evidently only a small portion of the whole frond.

Branches moderately strong, enlarging below the bifurcations, and the width just above bifurcation is .33 mm., below bifurcation .66 mm. or slightly less. The distance between the branches is variable; there are on different portions of the frond five or six branches in the space of five millimetres; on non-poriferous side the branches are angular, and have along the middle a slight keel or carina, which connects with a similar carina on the dissepiments; when the dissepiments on opposite sides of a branch are alternating, the carina of the branch, in connecting with the carina of the dissepiment, becomes zigzag, which causes the branches to appear more irregular and less rigid than on the poriferous side; the branches are smooth.

Dissepiments about .25 mm. in diameter, four in the space of five millimetres; on non-poriferous side slightly depressed, angular and carinated; on poriferous side, depressed, rounded.

Fenestrules, on non-poriferous side, subquadrangular in outline; on poriferous side oval; length about one millimetre, width varying from one-third to two-thirds the length.

Cells in from two to four ranges, occurring as follows: In a branch which from commencement to bifurcation is six millimetres in length, for one millimetre only two ranges of cells occur, three ranges for the

* The species of the present paper only partially represent the genus as occurring in the Hamilton group. It is published in this incomplete form in order to show the progress of the work upon the Bryozoans, and to facilitate the final revision of the species.

space of three millimetres, and for the remaining two millimetres four ranges of cell apertures. Cells minute, circular, about .12 mm. in diameter, distant from each other equal to the diameter of an aperture, twenty in the space of one millimetre, four in the space of one fenestrule, counting those opposite the dissepiment; margins distinctly elevated, and those of the outer rows indenting the border of the fenestrule; apertures sometimes alternating and forming oblique transverse rows, at other times irregularly arranged; where two rows occur the apertures open directly upward; where three or four rows occur the central row or rows open directly upward, and the two outer rows laterally; space between rows of apertures smooth.

Formation and localities. Hamilton group; Moscow, Livingston county, and Alden, Erie county, N. Y.

FENESTELLA LATITRUNCATA, n. sp.

See 6th Annual Rep of State Geologist - Pl. 13, Fig 1-9.

Bryozoan, occurring only in fragments; the form of frond is not certainly known, but probably is infundibuliform.

Branches strong, gradually enlarging to the bifurcations; width just below bifurcation one and one-third millimetres, just above, two-thirds to three-fourths of one millimetre; the distance between the branches is from one-half to four-fifths of one millimetre; three to four branches in the space of five millimetres; on non-poriferous side the branches are slightly angular.

Dissepiments about .5 mm. in diameter, slightly expanding at their junction with the branches, two in the space of five millimetres; on non-poriferous side, on a plane with the branches, slightly arching and angular; on poriferous side slightly depressed, rounded.

Fenestrules, on non-poriferous side, subquadrangular; on poriferous side oval, in outline; length one and three-fourths millimetres.

Cells arranged in from three to six ranges; cell apertures minute, circular .14 mm. in diameter, distant from each other a little more than the diameter of an aperture, sixteen in the space of five millimetres longitudinally; margins distinctly elevated, and those of the outer rows indenting the border of the fenestrules, so much so, that the margins are plainly visible from the non-poriferous side, giving a somewhat serrate appearance to the margin, alternating and forming oblique, transverse rows; the longitudinal rows are separated by a fine, slightly elevated carina; the space between the apertures, longitudinally, has sometimes a single striation.

Where fragments of this species occur, from the large branches, and the widening below the bifurcations, which, when the branches are broken off a short distance above, present a clavate appearance, they very much resemble a *Thamniscus*, this is especially the case where the depressed dissepiments of the poriferous side are covered with sediment, while the branches are not; without a critical examination it would be considered a *Thamniscus*.

This species can be distinguished from *F. multiplex* by its more robust form, and the greater number of ranges of cell apertures.

Formation and locality. Hamilton group; Ontario, Canada.

FENESTELLA FISTULATA, *n. sp.*

see 6th Annual Rep of State Geologist - P 12. Fig 1-16

Bryozoan, broadly infundibuliform or cup shaped.

Branches slender, gradually increasing in size to the bifurcations; bifurcations distant from five to ten millimetres; diameter of branch just below bifurcation a little less than .5 mm., above bifurcation, .33 mm.; the distance between branches is less than the width, or about .25 mm.; from nine to eleven branches in the space of five millimetres; on non-poriferous side branches slightly angular, and having along the middle a narrow, slightly elevated carina or keel, which connects with similar carinae on the dissepiments; when the dissepiments or opposite ends of the branch alternate, the carina of the branch, in order to connect with the carina of the dissepiments, assumes a zigzag form, and also surrounds the fenestrules with a hexagonal elevation. There is no evidence of striae or of nodes.

Dissepiments comparatively strong, .25 mm. in width, expanding at the junction with the branches, depressed on both poriferous and non-poriferous side; on non-poriferous side, carinated and slightly angular; on poriferous side rounding.

