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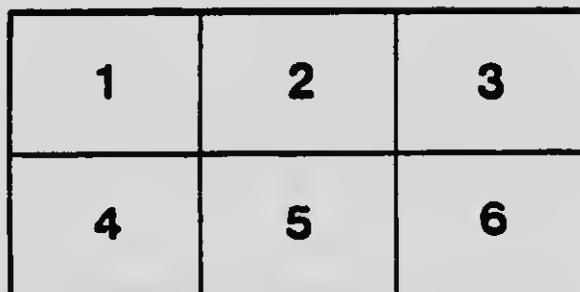
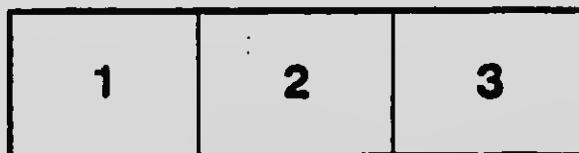
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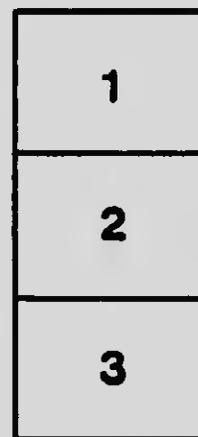
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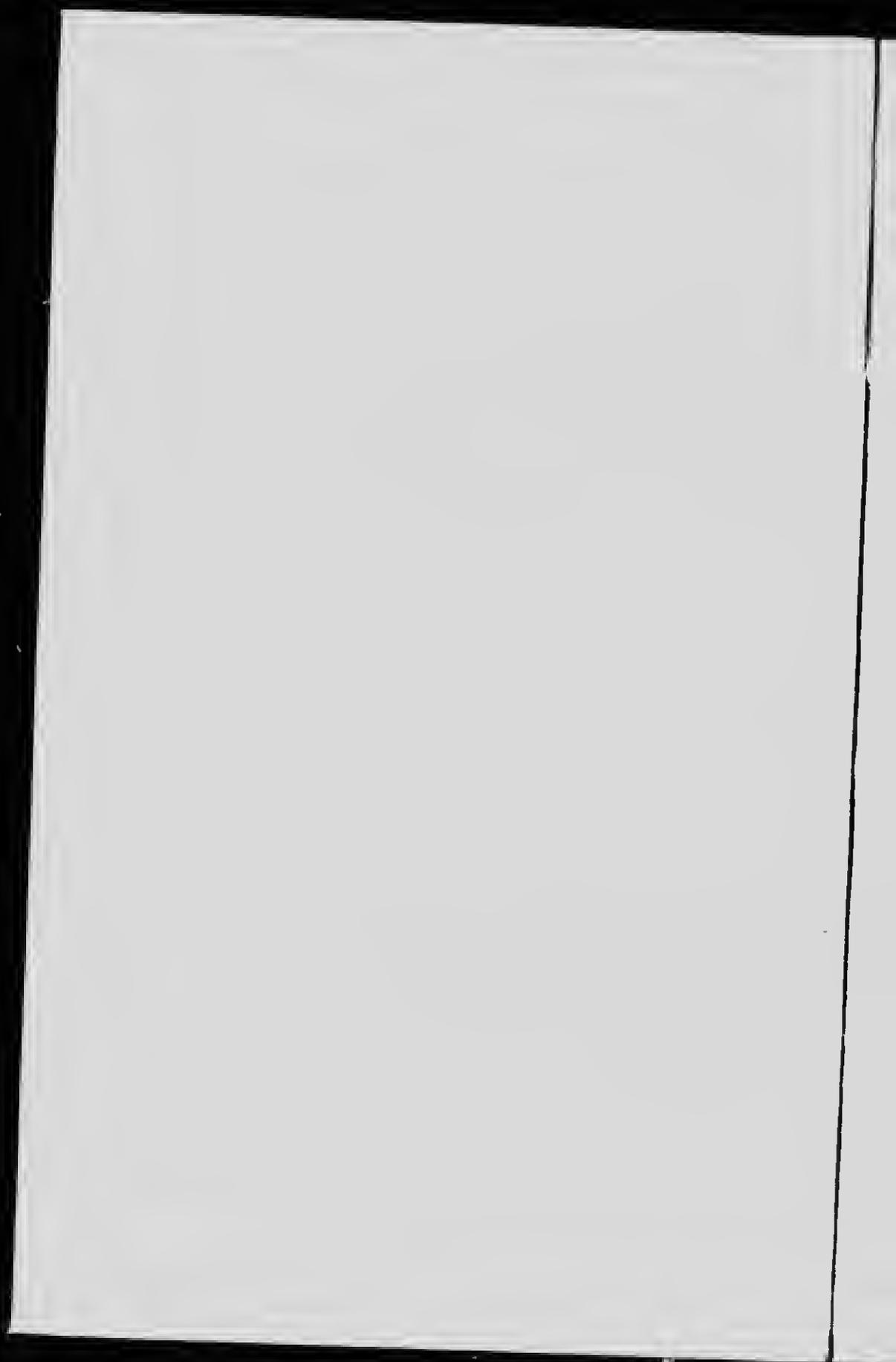
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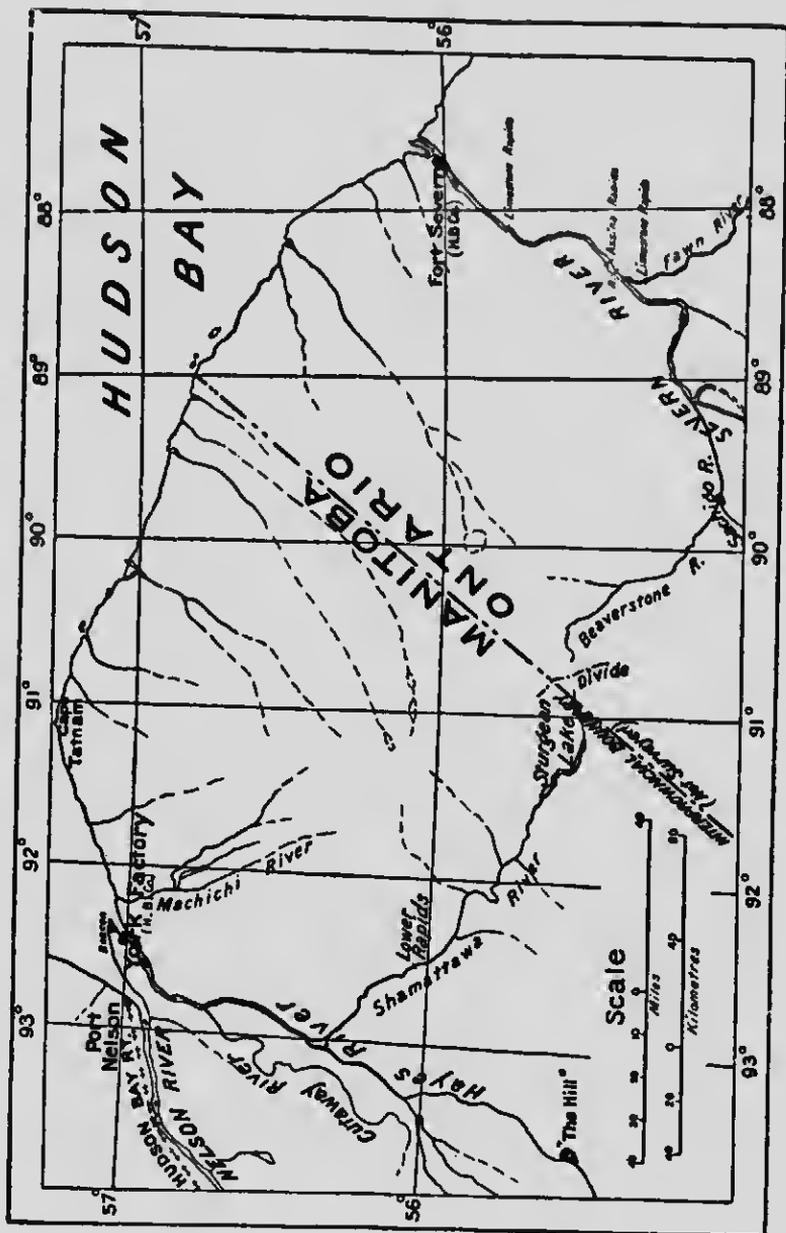


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PALAEOZOIC FOSSILS
FROM A REGION SOUTHWEST OF
HUDSON BAY

A DESCRIPTION OF THE FOSSILS COLLECTED BY JOSEPH B.
TYRRELL, ESQ., F.R.S.C., IN THE DISTRICT OF PATRICIA,
ONTARIO, AND IN NORTHERN MANITOBA
DURING THE SUMMER OF 1912.

By
W. A. PARKS, Ph.D., F.R.S.C.,
(Associate Professor of Geology, University of Toronto.)



TRANSACTIONS
OF
THE ROYAL CANADIAN INSTITUTE.

PALAEOZOIC FOSSILS FROM A REGION SOUTHWEST OF
HUDSON BAY.

*A Description of the Fossils collected by Joseph B. Tyrrell, Esq., F.R.S.C.,
in the District of Patricia, Ontario, and in Northern Manitoba
during the Summer of 1912.*

By W. A. PARKS, PH.D., F.R.S.C.
(Associate Professor of Geology, University of Toronto.)

By Act of Parliament of Canada in the year 1912, a portion of the old District of Keewatin, estimated at 157,400 square miles, was added to the Province of Ontario. In the same year appeared a compilation of the literature bearing on this region which was published as the Second Part of the Twenty-first Volume of the Report of the Bureau of Mines of Ontario. This report, written by Professor W. G. Miller, Provincial Geologist, gives an excellent summary of the work hitherto done in this area, which is now embraced in the Province of Ontario under the name of the District of Patricia.

In April 1912, the Honourable the Minister of Lands, Forests and Mines of the Province of Ontario instructed Joseph B. Tyrrell, Esq., to perform certain duties regarding the details of boundary between the Provinces of Ontario and Manitoba and "finally to return home through that part of the District of Keewatin added by the Act of Parliament of last session to the Province of Ontario, and now known as the District of Patricia, obtaining such general information as to the character, resources and possibilities of this district as it might be possible to procure in the time available".

In the course of his investigations, Mr. Tyrrell collected a large number of fossils from the Silurian outcrops along the Severn river and its tributary the Fawn river. On the Manitoba side of the boundary, particularly at the lower rapids of the Shamattawa river, a number

of Ordovician species was obtained. In addition to the material from these definite horizons some few fossils were collected from the drift at the mouth of the Nelson river and in the vicinity of York.

Under the caption "Hudson Bay Exploring Expedition, 1912" Mr. Tyrrell published the results of his investigations in the First Part of the Twenty-second Report of the Bureau of Mines of Ontario. The fossils collected on the expedition had been submitted to me for examination and a preliminary account of these remains is contained in Mr. Tyrrell's report. The present paper is an attempt to present in more extended form a description of all the recognizable material collected by Mr. Tyrrell.

Nearly all the Silurian fossils and many of the Ordovician species are represented by casts only: this has made the identification of the forms difficult, and in many cases, doubtful. In fact, had the material been obtained from an accessible region, much of it would have been thrown away as indeterminable; but the remoteness of the area and the desire to furnish a full account of the *collection* has induced me to carry my determinations beyond the point justified under normal conditions. Mistakes have doubtless occurred, and science has possibly been burdened with more synonyms, but I have refrained from new specific names in many cases where I have little doubt a new species is represented, and have preferred to leave the form indeterminate until better specimens have been found. A complete disregard of this doubtful material would not have done justice to Mr. Tyrrell's work. It is to be understood, therefore, that this paper is an account of the *collection* and not a treatise on the *fauna* of the region.

The collection contains 132 distinct forms to which possibly a dozen more might be added: of these, 48 are ascribed to known species, and 31 are new to science. The remaining 53 species are described, and in some cases figured, but their preservation does not justify specific names, although many of them are probably new. An analysis of the collection is given on the following page.

The most notable feature of this list is the great preponderance of Gastropods and Cephalopods, and in this connection it may be noted that some unusually large forms occur. *Phragmoceras whitneyi* and *Euomphalopterus tyrrelli*, herein described, are of exceptional size for the genera to which they belong.

The general aspect of the fauna of the Severn and Fawn river Silurian indicates an horizon comparable with the Guelph of Ontario, and the Ordovician species of the Shamattawa river suggest the fauna of the Trenton. While presenting features characteristic of the Manitoba Trenton, the Ontario Trenton and the Trenton of Baffin Land, our

	Ordovician				Ordovician drift				Silurian				Silurian drift		Doubtful drift		
	New sp.		Indet. sp.		New sp.		Indet. sp.		New sp.		Indet. sp.		New sp.		Indet. sp.		
	Known sp.		Known sp.		Known sp.		Known sp.		Known sp.		Known sp.		Known sp.		Known sp.		
Porifera.....	1																
Stromatoporoids.....																	
Actinozoa.....	3	1	1	1													
Bryozoa.....	1	1	1	1													
Brachiopoda.....	1	1	2	1													
Gastropoda.....	1	4															
Pelecypoda.....																	
Cephalopoda.....	3	5	3	3													
Trilobita.....																	
Ostracoda.....																	
Total.....	9	12	8	7					35	17	34	5	1				4

assemblage seems to indicate a fauna differing somewhat from any of these.

The fossils herein described were presented to the Royal Ontario Museum of Palaeontology, Toronto, by the Hon. W. H. Hearst, who was Minister of Lands, Forests and Mines at the time Mr. Tyrrell's expedition was undertaken, and who is now Prime Minister of the Province of Ontario.

As Professor Miller has published (*op. cit.*) a summarized account of the general geology of the area, with references to the literature bearing on the subject, it will be unnecessary to repeat that information here, but it seems advisable to mention the chief palaeontological papers dealing with the Ordovician and Silurian faunae, not only of this immediate vicinity, but of Manitoba and the Arctic islands. The more important contributions are as follows:

- AME, H. M.—Appendix to "The Cruise of the Neptune", Govt. Printing Bureau, Ottawa, 1906.
- KINDLE, E. M.—On some Palaeozoic Fossils from Baffin Land, *Am. Jour. Sci.* (4), Vol. II, pp. 455-456.
- KINDLE, E. M.—The Silurian and Devonian Section of Western Manitoba, *Geol. Sur. Can., Summary Rep.* 1912, p. 247.
- LAMBE, L. M.—*Geol. Sur. Can., Ann. Rep.*, Vol. IX, p. 54 F, 1896.
- LAMBE, L. M.—Appendix to "The Cruise of the Neptune". Govt. Printing Bureau, Ottawa, 1906.
- MCINNES, W.—Report on a Part of the Northwest Territories of Canada drained by the Winisk and Attawapiskat Rivers. *Geol. Sur. Can., Publication No.* 1080, 1909.
- MCINNES, W.—The Basins of the Nelson and Churchill Rivers. *Geol. Survey, Can., Memoir* 30 (No. 1225), 1913.
- PARKS, W. A.—Notes on Silurian Stromatoporoids from Hudson Bay. *Ottawa Naturalist*, Vol. 22, pp. 25-29, 1908.
- PARKS, W. A.—Silurian Stromatoporoids of America. *Univ. of Toronto Studies, Geol. Series*, No. 6, 1909.
- PARKS, W. A.—Preliminary List of the Fossils collected by Joseph B. Tyrrell in the District of Patricia, etc. *Bur. of Mines of Ont.*, 22nd Rep., pt. 1, 1913.
- SALTER, J. W.—Appendix to Sutherland's Journal of Captain Penny's Voyage to Wellington Channel, etc., 1852.
- SALTER, J. W.—On Arctic Silurian Fossils. *Quart. Jour. Geol. Soc. Lon.*, Vol. IX, 1853.
- SCHUCHERT, C.—On the Lower Silurian Fauna of Baffin Land. *Proc. U.S. Nat. Mus.*, Bull. 22, pp. 143-177, 1900.