Fenestrules small, oval; length from .33 to .50 mm., width about two-thirds the length, appearing the same size on each face of the frond.

Cells in two and three ranges, sometimes the third range extends only a short distance below the bifurcation, at others nearly the whole length to the next bifurcation; apertures, minute, circular, about .12 mm. in diameter, distant from each other less than the diameter of an aperture, twenty-five in the space of five millimetres, opening nearly directly upward; margins distinctly elevated, but on account of the apertures opening upward, scarcely indenting the border of the fenestrule ranges of apertures separated by a narrow, slightly elevated, flexuous ridge, which is shorter and more prominent when there are only two ranges of pores present.

This species is one of the most abundant of those occurring in the Hamilton group, and its poriferous face is generally easily recognized; from *F. multiplex* and *F. latitruncata* it is easily distinguished by its size and compactness.

Formation and localities. Hamilton group; Genesee and Erie counties, N. Y., and West Williams, Ontario.

FENESTELLA ASPECTUS, *n. sp.*

see 6th Annual Rep of State Geologist - P 13. Fig 10-14.

Bryozoan infundibuliform, undulating, frequently partially folded upon itself on a line with the branches.

Branches slender, gradually increasing in size to the bifurcations, which are distant from each other from three to fifteen millimetres; a transverse section of the branch is sub-cuneiform in outline, the widest part is on the poriferous side; just below the bifurcation on the poriferous side the branch is about .5 mm. in width, gradually growing smaller to the non-poriferous face, where it is less than half that width; just above bifurcation on poriferous side the branch is .33 mm.

in width; ten branches in the space of five millimetres; on non-poriferous side the branches are rounded or circular, and frequently have a very narrow, slightly elevated keel or striation running along the middle, which connects with a similar keel on the dissepiments, and opposite each dissepiment is a prominent triangular node.

Dissepiments slender, about .25 mm. in diameter, eight or nine in the space of five millimetres, much expanded at their junction with the branches; on non-poriferous side depressed, and with a thin, slightly elevated carina; on the poriferous side they are scarcely perceptible.

On account of the cuneiform shape of the branches, the fenestrules on the different faces of the frond have an entirely different appearance; on the non-poriferous side the fenestrules appear broadly oval, or nearly circular, a little less than .5 mm. in length and of about the same width; the branches rapidly thicken to the poriferous side where they are contiguous or nearly so, the fenestrule generally not showing at all, and when showing appearing only as a narrow slit.

Cells in two or three ranges, two ranges occur for only a short distance above the bifurcation, the greater part of the branch being occupied by three ranges; apertures small, circular, about .16 mm. in diameter, closely arranged, frequently nearly contiguous, twenty-eight in the space of five millimetres, the central row opening directly upward, the two outer rows nearly upward, slightly lateral; margins distinctly elevated and unusually thick; the margins of the outer rows of adjacent branches are separated only by a narrow line, sometimes contiguous; the central row of apertures is elevated above the outer rows, making the branch angular.

This species is not common, and when the poriferous face is seen is easily recognized; like *F. fistulata*, the cells are arranged in two and three rows and the branches are nearly of the same size, but it differs in having the cell apertures larger and much more closely arranged, and the central row much elevated, making the branch angular, while in that species the branch is nearly if not quite flat, the apertures being on the same plane; the contiguity of the branches, or the poriferous face, is also a distinguishing characteristic.

Formation and locality. Hamilton group; Bellona, New York.

FENESTELLA ANGUSTATA, n. sp.

See 6th Annual Rep. of State Geologist P. 8. Fig 1-8.

Bryozoan infundibuliform; fronds large.

Branches of nearly the same size throughout their entire length, except immediately below the bifurcations, or increasing in size very gradually; bifurcations at very irregular distances from each other, varying from five to fifteen millimetres; width of branches from .33 to .50 mm.; distance apart less than the width of the branches; from ten to thirteen branches in the space of five millimetres; on non-poriferous side the branches are rounded, with generally a single range of nodes along the middle; sometimes there are additional scattering nodes with indistinct evidences of striations; on other parts of the frond the nodes are obsolete, either from wearing or some other cause not apparent, and there are from three to five strong striations on a branch.

Dissepiments comparatively strong, about .25 mm. in diameter, expanding at their junction with the branches, nine or ten in the space of five millimetres; on non-poriferous side rounded, nearly on a plane with the branches, granulose; on poriferous side depressed slightly below the ranges of apertures.

Fenestrules on non-poriferous side broadly oval, appearing narrower on poriferous side; length about .5 mm.; width from one-half to two-thirds the length.

Cells in two ranges, opening at an angle of forty-five degrees from the axis of the branch; apertures small, circular, about .14 mm. in diameter; distance apart less than the diameter of an aperture, twenty-eight to thirty in the space of five millimetres; apertures distinctly elevated and indenting the border of the fenestrules; space between the ranges of apertures carinated; carina sharp, slightly elevated, and having prominent nodes or short spines, four in the space of one millimetre.

To the poriferous side of *F. fistulata* this species has no resemblance; it slightly resembles the non-poriferous side, from which, however, it is readily distinguished by the absence of the keel along the middle of the branch and on the dissepiments, and by the presence of striations, nodes and granules.

Formation and locality. Hamilton group; Alden, Erie Co., N. Y.

FENESTELLA MARCIDA, *n. sp.*

See 6th Annual Rep of State Geologist. Pl. Fig 10-15.

Bryozoan, consisting of large infundibuliform fronds, frequently undulating or partially folding upon itself along the line of the branches. Branches slender, very gradually enlarging to the bifurcations, which are distant from each other from seven to twenty-four millimetres; width below bifurcation .33 mm.; width just above bifurcation .25 mm.; distance from each other equal to or a little more than the width of the branches, sometimes appearing less on poriferous side than on non-poriferous; on non-poriferous side branches rounded, except just below bifurcation, where they are flattened, striated; striæ fine but distinct, finely granulose, from three to five on a branch.

Dissepiments about .20 mm. wide, eight in the space of five millimetres; on some fronds the width is .25 mm., nearly equal in width to some parts of the branches, expanding slightly at their junction with the branches; on non-poriferous side depressed, striated; striæ granulose; on poriferous side slightly depressed, rounding, carinated; carina very thin, slightly elevated.

Fenestrules broadly oval, occasionally subquadrangular; length nearly .5 mm.; width two-thirds the length; on poriferous side the fenestrules appear narrower, the width often not more than one-third the length and sometimes appearing only as a narrow slit.

Cells in two ranges, apertures small, circular; diameter about one-seventh of one millimetre; distant from each other less than the diameter of an aperture, seven to eight in the space of five millimetres; margins distinctly elevated and indenting the border of the fenestrule; space between ranges of apertures carinated; carina spinulose; nodes

or spines prominent, about .16 mm. in height, three in the space of one millimetre.

This is a very abundant species; it is very similar to *F. angustata*, but is of less compact growth; the non-poriferous side is very finely granulose, while that species has a line of comparatively strong nodes along the middle of the branch.

Formation and localities. Hamilton group; Darien and Moscow, N. Y.

FENESTELLA PLANIRAMOSA, *n. sp.*

See 6th Annual Rep of State Geologist, Pl. Fig. 1-13
Bryozoan fan-shaped, no perfect frond observed; largest fragment seen five centimetres long and four wide.

Branches slender, bifurcations at very irregular distances from each other, varying from four to twenty-five millimetres; the branches just below bifurcation are of the same width, so that where the bifurcations are close together the branches increase rapidly in width, where they are distant they increase very gradually; branches just above bifurcation .33 mm. in width; just below, .66 mm. in width. The space between the branches is greater than their width; from four to seven branches in the space of five millimetres; on non-poriferous side, just above the bifurcation, the branch is rounded, sometimes slightly angular, soon becoming flattened, and for the greater part of the length flat or slightly concave; striated; striæ very fine but distinct, from four to nine on a branch.

Dissepiments extremely slender, about .20 mm. in width; distance from each other variable, from two to four millimetres, generally a little over three millimetres, not expanding at their junction with the branches, frequently curving; on non-poriferous side often arching, striated, rounding.

Fenestrules quadrangular; length variable but usually slightly less than three millimetres; width varying from .50 to .66 mm.

Cell apertures in two and three ranges, two for the greater part of the length of the branch; apertures small, oval or circular, opening obliquely; about .20 mm. in length; distance apart varying from about two-thirds to a little more than the diameter of an aperture, from twelve to eighteen in the space of five millimetres; margin of the lower portion of aperture elevated more than that of the upper portion; space between the ranges of pores occupied by a carina; carina sharp, elevated one-fifth of one millimetre, and having prominent nodes or spines which are elevated above the carina equal to the height of the carina; three in the space of two millimetres.

Formation and locality. Hamilton group; Bellona, Yates Co., N. Y.

FENESTELLA CINCTUTA, *n. sp.*

See 6th Annual Rep of State Geologist, Pl. Fig. 16.
Bryozoan occurring only in fragments; the form of a perfect frond is not known; one fragment, the largest seen, is somewhat curved as if forming part of a frond infundibuliform in shape, but one of the edges of the fragment is entire, rounded, and non-celluliferous, which

shows that the frond could not have been continuous; the largest fragment observed is three and one-half centimetres long and two and one-half wide.

Branches comparatively strong, increasing in size but slightly, if any, below bifurcations; width of branch .66 mm.; branches flexuous, regularly bent from side to side, forming on each side of the branch convexities and concavities, which alternate with each other, the convexities of contiguous branches uniting and coalescing; on non-poriferous side the branches are slightly angular, with a carina running along the middle; the carinæ of two contiguous branches, at the anastomosed part, sometimes unite and form on that portion one carina, at other times there is a space of .25 mm. or more, which is deeply channeled.