- TYRRELL, J. B.—Report on the Doobaunt, Kazan and Ferguson Rivers. Geol. Sur. Can., Ann. Report, Vol. IX, p. 91 F, 1896.
- TYRRELL, J. B.—The Hudson Bay Exploring Expedition, 1912. Bur. Mines, Ont., 22nd Rep., Pt. 1, 1913.
- ULRICH, E. O.—On Sceptropora, with Remarks on Heliopora, etc. Am. Geologist, Vol. I, pp. 228-234, 1888.
- ULRICH, E. O.—Bryozoa and Ostracoda from the Cambro-Silurian of Manitoba. Geol. Sur. Can., Cont. to Can. Micro-Palaeontol., Vol. I, 1889.
- WHITEAVES, J. F.—Description of Eight new Species of Fossils from the Trenton Limestone of Lake Winnipeg. Can. Rec. Sci., Vol. VI, pp. 387-397, 1895.
- WHITEAVES, J. F.—Fossils of the Galena-Trenton and Black River Formations of Lake Winnipeg and its Vicinity. Geol. Sur. Can., Palaeoz. Foss., Vol. III, Pt. 3, 1897.
- WHITEAVES, J. F.—Descriptions of Eight new Species from the Cambro-Silurian Rocks of Manitoba. Trans. Royal Soc. Can., Vol. VII, Sec. IV, pp. 75-83, 1890.
- WHITEAVES, J. F.—The Orthoceratidae of the Trenton Limestone of the Winnipeg Basin. Trans. Royal Soc. Can., Vol. IX, Sec. IV, pp. 77-90, 1892.
- WHITEAVES, J. F.—Notes on the Gastropoda of the Trenton Limestone of Manitoba. Can. Rec. Sci., Vol. V, pp. 317-328, 1893.
- WHITEAVES, J. F.—A recent Discovery of Rocks of the Age of the Trenton Formation at Akpatok Island, Ungava Bay. Am. Jour. Sci., Vol. VII, pp. 433-434, 1899.
- WHITEAVES, J. F.—On some Silurian and Devonian Fossils collected by Dr. Bell in Manitoba and Hudson Bay. Can. Nat., New Series, Vol. IX, p. 315, 1880.
- WHITEAVES, J. F.—On some Silurian and Devonian Fossils from Manitoba and Valleys of the Nelson and Churchill Rivers. Geol. Sur. Can., Rep. of Prog., 1878-79, pp. 45-51 C, 1880, 1881.
- WHITEAVES, J. F.—Preliminary List of Fossils from the Silurian Rocks of the Ekwan River and Sutton Mill Lakes, Keewatin. Geol. Sur. Can., Ann. Rep., Vol. XIV, Pt. F., pp. 38-59, 1904.
- WHITEAVES, J. F.—On the genus Trimerella, with Descriptions of two supposed new Species of that Genus from the Silurian Rocks of Keewatin. Ottawa Nat., Vol. XVI, pp. 139-143, 1891.
- WHITEAVES, J. F.—Description of a new genus and species of Rugose Coral from the Silurian Rocks of Manitoba. Ottawa Nat., Vol. XVIII, pp. 113-114, 1904.

- WHITEAVES, J. F.—The Fossils of the Silurian Rocks of Keewatin, Manitoba, the Northeastern Shore of Lake Winnipegosis, and the lower Saskatchewan River. Geol. Sur. Can., Pal. Fossils, Vol. III, Pt. 4, pp. 243-296, 1906.
- WHITEAVES, J. F.—Notes on *Cyrtoceras cuneatum*. Ottawa Nat., Vol. XX, pp. 133-134, 1906.
- WHITFIELD, R. P.—Observations on and Descriptions of Arctic Fossils. Am. Museum of Nat. Hist., Bull. 13, pp. 19-22, 1900.

The descriptions herein contained are compiled as follows:

- I. Ordovician species.
- II. Species from Ordovician drift.
- III. Silurian species.
- IV. Species from Silurian drift.
- V. Species from the drift of doubtful age.

I.

ORDOVICIAN SPECIES

The following species were obtained chiefly from the lower rapids of the Shamattawa river, which enters Hudson Bay near Port Nelson. The horizon is Trenton, but the assemblage of fossils indicates a slightly different position from the Trenton of Baffin Land.

PORIFERA

AULOCOPIUM (AULOCOPELLA?) GIGANTEA, *sp. nov.*

Plate V, Figure 7.

This species is represented by a single fragment, 110 mm. long, 70 mm. wide and about 15 mm. thick. The curvature of the canals and the divergence of the skeletal elements indicate that the diameter could not have been less than 300 mm.

The polished vertical section of the specimen shows large concentric canals of about 3 mm. in width. The canals are not round, but elliptical, with the greater diameter in the plane of section: they are 2 to 3 mm. apart in the plane of section and rather less in the opposite direction. Smaller radial pores traverse the tissue at right angles to the larger concentric pores. The radiating skeletal elements appear to the number of 5 or 6 in the space of one mm.

There can be little doubt that this specimen represents a species of the genus *Aulocopium*, but its reference to the sub-genus *Aulocopella* is less certain. Regarding this sub-genus Rauff says: "Untergattung

Aulocopella. . . Von *Aulocopium* dadurch verschieden, dass der Skeletradiant nicht an oder dicht über dem Fusspunkte, sondern wie z. B. bei den Astylospongiden inmitten des Spongienkörpers liegt".¹ It is manifest that this determinative feature cannot be ascertained in our fragment, but the striking resemblance to *Aulocopella winnipegensis* would suggest the sub-genus. This remarkable sponge was described by Dr. Rauff (*op. cit.*) from a specimen from Cat Head, Lake Winnipeg, submitted to him by Dr. Whiteaves, who refigures the species in the Third Volume of Palaeozoic Fossils (Page 145, Plate 16, Figures 1-3 and Figure 9, p. 146). On account of the great similarity of our specimen I am inclined to regard the section as passing vertically through one of the lobes of an *Aulocopella* resembling *A. winnipegensis*. The two species can scarcely be identical, for our form is very much larger and shows distinct radial pores which have not been observed in *A. winnipegensis*.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 417 S. Royal Ontario Museum of Palaeontology.

ACTINOZOA

Cf. FAVOSITES ASPERA, d'Orbigny.

Cf. COLUMNARIA FRANKLINI, Salter sp.

- FAVOSITES ALVEOLARIS, *Lonsdale*. Murch. Sil. Syst., p. 681, pl. 15 bis, figs. 1, 1a, 1b and 2, 2a, 1839.
- FAVOSITES ASPERA, *d'Orbigny*. Prodr. de Paleont., Vol. I, p. 49, 1850.
- FAVOSITES ASPERA, *Milne-Edwards and Haime*. Polyp. Foss. des Terr. Palaeoz., p. 234, 1851.
- FAVOSITES ASPERA, *Milne-Edwards and Haime*. Brit. Foss. Corals, p. 257, pl. LX, figs. 3, 3a, 1855.
- FAVOSITES ASPERA, *McCoy*. Brit. Pal. Foss., p. 20, 1855.
- FAVOSITES PROLIFICUS, *Billings*. Can. Nat., 2nd series, Vol. II, p. 429, 1865; Cat. Sil. Foss. of Anticosti, p. 6, 1866.
- FAVOSITES (?) CAPAX, *Billings*. Cat. Sil. Foss. of Anticosti, p. 6, 1866.
- FAVOSITES NIAGARENSIS, *Rominger (non Hall)*. Geol. Sur. Mich., Foss. Corals, p. 22, pl. V, fig. I, 1876.
- FAVOSITES ASPERA, *Lebedeff*. Obersilurische Fauna des Timan, p. 8, pl. I, figs. 1, a, b, c, 1892.
- FAVOSITES PROLIFICUS, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. II, p. 113, 1895.
- FAVOSITES ASPERA, *Lambe*. Geol. Sur. Can., Cont. to Can. Pal., Vol. IV, pt. I, p. 4, 1899.
- FAVOSITES ASPERA, *Parks*. Bur. Mines of Ont., 22nd Rep., p. 190, 1913.
- FAVISTELLA FRANKLINI, *Salter*. Sutherland's Journal of Captain Penny's Voyage to Wellington Channel, etc., Vol. II, Appendix, p. CCXXIX, pl. 6, figs. 3 and 3a, 1852.

¹ Palaeospongiologie, Dr. Hermann Rauff, Palaeontographica, Vol. XLIII, p. 268 (392).

Portions of two coralla are represented in the specimens: these are each about 4 inches in diameter and are of identical structure except that the corallites are larger in one specimen than in the other.

The coarser specimen is part of a hemispherical or cake-shaped mass composed of polygonal, closely appressed tubes about 2.5 mm. in average diameter. The walls are thin and appear to be common to the contiguous tubes. Although the specimen is well preserved, there is no evidence of the presence of mural pores or septal spines. Straight or slightly arched tabulæ are well and regularly developed at intervals of rather less than one millimetre.

The finer specimen differs only in the size of the tubes which are 1.5 to 2 mm. in diameter. The tabulæ are perfect, only slightly wavy, and spaced at intervals of .5 mm.

Both specimens are so well preserved that the absence of pores and spines can scarcely be attributed to mineralisation, nevertheless such an assumption must be made if we are to place the specimen in any known genus or even family of Palaeozoic corals. If we assume the presence of pores in the angles of the corallites and a slight development of spiniform septa the forms are strikingly like *F. aspera*, particularly in view of the following remarks of Lambe in the work cited above: "Specimens of a *Favosites* have also been collected at East Selkirk and Lower Fort Garry, Manitoba, that are doubtfully referred to this species; they do not show the pores, although otherwise the structure is well preserved. The rocks at these localities have been assigned by Mr. Whiteaves to the Galena-Trenton, so that if, through the medium of other specimens from these places, the pores are found to be situated at the angles of the corallites, the downward extension of the range of *Favosites aspera* will be considerable".

By assuming the presence of very short septa our specimens approach very close to *Favistella (Columnaria) franklini*, Salter. I am inclined to favour this identification. As the original description in "Sutherland's Voyage" is somewhat difficult to obtain, it is reproduced in full below:

"*Favistella franklini*—Masses a foot in diameter composed of long polygonal tubes, nearly two lines broad, of very nearly equal size on the surface, the growth is by interposition of young tubes, which soon attain to the adult size. The walls of the tube are as thick in reality as those of the last species (*Favistella reticulata*), but appear much thinner from the absence of lamellæ: these are reduced to mere longitudinal striæ, seldom projecting at all into the tube, and in general scarcely visible to the naked eye. The diaphragms are very closely packed, about four in the space of a line throughout the largest specimen,

—those in the figured fragment are more distant, especially towards the base of the young tubes. They are seldom quite flat, usually a little waved up or down, as in the last species”.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

Nos. 287 S, 288 S, Royal Ontario Museum of Palaeontology.

STRIATOPORA, *sp. indet.*

Cf. FAVOSITES POLYMORPHA, Salter (*non Goldfuss*). Sutherland's Journal of Captain Penny's Voyage to Wellington Channel, etc., Vol. II, appendix, p. CCXXVIII, pl. 6, figs. 9, 9a, 1852.

The collection contains two specimens of a small branching coral, showing a maximum diameter of 15 mm. One specimen is badly water worn and cannot be relied upon for external characters, the other is less worn and shows the slightly oblique apertures, thick walls and sharp edges characteristic of *Striatopora*. The cells are about 2 mm. in diameter, but the calyces are too badly preserved to show the radiating striae.

A vertical section shows that the walls of the tubes are at first thin and that they increase in thickness as they turn gradually out to the surface. Tabulae are very faintly indicated, and mural pores cannot be made out, as the specimens are considerably silicified. In view of these imperfections it is manifestly impossible to ascribe the form to any known species or to attempt its full description. It is very likely that we are dealing with the same form ascribed by Salter (*op. cit.*) to *Favosites polymorpha*, Goldfuss, as the external appearance is very like that of the figures given by Salter.

Salter's description is in part as follows: "The tubes are by no means of equal size—numerous small ones occurring between the others. The edges are somewhat thickened. Internally the tubes are sometimes cylindrical and smooth, at others more prismatic. They are sometimes faintly striate inside. The pores occur in single rows at wide distances apart. The transverse diaphragms are not visible in these specimens.

"But another specimen, with all the same external characters as the rest, and having the internal diaphragms very plain and rather close, about two in the diameter of a tube, and the pores in two rows on each face, agrees well with *F. crassa* of McCoy."

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 297 S. Royal Ontario Museum of Palaeontology.

COLUMNARIA RUGOSA, *Billings* sp.

- LITHOSTROTION STOKESI, *Milne-Edwards and Haime*. Polyp. Foss. des Terr. Palaeoz., p. 440, pl. 20, fig. 2, 1851.
 PALAEOPHYLLUM RUGOSUM, *Billings*. Geol. Sur. Can., Rep. Prog. for 1857, p. 168, 1858.
 COLUMNARIA ERRATICA, *Billings*. *Ibid.* p. 166, 1858.
 DIPHYPHYLLUM STOKESI, *Whiteaves*. Geol. Sur. Can., Pal. Foss., Vol. III, pt. III, p. 152, pl. XVII, figs. 3, 5a, 5b.
 COLUMNARIA RUGOSA, *Lambe*. Ottawa Naturalist, Vol. XII, p. 217, 1899.
 COLUMNARIA RUGOSA, *Lambe*. Con. Can. Pal., Vol. IV, pt. II, p. 101, pl. III, figs. 3, 3a, 3b, 1900.
 COLUMNARIA RUGOSA, *Parks*. Bur. Mines Ont., 22nd Rep., p. 190, 1913.

A well preserved fragment showing about fifty corallites. *Lambe* gives the corallites of this species a diameter varying from three to nine millimetres: the maximum diameter of our corallites is six millimetres with an average considerably less. *Lambe* also states that the tabulae occur to the number of four in a distance of two millimetres: while this is true in parts of our specimen, a much wider spacing is observed in others. There can be little doubt, despite these trifling differences, that this specimen is referable to *C. rugosa*.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 291 S. Royal Ontario Museum of Palaeontology.

STREPTELASMA cf. RUSTICUM, *Billings*.

Plate V, Figures 4 and 5.

- STREPTELASMA CORNICULUM, *Milne-Edwards and Haime*. Polyp. Foss. des Terr. Palaeoz., p. 398, pl. 7, figs. 4, 4a, 4b, 1851.
 PETRAIA RUSTICA, *Billings*. Geol. Sur. Can., Rep. for 1857, p. 168, 1858.
 ZAPHRENTIS CANADENSIS, *Billings*. Geol. Sur. Can., Pal. Foss., Vol. I, p. 105, figs. 93a-c, 1862.
 PETRAIA CANADENSIS, *Billings*. Geol. Sur. Can., Rep. 1863, p. 208, fig. 205.
 STREPTELASMA CORNICULUM, *Nicholson*. Pal. Ont., p. 26, 1875, and Geol. Sur. Ohio, Vol. II, p. 218, 1875.
 STREPTELASMA CORNICULUM, *Rominger*. Geol. Sur. Mich., Foss. Corals, p. 141 (pars), pl. LI, upper row, specimens from the Hudson River formation only, 1876.
 STREPTELASMA RUSTICUM, *Lambe*. Geol. Sur. Can., Cont. to Can. Pal., Vol. IV, pt. II, p. 110, pl. VII, figs. 2, 2a and 3, 1900.
 STREPTELASMA CORNICULUM, *Parks*. Bur. Mines Ont., 22nd Rep., p. 190, 1913.

The specimen in this instance is a single broken corallum showing neither calyx or apex: it is 41 mm. long and presents a diameter at the anterior end of 33 mm. The posterior diameter is 25 mm. The general form of the corallum in the portion preserved is nearly straight. The exterior is smooth and is apparently covered by a complete epitheca, as the septal markings are not to be observed.

A transverse section (Pl. V, Fig. 5) at about the middle of the specimen, where the diameter is 31 mm., shows 50 long primary septa which extend inwards for a length of 11 mm.: towards the centre they coalesce and lose their identity in a mass of reticulated tissue. Secondary septa appear between the primaries and extend inwards for 6 mm. This outer zone is thickened by deposits of calcareous matter and shows no structures besides the septa. Between the inner ends of the secondaries and the central area of reticulated tissue, inwardly curved dissepiments appear in the interseptal loculi. The transverse section, therefore, presents three well defined zones—an outer ring with primaries and secondaries, a middle zone with primaries and dissepiments and an inner reticulated area.

A longitudinal section (Pl. V, Fig. 4) shows no further structures in the outer zone. The intermediate area, as the section is not exactly median, shows the severed edges of some primary septa and upwardly directed dissepiments. On entering the central area the dissepiments assume a more horizontal direction and present, to some extent, the characteristics of tabulæ. This central area shows a rather indistinct arrangement of dissepiments and septa, and, on the whole, suggests a transition between the structure typical of *Streptelasma* and that which characterizes *Zaphrentis*. There is more evidence of irregularity in the vertical than in the horizontal elements of the reticulation.