Dissepiments or anastomosed portions of the branch vary in width from .66 mm. to 1.33 mm.; the narrower ones are in reality not anastomosing, but very short celluliferous dissepiments; there are three in the space of five millimetres.

Fenestrules oval, one millimetre in length, .66 mm. in width.

Cells in three ranges; on the dissepiments sometimes one or two ranges more; apertures minute, circular, a little more than .20 mm. in diameter, closely arranged, frequently nearly contiguous, eighteen in the space of five millimetres; the central range opens directly upward, the outer range nearly directly upward, very slightly laterally; margins comparatively strong, very distinctly elevated.

Formation and locality. Hamilton group; Ontario, Canada.

FENESTELLA PERUNDULATA, *n. sp.*

See 6th Annual Rep of State Geologist P 2. Fig 1-14

Bryozoan probably infundibuliform in shape.

Branches moderately strong, .5 mm. in width; space between the branches more than the width of the branches, seven branches in the space of five millimetres; on non-poriferous side angular, carinated; carina and upper part of the branch regularly flexuous; at the dissepiments the carina and angular portion of the branches frequently meet and coalesce, giving the appearance of anastomosing branches.

Dissepiments strong, from .50 to .66 mm. in width, expanding at their junction with the branches, about three in the space of five millimetres; on non-poriferous side, angular and on a plane with the branches; on poriferous side depressed, rounding.

Fenestrules small, oval, .75 mm. in length, .5 mm. in width.

Cells in two ranges; apertures small, circular, opening nearly directly upward, about .16 mm. in diameter, distance apart less than the diameter of an aperture, about twenty in the space of five millimetres; margins distinctly elevated; space between ranges of apertures carinated; carina strong, with an elevation equal to the thickness of a branch, and slightly expanded and flattened at the top; width of expanded portion .25 mm.; finely striated.

On the poriferous face the branches, carinations and ranges of apertures are straight, presenting a somewhat rigid appearance, while on the non-poriferous face the whole upper portion of the branch is regu-

larly flexuous. Sometimes, on the dissepiments, the carinations meet, coalesce, and form a carination across the dissepiments; at others there is a space between of .25 mm.; sometimes this space is smooth and deeply channeled across the dissepiment, at others the dissepiment has a carina connecting the carinæ of the adjacent branches; the two faces present such a different appearance, that were it not for the fact that both sides of the same specimens are seen they would be very easily mistaken for different species.

Formation and locality. Hamilton group; Moscow, Livingston county, N. Y.

FENESTELLA ASSITA, *n. sp.*

See 6th Annual Rep of State Geologist, P 7, Fig 8-11.

Bryozoan probably infundibuliform, though occurring only in fragments in the present collections; largest fragment observed two and one-half centimetres long, two centimetres wide.

Branches moderately strong, gradually enlarging in size to the bifurcations, which are distant from each other from three to fourteen millimetres; width of branches on non-poriferous side .33 mm., on poriferous side about .50 mm.; space between branches less than the width of the branches, ten branches in the space of five millimetres; on non-poriferous side branches rounding, carinated; carina thin, elevated about .20 mm., and obscurely nodose.

Dissepiments strong, .33 mm. in width, eight in the space of five millimetres, expanding at their junction with the branches; on non-poriferous side, on a plane with the branches, carinated; on poriferous side depressed, carinated.

Fenestrules oval, about .33 mm. in length; width on non-poriferous side about two-thirds the length; on poriferous side they are very obscure, either not perceptible or appearing as very narrow slits.

Cell apertures in two and three ranges; the greater part of the length of the branch has only two ranges; in a branch which is eleven millimetres long before bifurcating, eight millimetres of that length has two ranges of cells, and three millimetres three ranges; apertures small, circular, opening directly upward, about .16 mm. in diameter; distance between apertures less than the diameter of an aperture, twenty apertures in the space of five millimetres; margins distinctly elevated; space between ranges of apertures carinated; carina strong, not much elevated, and having minute spines situated at quite regular distances from each other, about twenty in the space of five millimetres; the ranges of apertures on adjacent branches are nearly contiguous.

Formation and locality. Hamilton group; New York.

FENESTELLA INFLEXA, *n. sp.*

Vol. III -

Bryozoan infundibuliform; fronds large, largest fragments seen seven millimetres across.

Branches flexuous, forming on each side of a branch regular and alternate convexities and concavities; the convexities of the opposite

side of adjacent branches frequently contiguous; coalescing; bifurcations distant from each other from two to ten centimetres or even more; width of branch .5 mm., eight in the space of five millimetres; on non-poriferous side the branches are angular and carinated; where two branches or the carinations of two branches unite there is very frequently a small spine or node.

Dissepiments or points of anastomosing about .66 mm. wide, four in the space of five millimetres; sometimes the branches simply anastomose; at other times there is a short dissepiment.