In the preliminary report this specimen, together with others from the same locality, was referred to *S. corniculum*, Hall. The straight form of the corallum, its greater size, its smooth exterior, and the relatively long secondary septa, seem to bring the form closer to *S. rusticum*, Billings, as redefined by Lambe. The internal structure is very like that figured by Lambe, but the secondary septa are relatively longer and the internal structures of a coarser type in our specimen; nevertheless, in the absence of better material, the form may reasonably be ascribed to Billings' species.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 285 S. Royal Ontario Museum of Palaeontology.

STREPTELASMA INTEGRISEPTATUM, *sp. nov.*

Plate V, Figures 1, 2 and 3.

This species is described from two very imperfect specimens which nevertheless present definite features not seen in species hitherto described.

The corallum is simple and conical, rather strongly curved at first, but almost straight in later stages of growth. The length of the concave side is 35 mm. and that of the convex side 56 mm. measured in a straight line from the apex. The diameter from the calyx rim on the concave side measured directly across is 27 mm.

The character of the calyx is somewhat doubtful, but it is probably of moderate depth, with a floor disposed at an oblique angle to the axis of the corallum. The centre of the floor is marked by a prominent elevation representing the extremity of a central zone of reticulated tissue. A fossula is probably present, although it was not observed in the specimens owing to the calyces being filled with matrix. The exterior is marked by very delicate transverse lines and faint septal furrows: both of these are so obscure that to the naked eye the exterior is quite smooth. Increase is effected by calycinal gemmation.

The transverse section shows a distinct tetrameral arrangement of the septa which are apparently of one order only. The thickened peripheral ends of the septa form an outer wall 2 mm. thick. It is possible that very short secondary septa are hidden in this wall, but no trace of their existence was observed. About 50 septa occur at a diameter of 25 mm. The cardinal septum is largely absorbed, and its position is clearly marked by an opening between the adjoining septa. On both sides of the cardinal septum the septa are rather short. The alar septa are long and the counter septum and those near it are long and rather crowded. On the cardinal side the septa do not reach the centre, but on the counter side the inner ends of the septa coalesce and with the dissepiments build up a zone of reticulated tissue. At a point nearer the apex a second transverse section does not show the above characteristic in so distinct a manner, as all the septa extend to the central spongy zone. Here also the septa are united by occasional curved dissepiments. Plate V, Fig. 2.

A tangential section shows the septa and the numerous downwardly arched dissepiments. Plate V, Fig. 3.

Median vertical sections show that the dissepiments are moderately flat or convex in the peripheral region, but that they turn upwards to join the central reticulated area. Plate V, Fig. 1 shows a considerable difference on the two sides: the right is the cardinal and the left the counter sides. The difference is in part due to the fact that the section is almost in the line of a septum on the left side, while on the right the septa are cut at a low angle.

This form is undoubtedly near *S. corniculum*, Hall, and I should ascribe it to that species except for the following points of difference: the smooth exterior, the absence of secondary septa, and the presence

of the sharply defined elevation on the floor of the calyx. The specimens have some resemblance to *Sirephodes pickthornii*, Salter,¹ but they differ in the absence of longitudinal striæ on the outer surface and in their greater size. Our forms also are more elongate and present fewer septa for a given diameter.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 286 S. Royal Ontario Museum of Palaeontology.

BRYOZOA

MONOTRYPA CUMULATA, Ulrich.

MONOTRYPA (CHAETETES) CUMULATA, Ulrich. Geol. Surv. Minn., Pal. Vol. III, pt. 1, p. 307, pl. XXVII, figs. 26 and 27, 1895.

Cf. DIANULITES PETROPOLITANA, Dybowski. Die Chaetetiden der Ostbaltischen Silur-Formation, p. 24, pl. 1, figs. 4 and 5, 1877.

Cf. DIANULITES PETROPOLITANA, Bassler. U.S. Nat. Mus., Bull. 77, p. 232, Plate 2, figs. 4-6a; pl. 10, figs. 7-11; text figs. 129-132, 1911.

One fragment about 60 mm. by 45 mm. by 10 mm., apparently belonging to a sub-hemispherical polyzoarium. Tangential and vertical sections of this specimen were submitted to Dr. Ray S. Bassler of the United States National Museum, who has kindly communicated the following determination: "The bryozoan is closely related to *Monotrypa cumulata*, Ulrich, from the Mohawkian rocks of Minnesota. In my Baltic Province bulletin you will find this species listed as a synonym under *Dianulites petropolitana*. Your species is too little different to make even a good variety".

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 420 S. Royal Ontario Museum of Palaeontology.

ESCHIAROPORA (?), *sp. indet.*

One small fragment showing round pores arranged diagonally. Four occur in the space of one mm. The surface is worn and identification therefore impossible.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 412 S. Royal Ontario Museum of Palaeontology.

¹ Sutherland's Journal of Captain Penny's Voyage to Wellington Channel, etc., Vol. II, Appendix, p. CCXXX, pl. 6, fig. 5, 1852.

BRACHIOPODA

RHYNCHOTREMA (?), *sp. indet.*

RHYNCHOTREMA CAPAX, *Conrad, Parks, Bur. Mines, Ont., 22nd rep., p. 190, 1913.*

One imperfect ventral valve, ventricose with moderately elevated median fold. The fold seems to be marked by a distinct central plication and by one other fainter plication on each side of the major one. Seven or eight ribs occur between the median fold and the angles of the shell. In the preliminary report this shell was referred provisionally to *R. capax*: while there is a superficial resemblance I fear the specimen is too imperfect to justify the comparison.

Schuchert records *Rhynchotrema minnesotensis*, Sardeson, *R. inaequivalvis*, Castelnau, and *R. inaequivalvis subtrigonalis*, Hall, in the Trenton of Baffin Land.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 405 S. Royal Ontario Museum of Palaeontology.

Cf. DINORTHIS PECTINELLA, Emmons sp.

ORTHIS PECTINELLA, *Emmons, Geol. Sur. N.Y., Rep. 2nd Dist., p. 394, fig. 2, 1842.*

Several broken and decorticated specimens, quite impossible of identification: they are referred to this species with the greatest doubt. Compare also *Orthis (Plectorthis) plicatella* which Schuchert states is a common fossil in the Trenton of Baffin Land.¹

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 405 S. Royal Ontario Museum of Palaeontology.

STROPHOMENA (?) TETRASTRIATA, *sp. nov.*

Plate IV, Figure 16.

One partially worn ventral valve which is made the type of the species and two other shells similar in size and shape but lacking the characteristic markings.

The type is 25 mm. wide and 15 mm. long. The beak extends slightly posterior to the cardinal line, and the anterior margin is strongly inflected. The surface is marked by four distinct but delicate elevated ribs, two on each side of the median line, with a greater interval between the pairs. Between the ribs, the surface is marked by very delicate, anteriorly curved, concentric striæ, which are also seen beyond the ribbed area, but which do not extend to the lateral margins of the shell.

¹ Proc. U.S. Nat. Mus., Bull. 22, 1900.

The general shape of the shell and the strongly inflected anterior margin suggest the genus *Leptaena*, but the concentric rugosities characteristic of that genus are not present. With no knowledge of the interior the form is provisionally referred to *Strophomena*. In the preliminary description the species was compared with *S. julia*, Billings,¹ with which it is doubtless related. Billings' species, however, has more numerous prominent striae or ribs, and instead of the concentric markings between the major ribs it has fine radial striations.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 403 S. Royal Ontario Museum of Palaeontology.

RAFINESQUINA, sp. indet.

RAFINESQUINA LATA, Whiteaves, Parks. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 190, 1913.

The collection contains a fragment of a large Strophomenoid shell which bears some resemblance to Whiteaves' species, but a close examination indicates that its reference to that species is not justified. The shell was possibly 40 mm. long, but its width is not revealed. The specimen shows only the median portion of the pedicle valve, which is strongly arched from umbo to anterior margin and also transversely with a broad but faintly marked median fold. The striae are of two orders, fine and coarse, but there is no regular arrangement of the two kinds: in places they are not to be differentiated. The shell is punctate, and the cast of the interior is marked by vascular sinus, particularly in the mid-anterior region. The brachial valve is concave and well set into the pedicle valve, but none of its structural features are revealed.