Fenestrules small, oval, .66 mm. in length; width about one-half the length. On the poriferous side the branches are angular.

Cells in two ranges, opening nearly directly upward, apertures minute, circular, about .20 mm. in diameter, closely arranged; distance between apertures less than the diameter of an aperture; sometimes nearly contiguous, eighteen in the space of five millimetres; margins distinctly elevated; space between ranges of apertures angular, carinated; carina sharp, sinuous, elevated about .20 mm.

The non-poriferous face presents a variety of phases; sometimes the carinae of adjacent branches unite and immediately separate, leaving the point of union merely a point which generally has a node or spine, and presents the appearance of a diamond-shaped elevation inclosing the fenestrule, sometimes they remain united for the space of half a millimetre or more, at other times they do not meet and the space between is sometimes channeled, and at others there is a transverse carination, connecting the two longitudinal carinations. This latter form occurs where the branches are united by dissepiments instead of anastomosing, and presents the appearance of an hexagonal elevation inclosing the fenestrule.

This species is very similar to *F. perundulata* on the non-poriferous face and without very critical comparison it would be difficult to distinguish them; but on the poriferous face the difference is more evident. In this species the carina separating the row of apertures is thin, sharp, highly elevated and very sinuous. In *F. perundulata*, it is strong, elevated equal to the thickness of the branch expanded at the top, and straight.

Formation and locality. Hamilton group; West Bloomfield, New York.

FENESTELLA PERFORATA, *n. sp.*

See 6th Annual Report State Geologist p 10. Fig 1-13.

Bryozoan consisting of large infundibuliform fronds; fragments are of six centimetres in length and five in breadth, evidently only a small portion of the frond; thickness of frond one and one-half millimetres; frond consisting of numerous cylindrical branches which frequently and irregularly bifurcate, and are connected by dissepiments; along the middle of the branches and dissepiments on the celluliferous face there is a keel or carina, which is elevated and expands above, forming secondary branches and dissepiments very similar in appearance to the principal ones.

Branches moderately strong, about .5 mm. in width, eight branches in the space of five millimetres; branches regularly sinuous, forming

on each side of the branch regularly alternating curvatures and concavities; the convexities of adjacent branches approach each other, but very seldom unite, being connected by dissepiments; on non-poriferous side the branches are rounding or slightly angular and have along the middle a carina; carina thin, slightly elevated and connected with similar carinæ on the dissepiments.

Dissepiments strong, of about the same width as the branches, five in the space of five millimetres; on non-poriferous side on the same plane as the branches; rounded or slightly angular; carinated; carina thin, slightly elevated and connected with the carinæ of the branches.

Fenestrules small, oval, slightly more than .5 mm. in length; width two-thirds to three-fourths the length.

Cells in two ranges, opening directly upward; apertures minute, nearly circular, about one-sixth or one-seventh of one millimetre in diameter, closely arranged, distance apart less than the diameter of an aperture, occupying the dissepiments as well as the branches, and forming an oval arrangement; the margins are distinctly elevated and indent the borders of the fenestrules; the space between the apertures both on the branches and dissepiments is carinated; carina thin and elevated about the thickness of the branch, when it expands and forms secondary non-celluliferous branches and dissepiments; branches .33 mm. in width, round, and having a carina; carina thin, but slightly elevated, though very distinct; branches regularly sinuous; dissepiments of the same width as the branches, round, carinated; carina similar to and connected with those of the branches.

Fenestrules oval or circular; the circular form has a diameter of about .66 mm.; the oval forms are .66 mm. (sometimes a little more) in length and about .5 mm. in width.

The two faces of the frond are very similar in appearance, the principal branches being a little wider than the secondary ones; the sinuosity of the branches and the connecting carinæ of the branches and dissepiments present the appearance of fenestrules enclosed by a hexagonal angular elevation; the dissepiments being of the same width as the branches on the same plane and similarly carinated, and the branches being quite irregular, it is sometimes very difficult to distinguish them.

Formation and locality. Hamilton group; New York.

FENESTELLA SCALARIS, *n. sp.*

See 6th Annual Rep of State Geologist Pg. Fig 1-11.

Bryozoan consisting of large infundibuliform fronds; largest fragment seen seven centimetres long and nearly four centimetres wide.

Branches slender, very gradually increasing in size to the bifurcations, which are distant from each other from five to thirty millimetres, generally from fifteen to twenty millimetres; width of branches about .33 mm.; distance between branches less than the width of the branches, from nine to eleven branches in the space of five millimetres; on non-poriferous side branches rounded, carinated; carina slightly elevated and finely nodose, about seven nodes in the space of one millimetre; on some fronds the nodes are more distant, and the rest of the branch is granulose.

Dissepiments comparatively slender, less than .25 mm. in width, six in the space of five millimetres; on non-poriferous side, on a plane with the branches, rounded, carinated; carina similar to the carina of the branch.

Fenestrules oval, length about .66 mm., width from one-half to two-thirds the length.

Cells in two ranges, opening nearly directly upward; apertures minute, circular, about .20 mm. in diameter, distance apart equal to and slightly more than the diameter of an aperture, about twenty in the space of five millimetres; margins slightly elevated, and indenting the border of the fenestrule; space between the ranges of apertures elevated, carinated; carina thin, elevated, nearly equal to the thickness of the branch, the upper half slightly expanded, and having a sharp, thin crest, the carinæ connected by their lateral projections or bars, which are very thin and extend down the side of the carinæ obliquely about .20 mm., or a little more, about eighteen bars in the space of five millimetres.

Where the poriferous face is seen this species can be easily distinguished by the very thin lateral bars connecting the carinæ, and their comparatively great distance apart. The species of the genus *Fenestella* are so similar in appearance, that without both poriferous and non-poriferous faces, it is sometimes very difficult to assign a specimen to the right species.

Formation and localities. Hamilton group; Bellona, N. Y., and West Williams, Ontario.

FENESTELLA EXORNATA, *n. sp.*

see 6th annual Rep of State Geologist. P 4. Fig 6-13 P 5. Fig 1-13.

Bryozoan probably infundibuliform, though occurring only in fragments in the present collections; largest fragment seen five centimetres long and three wide.

Branches moderately slender, appearing more slender on non-poriferous side than on poriferous, gradually increasing in size to the bifurcations, which are distant from each other generally from five to seven millimetres; branches from .33 to .50 mm. in width; space between the branches on non-poriferous side more than the width of branches, on poriferous side about equal to the width, five or six branches in the space of five millimetres; on non-poriferous side flat, with a comparatively thin, sharp elevation around the edge of the fenestrules; the space between these elevations flat or slightly concave, with frequent, short, broad, conical spines, about .20 mm. in height.

Dissepiments strong, frequently as wide as, or wider than the branches, there are four in the space of five millimetres, greatly expanding at their junction with the branches, on a plane, and having the same appearance in every respect as the branches on their non-poriferous side; on poriferous side very much depressed and flattened.

Fenestrules, on non-poriferous side, appearing broadly oval, on poriferous side elongate-oval; length from three-fourths to one millimetre; width on poriferous side .5 mm.

Cells in two ranges, opening slightly laterally; apertures small, circular; diameter about .16 mm.; distance apart equal to or a little more than the diameter of an aperture, about twenty in the space of five millimetres; margins slightly elevated; space between the rows of apertures carinated; carina thin, sharp, consisting of two plates, which coalesce near the crest; height of carina .75 mm., or nearly twice the width of the branches.

This species is very characteristic and is easily recognized from either surface, from non-poriferous by the flat branches, with elevation around the fenestrule; and from the poriferous face by the thin greatly elevated carina, in which respects it differs from any other known species of this formation.

Formation and locality. Hamilton group; Alden, Erie county, N. Y.

FENESTELLA QUADRANGULA, *n. sp.*

See 6th Annual Rep. of State Geologist - Pl. Fig 7-12.

Bryozoan probably infundibuliform in shape though, so far as observed, occurring only in small fragments; frond rigid in appearance.

Branches slender, very gradually increasing in size to the bifurcations which are distant from each other from five to fifteen millimetres, generally from ten to twelve millimetres; width of branches from .33 to nearly .50 mm. space between the branches more than the width of the branches; nine branches in the space of five millimetres; on non-poriferous side, branches rounded and frequently having a node or spine opposite the dissepiments; striated; striæ fine; sometimes entirely concealed by fine granules.

Dissepiments slender, less than .25 mm. in width; seven in the space of five millimetres, expanding at their junction with the branches; on non-poriferous side on a plane with the branches, rounding; poriferous side depressed, angular; slightly carinated.

Fenestrules broadly oval or sub-quadrangular; length from .50 to .66 mm.; width from .33 to .50 mm. Cells are in two ranges, opening slightly laterally; apertures minute, .16 mm. in diameter, very closely arranged; distance apart about one-half the diameter of an aperture; twenty-two in the space of five millimetres; margins slightly elevated; space between ranges of apertures, angular, carinated; carina moderately strong; very slightly elevated and having a row of nodes; nodes moderately strong, about four in the space of one millimetre.

Formation and locality. Hamilton group; Darien, N. Y.

FENESTELLA EMACIATA, *n. sp.*

See 6th Annual Rep. of State Geologist - Pl. Fig 9-13.

Bryozoan occurring only in fragments, the form of the whole frond is not certainly known, but probably infundibuliform; largest fragment observed five centimetres long and three wide.

Branches moderately slender; not increasing in size, except just below the bifurcations, which are distant from each other from four to twenty-four millimetres — generally about fifteen millimetres; width

of branches from .33 to .50 mm.; space between about equal to the width of the branches; seven branches in the space of five millimetres; on non-poriferous side, rounded, striated; striæ moderately strong, from three to five on a branch; finely granulose; sometimes the central stria resembles a narrow carina.