The large size of this shell, its surface markings and its horizon suggest *R. lata*, but its arcuate outline, particularly in the transverse direction, seems to prohibit its reference to that species. The loss of the cardinal angles makes its specific identification doubtful, and I therefore prefer to leave it for the present as an indeterminate species.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 415 S. Royal Ontario Museum of Palaeontology.

GASTROPODA

HORMOTOMA ACUMINATA, sp. nov.

Plate IV, Figure 3.

HORMOTOMA sp., Parks. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 190, 1913.

This species is founded on a cast of the interior showing five whorls. In the drawing the upper part of the spire is restored.

¹ Geol. Sur. Can., Palaeoz. Foss., Vol. I, p. 127, fig. 105a and b.

The total height is about 60 mm., while the width of the body whorl is only 18 mm. The whorls are evenly rounded and the sutures rather deeply impressed. The aperture is not well shown, but it appears to be narrow and moderately elongate. There are probably twelve whorls in all. A second broken portion showing two whorls probably belongs to this species and indicates a somewhat greater size, as the larger whorl is about 20 mm. in diameter. The sutures, however, are not as deep and the whorls are flatter: it may possibly represent another species.

H. acuminata is of the type of *H. gracilis*, and except for its much greater size approaches close to some of the varieties of that species: it also resembles *H. salteri*, Ulrich.

Ami has listed two species of *Hormotoma* from Beechey island as *H. arctica* and *H. affinis*, but as they are from a horizon probably much higher, it is not likely that the present species is identical with either.¹

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 363 S. Royal Ontario Museum of Palaeontology.

The collection contains also a fragment of a body whorl of a *Hormotoma* indicating a much larger shell than the above. Ordovician, Shamattawa river.

No. 384 S. Royal Ontario Museum of Palaeontology.

HOLOPEA MEDIA, *sp. nov.*

Plate IV, Figure 4.

This species is founded on one broken cast of the interior; as it is distinctly different from any other of the specimens from this horizon, I venture to ascribe a specific name. The general shape of the whorls and the nature of the spire are fairly well shown, but there is no information available as to the surface markings, the aperture, or the umbilicus: the generic position must therefore be left in doubt, but the character of the whorls suggests *Holopea*.

The maximum width of the specimen is 40 mm. and its height to the top of the third whorl about 31 mm. The whorls are fairly evenly rounded on the outer side, but there is a slight degree of flattening on the upper lateral aspect which is more pronounced towards the aperture. The whorls expand rapidly, the body whorl being relatively very large and those of the spire being impressed to about a third of their height in the whorl below. The cast shows no evidence of surface markings of any kind. This form is remarkably like *Holopea guelphensis*, Billings, from the Guelph of Ontario, but it cannot be identical at the present horizon.

¹ "The Cruise of the Neptune", Appendix IV, pp. 329 and 330, 1906.

This form must be compared with *H. borealis*, listed by Ami but without description in "The Cruise of the Neptune".

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 361 S. Royal Ontario Museum of Palaeontology.

TROCHONEMA UMBILICATUM, Hall sp.

PLEUROTOMARIA UMBILICATUM, Hall, Pal. New York, Vol. 1, pp. 43 and 175, 1847.

TROCHONEMA UMBILICATA, Salter, Geol. Sur. Can., Can. Org. Remains, Dec. 1, p. 27, pl. VI, fig. 3, 1859.

TROCHONEMA UMBILICATUM, Ulrich, Geol. Sur. Minn., Palaeon., Vol. III, pt. II, p. 1047, pl. LXXVII, figs. 1-8, 1897.

Seven specimens, all casts, showing some variation. They are ascribed to this species with considerable certainty.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 360 S. Royal Ontario Museum of Palaeontology.

MACLUREA SUBOVATA, Parks. (nom. prov.)

Plate VII, Figures 4 and 5.

MACLUREA SUBOVATA, Parks, Bur. Mines of Ont., 22nd Rep., pt. 1, p. 190, 1913.

It is with considerable hesitation that a new species is established for this *Maclurea* which is represented in the collection by one good cast and several fragments. It cannot be denied that the specimens show considerable resemblance to *M. logani*, Salter, and to *M. bigsbyi*, Hall. After careful comparison, however, I am unable to ascribe the forms with any certainty to the species mentioned, and until better material is secured I am of the opinion that the specimens are worthy of a provisional name.

The most perfect specimen, which I think is nearly complete, although the aperture is not shown, measures about 65 mm. in maximum diameter. Only two distinct whorls are seen, but there is evidence of a third very small initial whorl. The shell is thick and partly worn away on the under (flat) surface, but judging from the cast of the interior, the most striking peculiarity is the considerable convexity shown by the under surface of the whorls.¹ The outer side of the volutions is characterised by a rather straight outline which is more pronounced towards the aperture. The umbilicus is about 15 mm. in diameter. The measurements of the outer whorl nearest the aperture are as follows: Maximum

¹ Following Ulrich, the flat side is regarded as the base; the "umbilicus" therefore is really an inverted spire.

height from the umbilical edge to the inferior lateral angle—40 mm. Height from the superior external to the inferior internal edge—33 mm. Width measured at right angles to the outer sloping side—25 mm. These figures are slightly greater than those indicated in Plate VII, Figure 5, which is prepared from a section not passing close to the aperture. The form of the aperture differs from the cross section shown in the figure, as the inner lip is drawn out giving a more rectangular appearance to the top.

The specimens show no evidence of lines of growth or external ornamentation of any kind.

The few and rapidly expanding whorls separate this species sharply from forms like *M. magna*, but this very feature suggests *M. logani*; in fact, the character of the coiling is so like that of *M. logani*, and the general resemblance of some of our forms is so striking that I was at first inclined to ascribe the specimens to that species. A further resemblance is shown in the greater height as compared with the width of the whorl, and even the convexity of the under side is presented, but probably in a less distinct manner, by *M. logani*.¹ On the other hand there are some striking points of difference shown by our specimens—the straight outline of the outer aspect of the whorl, the sharper inferior lateral margin, and the very much wider umbilicus. Our specimens may be distinguished from *M. bigsbyi* by the greater convexity of the under sides of the whorls and the straighter lateral outline. The whorls seem to expand more rapidly than in *M. bigsbyi*, and the relative height of the whorl is greater. Schuchert recognizes *M. crassa*, Ulrich and Schofield in the Trenton of Baffin Land; although our form is similar, I cannot regard it as belonging to this species.

Whiteaves describes a species of *Maclurea* from the second and third limestone rapids of the Nelson river which he compares with *M. bigsbyi*. This form, however, cannot be co-specific with our specimens, as Whiteaves emphasizes the fact that the whorl is one-third greater in width than in height.²

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 351 S. Royal Ontario Museum of Palaeontology.

¹ Geol. Sur. Can., Palaeon. Decade I, p. 7, pl. I.

² Geol. Sur. Can., Rep. 1878-79, p. 48 C.

MACLUREA ACUTA, sp. nov.

Plate VII, Figures 1 and 2.

MACLURINA MANITOBENSIS ACUTA, Parks, Bur. Mines of Ont., 22nd Rep., pt. 1, p. 190.

The only specimen of this species has a maximum diameter of nearly 100 mm. (The cast is 95 mm.). The vertical height of the deepest part preserved is 35 mm. Three whorls are shown, the inner one being extremely small. The under side is flat and slightly concave in the centre. The lower aspect of the whorls is very slightly convex, but this appearance would be greatly increased in the cast and the sutures would be quite deep. The actual width of the umbilicus is 18 mm. and its greatest width from summit to summit of the body whorl is 35 mm. The inferior margin of the whorls is acute, with a slight but distinct depression just above the angle. The outer aspect shows a decided slant with a slight convexity to the summit of the whorl. The measurements of the *cast* of the outer whorl nearest the aperture are as follows:

Vertical height—33 mm.

Width on the flat side—35 mm.

Width at right angles to the outer side—28 mm.

Although the shell is very well preserved on the base there is no indication of lines of growth or of ornamentation.