Dissepiments about .25 mm. in width; six in the space of five millimetres; slightly expanding at their junction with and oblique to the branches; angle of obliquity from ten to twenty degrees; on non-poriferous side moderately depressed, rounded, transversely striated, granulose; on poriferous side, very much depressed, slightly angular, carinated; carina slight.

Fenestrules oval or subquadrangular; length .66 mm.; width from .33 to .50 mm.

Cells in two ranges opening laterally; apertures small, .20 or .16 mm. in diameter, closely arranged, frequently nearly contiguous; from twenty to twenty-five in the space of five millimetres; margins elevated and indenting the border of the fenestrule.

Space between the ranges of apertures elevated, height equal to one-half the thickness of the top of the branch; slightly rounding; not acutely angular, having a row of nodes; nodes minute; frequently wanting.

This species differs from *F. marcida* by having stronger, more widely separated branches; dissepiments farther apart and oblique to the branches; on the poriferous side the cells open more laterally; the space between the cells is elevated, not carinated, and comparatively thick, and without the closely arranged, prominent nodes of that species.

Formation and locality. Hamilton group, shore of Seneca lake, N. Y.

FENESTELLA CURVATA, *n. sp.*

See 6th Annual Rep of State Geologist P. 6. Fig 1-9.

Bryozoan infundibuliform; largest fragments seen four millimetres in length and of about the same width.

Branches slender, scarcely increasing in size to the bifurcations, which are distant from each other from four to fifteen millimetres, generally about ten millimetres; width of branches from a little less than .25 to .33 mm., occasionally slightly more; transverse section sub-cuneiform in outline; space between branches greater than the width of the branches; seven branches in the space of five millimetres; when the dissepiments on opposite sides of the branches alternate, the branch is flexuous, but not when the dissepiments are opposite each other; on non-poriferous side the branches are rounder, in well-preserved specimens showing fine, granulose striæ, from five to seven on a branch; generally opposite the dissepiments there is a prominent, conical spine about .25 mm. in height.

Dissepiments comparatively strong; width nearly or quite equal to that of the branches; thirteen in the space of ten millimetres; not expanding at their junction with the branches; on non-poriferous side slightly depressed, rounding; on poriferous side scarcely perceptible.

Owing to the sub-cuneiform shape of the branches the fenestrules of the poriferous and non-poriferous face present an entirely different appearance; on non-poriferous face they are broadly oval or sub-quadrangular; .66 mm. in length; width from .50 to .66 mm.; on the poriferous side they frequently appear merely as narrow slits; sometimes the branches are apparently contiguous.

Cells in two ranges, opening slightly laterally; apertures minute, circular, diameter about .20 mm., closely arranged; distance apart from one-half to one diameter of an aperture, about twenty in the space of five millimetres; margin distinctly elevated and indenting the border of the fenestrule; space between ranges of apertures carinated; carina thin, slightly elevated and having prominent nodes or short spines, two in the space of one millimetre.

When both the poriferous and non-poriferous faces of this species can be seen, it will be very easily distinguished from any other species of this formation.

Formation and locality. Hamilton group; Moscow, Livingston county, N. Y.

FENESTELLA BREVILINEA, n. sp. *See F. Eryonata.*

See 6th Annual Rep of State Geologist - P 4 - Fig 6-13 P 5. Fig 1-13

Bryozoan probably infundibuliform, largest fragment seen seven centimetres wide and five long.

Branches moderately strong, a transverse section sub-cuneiform in outline — the widest portion on poriferous side — gradually increasing in size to the bifurcations, which are distant from each other from seven to twenty millimetres; width of branches from .33 to .66 mm.; space between branches greater than the width of the branches, five or six in the space of five millimetres; or when the dissepiments on opposite sides of the branches alternate, which is generally the case, the branches are sinuous; on non-poriferous side rounding or slightly angular, carinated; carina thin, but slightly elevated, sinuous; surface pustulose.

Dissepiments from .50 to .66 mm. in width, three in the space of five millimetres on non-poriferous side, on a plane with the branches, rounded, with a semi-circular carination; pustulose.

Fenestrules oval; owing to the sub-cuneiform shape of the branches, the fenestrules on poriferous and non-poriferous sides present a widely different appearance; on non-poriferous side 1.33 mm. in length, .50 mm. or slightly more in width; on poriferous side they appear much smaller, both in regard to length and width.