In the preliminary report this shell was made a variety of *Maclurina manitobensis*, Whiteaves,¹ which it strongly resembles in the character of the coiling and in the shape of the whorls. Although the aperture of our specimen is not shown, it is nevertheless fairly complete and indicates a much smaller size than that of *M. manitobensis*, and although the shell is well preserved on the flat side there is no indication of the periodic arrests of growth mentioned by Whiteaves, nor is any sign to be seen of the revolving lines and transverse costæ on the upper side, although a small portion of the shell is preserved. A comparison with specimens in the Royal Ontario Museum indicates a slightly greater rate of expansion in the whorls of the present example. I am by no means convinced that my original diagnosis was wrong, but as surface ornamentation is of prime importance in *M. manitobensis*, and as this ornamentation is not shown by our specimen, it is perhaps better to describe the present example as a distinct species, more particularly as Whiteaves' species has been removed to another genus, *Maclurina*, on the basis of the structure of the operculum—a feature which cannot be ascertained for the present example. *Maclurina manitobensis* is common in the Trenton of Silliman's Fossil Mount, Baffin Land, which is an additional argument for the identity of the present form.

¹ Trans. Royal Soc. Canada, Vol. VII, sec. IV, p. 75, pl. XII, pl. XIII, figs. 1 and 2.

The much greater slant of the outer side of the whorl and the more acute peripheral angle separates this form from *M. subovata*; the large umbilicus distinguishes it from *M. logani*. The sharply angulated periphery and the flattening of the outer side of the volutions on the convex side separate it from *M. bigsbyi*.

This form may possibly be identical with the *Maclurea* described by Whiteaves from the Nelson river (See page 20).

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 350 S. Royal Ontario Museum of Palaeontology.

CEPHALOPODA

ORTHO CERAS (THORACOCERAS) LEPIDODENDROIDES, Parks.

Plate II, Figure 4.

ORTHO CERAS LEPIDODENDROIDES, Parks. Bur. Mines of Ont., 22nd Rep., pt. I, p. 190, 1913.

The species is founded on a single cast of a portion of a longicone. The specimen is 75 mm. long and shows portions of 8 camerae: it has been badly crushed and now measures 60 mm. by 30 mm. If round its diameter would be 45 mm. The outline was probably ovate with a greater diameter in one direction. The septa are somewhat irregularly spaced, but the interval would average about 6 mm. In the crushed form the specimen shows evidence of flexuous sutures with low lobes and saddles, but this appearance may be entirely due to deformation.

The one remarkable and characteristic feature is that the whole surface of the cast is raised into blunt nodes arranged in a diagonal manner around the cone. These nodes are 4 to 6 mm. apart and besides the diagonal arrangement they are disposed in rows on each camera. While this latter statement is generally true, there is evidence in certain parts of the specimen that the nodes are independent of the camerae. The drawing is much restored, as the ornamentation has been destroyed by weathering in certain parts: the nodes have been restored with rather too great regularity with respect to the camerae. The nodes are blunt, from 4 to 5 mm. long, and wider anteriorly.

The genus *Orthoceras*, as now defined, is confined to forms with a smooth shell: it would appear that the present form was ornamented with obliquely arranged spines of which the nodes on the cast are the internal impressions. I am aware of no genus into which the specimen would properly fall, but as my literature is by no means complete, I hesitate to create a new genus. The genus *Thoracoceras*¹ includes longi-

¹ Eich., Bull. Soc. Imp. de Nat. de Mosc., p. 761, 1844.

cones in which the ridges become spiny, or are roughened by the prominence of the transverse striæ or ridges. This unique species is provisionally referred to Eichwald's genus.

Named on account of the striking resemblance of the cast to a stem of *Lepidodendron*.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 321 S. Royal Ontario Museum of Palaeontology.

ORTHO CERAS, *sp. indet.*

Two fragments of orthoceracones.

One fragment shows a body chamber about 44 mm. long, and portions of three camerae. The transverse section is elliptical, 25 mm. by 28 mm. at the third septum. Septa about 5.5 mm. apart. No siphuncle preserved.

The second fragment is from a smaller individual of possibly the same species; it is 45 mm. long, elliptical in section, 25 mm. by 20 mm. at the anterior end.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 333 S. Royal Ontario Museum of Palaeontology.

ACTINOCERAS, *Bronn.*

ACTINOCERAS, *Bronn.* *Lethaea Geognostica*, Zweite Aufl., Band. I, p. 97, 1837.

ACTINOCERAS, *Hyatt.* *Proc.*, Boston Soc. of Nat. Hist., vol. XXII, p. 272, 1884.

ACTINOCERAS, *Foord.* *Cat. Foss. Ceph.*, Brit. Mus., p. 164, 1888.

The characteristics of the genus are described in the above works: it is unnecessary to repeat here the details of structure. Of true *Actinoceras* or the modified form, *Huronia*,¹ our collection contains at least eight distinct species, which in most cases are represented by siphuncles only or by siphuncles with a fragment of the septate shell.

ACTINOCERAS BIGSBYI, *Bronn.*

Plate VI, Figure 7.

ORTHO CERAE, *Bigsby.* *Trans. Geol. Soc.*, ser. 2, Vol. I, p. 198, pl. XXV, figs. 1 and 2 (excl. fig. 3), 1824.

ACTINOCERAS BIGSBYI, *Bronn.* *Lethaea Geogn.*, Band I, p. 98, Taf. I, fig. 8 (after Bigsby), 1837.

ACTINOCERAS BIGSBYI, *Foord.* *Cat. of Foss. Ceph.*, British Museum, p. 168, 1888. (For extended synonymy see this article.)

ACTINOCERAS BIGSBYI, *Whiteaves.* *Trans. Royal Soc. Can.*, Vol. IX, sec. IV, p. 84, pl. X, fig. 2, 1891.

ACTINOCERAS BIGSBYI, *Parks.* *Bur. Mines of Ont.*, 22nd Rep., p. 191, 1913.

¹ *Trans. Geol. Soc.*, ser. 2, Vol. I, pt. II, explanation of pl. XXVIII, 1824.

Our specimen is a fragment of the camerate shell about 120 mm. long: it is 65 mm. in diameter at the anterior end, and 47 mm. at the posterior extremity. It is possible, but not certain, that the shell was somewhat elliptical, measuring 65 by 50 mm. anteriorly and 47 by 40 mm. posteriorly. The rate of tapering indicated by these figures agrees fairly well with that given for *A. bigsbyi*. The external characteristics of the shell are not well shown, but it is probably smooth. I am unable to see "the longitudinal, undulated, fine, thread-like lines" of Hall.

The septa are 10 mm. apart, strongly curved orad: they are thin and delicate in structure.

The siphuncle is large, possibly 27 mm. in diameter at the smaller end of the specimen, but as some deformation has occurred, the exact diameter cannot be stated. The siphuncle is situated very close to one side of the shell.

The structure of the siphuncular sheath is very exact and persistent. In vertical section the inner ends of the septa are seen to extend directly apicad, forming an annular funnel for half the interseptal distance. In the posterior half of the interspace the siphuncle swells out into evenly rounded rings. This definite structure is not emphasised by authors in the descriptions of *A. bigsbyi*, and on this account I was inclined to ascribe our specimen to some other species. Bigsby's original figures, however, point strongly to this type of siphuncle.¹ Barrande's revision of the species shows that the swelling is located in the posterior part of the interseptal space, but his drawings do not emphasize the directly backward inflection of the septa into tubular necks.²

The endosiphuncle is not preserved, but the whorls of radial tubuli ("verticillations" of Stokes) are admirably preserved, and project from the inner sides of the nummuloidal rings almost at right angles. These structures must have been strongly calcified to withstand the vicissitudes to which the specimen has been subjected. The presence of these structures outweighs any objection based on the exact form of the siphuncular segments, which, considered alone, would suggest *Orthoceras* (*Actinoceras*) *anticostiense*, Billings, from the Upper Ordovician of Lake St. John (See plate 434, Figs. 9 and 10, *Système Silurien de la Bohême*).

My examination of this specimen has induced me, with great reluctance, to doubt Whiteaves' recorded occurrence of the species at Lower Fort Garry. If the form figured by Whiteaves is really *A. bigsbyi* we must entirely recast our conception of the species. (*Royal Soc. Can., op. cit.*).

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 308 S. Royal Ontario Museum of Palaeontology.