Cells in two ranges minute, circular or lunate, opening slightly laterally; diameter .20 or .16 mm.; space between the apertures longitudinally, equal to or more than the diameter of an aperture; ranges of apertures separated by a carina, which is very much elevated; height about .75 mm., or more than the thickness of the branch; at the base it is nearly .25 mm. in thickness, continuing of that thickness for about one-third the height of the carina, where it abruptly narrows and for the rest of the height the carina is extremely thin. Owing to the sudden contraction of the carina it appears to have a ridge upon the side when viewed from above; apparently the dissepiments sometimes have

a similar ridge; though not invariably, as the specimens, so far as observed, never occur with the poriferous face free, and the carina being extremely thin, so that in separating from the rock it might possibly be that the carinæ of the dissepiments, if any exist, are broken. The non-poriferous face, on different portions of the frond, presents a variety of appearances; on some portions apparently the branches have a continuous carina very thin and but slightly elevated and the dissepiments with a semi-circular carina, not connecting with the carina of the branch; on other portions the fenestrules are surrounded by thin elevations, the space between being somewhat flattened and in the wider portions having slightly elevated irregular lines and in the narrower portions pustulose.

This species can be distinguished from *F. exornata* by its coarser appearance as well as by the different ornamentation of the non-poriferous face of the branches.

Formation and locality. Hamilton group; Moscow, Livingston county, N. Y.

FENESTELLA SUBTORTILIS, n. sp.

See 6th Annual Rep of State Geologist - P 9. Fig 1-5.

Probably infundibuliform in shape, but occurring only in fragments; largest fragment observed three centimetres long and two and one-half in diameter.

Branches comparatively slender, of nearly the same width throughout their entire length; bifurcations distant; width of branches from .25 to a little more than .33 mm.; space between equal to or a little more than the width of the branches; nine branches in the space of five millimetres; where the dissepiments on opposite sides of the branches alternate, which is generally the case, the branch is regularly flexuous; on non-poriferous side the branches are moderately convex, and with a thin, slightly elevated carina running along the middle which is frequently obliterated by weathering; the carina is finely nodose, the rest of the branch is also nodose or granulose; branches wider on poriferous side, giving the appearance of being more densely arranged than on the non-poriferous side.

Dissepiments strong, as wide or wider than the branches, six in the space of five millimetres; on non-poriferous side, on a plane with or elevated slightly above the branches, rounded, carinated; carina thin, slightly elevated and connecting with the carinæ of the branches; on poriferous side depressed, narrower than on the non-poriferous side.

Owing to the branches being widest on the poriferous side, the appearance of the fenestrules on the poriferous face varies from that of the non-poriferous side; on which side they are broadly oval or circular; length about .5 mm.; width from three-fourths to equal the length; on poriferous side they appear much narrower, the branches sometimes being nearly contiguous.

Cells in two ranges, opening directly upward; apertures minute, circular, about .20 or .16 mm. in diameter; distance apart equal to or less than the diameter of an aperture, eighteen in the space of five millimetres; margins thin, elevated; space between ranges of apertures carinated; carina at first very thin, sinuous, thickening immediately

to about .25 mm., and having on top a thin, very slightly elevated crest. This species, especially on poriferous side, has some resemblance to *F. perundulata*, but is a much finer frond; the non-poriferous face resembles *F. curvata*, but the branches are stronger, more compactly arranged, and without spines or prominent nodes; the poriferous side is very dissimilar.

Formation and locality. · Hamilton group; Moscow, Livingston county, N. Y.

FENESTELLA STRATA, *n. sp.*

see 6th Annual Rep of State Geologist - P. 3, Fig 1-6.

Bryozoan infundibuliform; largest fragment observed five centimetres long and three wide.

Branches moderately strong; widest on the poriferous side, where they are .5 mm. in width; on non-poriferous side about .25 mm.; extremely sinuous, forming at the sides of the branch alternating and regular convexities and concavities; the convexities of adjacent branches touching and coalescing; on poriferous side the branches are angular, having a slight keel, which is conspicuously nodose, owing to that side of the branch being the narrowest and the angular tops of the branches coalescing; the sinuosity of the branches is much greater on the non-poriferous side, forming diamond-shaped elevations; the frond presenting a reticulated appearance, and it is with great difficulty that the direction of the branches can be determined.

Dissepiments; the points of coalition or anastomosing are in width equal to or a little more than that of the branches; four in the space of five millimetres.

Fenestrules on non-poriferous side oval, sometimes nearly circular, usually about one millimetre in length; width two-thirds to three-fourths the length; the size and shape, however, are somewhat variable; on non-poriferous side appearing much smaller both as regards length and breadth; the branches on poriferous side, though sinuous, present a much straighter appearance than on the non-poriferous side.

Cells in two ranges, opening directly upward or slightly laterally, minute, circular; .14 mm., or a little less, in diameter; distance apart more than the diameter of an aperture, about eighteen in the space of five millimetres; margins thin, distinctly elevated; space between the ranges of apertures carinated; carina moderately thin, elevated about .20 mm., sinuous and finely crenulate.

This species in its sinuous, anastomosing branches resembles *F. inflexa*, but the branches are more slender, and on the non-poriferous side it has two ranges of apertures, divided by a carina, while that species has three or more ranges without carina. In *F. perundulata* the frond on non-poriferous face has a much more irregular appearance, and is more decidedly anastomosing.

Formation and locality. Hamilton group; Moscow, Livingston county, N. Y.