¹ *Trans. Geol. Soc., ser. II, Vol. I, pl. XXV, figs. 1 and 2, 1824.*

² *Système Sil. de la Bohême, pl. 437, figs. 10-16, 1870.*

ACTINOCERAS *cf.* BIGSBYI, *Bronn.*

Plate VI, Figure 6.

One broken fragment showing only the siphuncle and the inner parts of the septa. Septa somewhat variably spaced but averaging 9 mm. apart. Siphuncle about 22 mm. in diameter evenly expanded in the posterior part of the interseptal space. The septa in contact with the posterior aspect of the rings, but separated from the anterior aspect by inwardly curved septal necks. In vertical section the outer, anterior wall of the nummuloidal expansion is broken in each segment, suggesting a communication between the interior of the siphuncle and the cameræ. No endosiphonal structure preserved.

This specimen in all probability, is to be referred to *A. bigsbyi*: it closely resembles some of Barrande's figures of that species, but is distinctly different from the other specimen which I have referred to *A. bigsbyi* (Page 23), in that the septal necks, before expansion, are much shorter and pass less abruptly into the nummuloidal rings. The spacing of the septa and the size and shape of the siphuncle are almost exactly the same as in the figure given by Foord (Cat. Foss. Ceph., Brit. Mus. p. 104, Fig. 21).

If the characteristic radial tubuli could be seen in the present example, there could be no hesitation in ascribing it to *A. bigsbyi*, and were it not for the distinct evidence of cylindrical structure in the anterior part of the siphuncular rings shown in Bigsby's original figures, I should consider this specimen nearer to *A. bigsbyi* than the one described on page 23.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 315 S. Royal Ontario Museum of Palaeontology.

ACTINOCERAS RICHARDSONI MAGNUM, *Parks, var.**Cf.* ACTINOCERAS RICHARDSONI, *Stokes.*

Plate II, Figure 1.

- ACTINOCERAS RICHARDSONI, *Stokes*. Trans. Geol. Soc., ser. 2, Vol. V, pt. 3, p. 708, pl. LIX, figs. 2 and 3, 1840.
- CONOTUBULARIA CUVIERI, *Troost*. Mem. Soc. Geol. de France, tom 11, 1me partie, p. 88, pl. 9, fig. 1, 1838.
- ORTHO CERAS (ACTINOCERAS) RICHARDSONI, *Barrande*. Syst. Sil. de la Bohême, Vol. II, Texte III, p. 734, pl. CCXXXIV, figs. 2 and 3, 1847.
- ACTINOCERAS RICHARDSONI, *Foord*. Cat. Foss. Ceph., Brit. Mus., p. 172, 1888.
- ACTINOCERAS RICHARDSONI, *Whiteaves*. Trans. Royal Soc. Can., Vol. IX, sec. IV, p. 83, pl. IX, figs. 1, 2 and 2a, 1891.
- ACTINOCERAS RICHARDSONI MAGNUM, *Parks*. Bur. Mines of Ont., 22nd Rep., p. 191, 1913.

Stokes' original description of this species is as follows: "In this the tube is small; it is surrounded by numerous laminae or plates, filling up the siphuncle; but it is difficult to determine their nature. The external shell is slightly conical in form. From Lake Winnipeg, in yellowish-white limestone much resembling that from Igloolik."

Stokes' figures show a siphuncle of about 28 mm. in diameter for a shell diameter of 53 mm. The nummuloidal rings are evenly rounded and fill the whole space between the septa, which are 8.5 mm. apart. The figures also show an irregularity in the development of the rings.

Foord (*op. cit.*) gives the spacing of the septa as 8 mm. at a shell diameter of 75 mm. He emphasises the vertical calcareous lamellae and the strongly orad curvature of the septa.

Whiteaves (*op. cit.*) states that the relative size of shell and siphuncle varies, though the maximum diameter of the latter is usually more than half that of the former. The posterior segment shown in his figures measures 36 mm. in breadth by 9 mm. in height and the anterior segment is 47 mm. in width by 10 mm. in height: ten segments intervene between these two.

The present specimen consists of a fragment 150 mm. long and 120 mm. wide, showing parts of 16 septa and 17 nummuloidal siphuncular rings. The maximum diameter of the siphuncle is 55 mm. at a point where the shell is probably 120 mm. in diameter. While it is hazardous to state definitely the size of the shell in a broken specimen such as this, it would appear that the siphuncle is somewhat less than half the diameter of the shell. Whiteaves' figures show the siphuncle to be within 6 mm. of the shell at a siphuncle diameter of 49 mm. and a shell diameter of 83 mm. Our specimen shows a minimum distance of 15 mm. between the siphuncle and the shell at a siphuncle diameter of 55 mm. These figures are not contradictory if we consider that our fragment is more orad than that referred to by Whiteaves. The relation between the height and width of the siphuncular segments is somewhat variable, but averages about 8 to 53; in the type figure this ratio is 8.5 to 28, and in Whiteaves' example it is 9 to 26 posteriorly and 10 to 47 anteriorly. It is apparent from Whiteaves' figures that the segments are relatively wider orad. Between the type, Whiteaves' example and our specimen, there is a discrepancy in these figures which may in part be explained by the different positions of the specimens relatively to the whole shell. Nevertheless, this difference is one reason for making a new variety of our specimen.

The septa arch strongly forward, particularly on the siphonal side, and occur to the number of 16 in a distance of 130 mm. The siphuncular funnels are short and extend about 2 mm. apicad. The inner parts of

the septa and the funnels appear to be double in correspondence with the general character of *Actinoceras*.

The endosiphuncle tapers rapidly, showing a diameter of 35 mm. at the anterior end and 12 mm. at the posterior end: its surface is finely striated longitudinally and it is drawn out into ridges between the septa. Tubuli arise from or near these ridges and pass directly outward into the nummuloidal rings which they appear to penetrate. The rapid tapering of the endosiphuncle is a feature not described for *A. richardsoni*, and constitutes a second reason for establishing a variety. The nummuloidal rings are somewhat irregularly developed, but are fairly evenly rounded, filling the whole interseptal space, and with the septa in contact with their posterior aspect for a considerable distance outwards.

Calcareous deposits form concretionary layers around the septal necks. Similar material is deposited around the endosiphuncle with the result that, with the shrinking of the endosiphuncle posteriorly, the whole space between the endosiphuncle and the siphuncle is filled with dense calcareous tissue.

I regard this specimen as related to *A. richardsoni* for the following reasons: The average septal spacing, the calcareous investment of the endosiphuncle, the somewhat irregular development of the nummuloidal rings, the well marked endosiphuncle, the strongly arched septa, and the direct outward course of the tubuli.

A distinct variety is indicated by the following points: The relatively greater width of the siphuncular segments to their height, the relatively smaller siphuncle compared with the width of the shell, and the rapidly tapering endosiphuncle. This latter fact may, however, be due entirely to the fact that our specimen probably represents a portion of the shell just posterior to the living chamber.

Locality—Mouth of Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 309 S. Royal Ontario Museum of Palaeontology.

HURONIA SEPTATA, *sp. nov.*

Plate V, Figure 8.

Our collection contains one broken siphuncle presenting part of the exterior and a longitudinal section which unfortunately is not median.

The fragment is 112 mm. long and shows six segments, making the average height of the segment 18.66 mm. The outline of the ring is a sigmoidal curve with the broader part anterior. The greatest diameter of the anterior ring is 40 mm. and the least diameter 28 mm.

The interior of the siphuncle shows about 20 longitudinal plates, radiating from a central endosiphuncle, which, however, is inferred but not observed. This internal support for radiating tubuli is very different from that of other species, in which it seems to take the form of annular membranous or calcareous expansions.

The height of the segments and the nature of the outline are very like those of *Huronia turbinata*, Stokes (Trans. Geol. Soc., Ser. II, Vol. 1, Pt. II, explanation of Plate XXVIII, Fig. 3; and Page 20^o Species III of Bigsby), but our specimen is relatively much wider.

An example in the Royal Ontario Museum referred to *H. turbinata* measures as follows: Height of segment 19 mm., greatest width 30 mm.; least width 18 mm. It is to be concluded that our specimen is of the same general type as *H. turbinata* but that it is not co-specific. The general assemblage of fossils at the Lower rapids of the Shamattawa river indicates Ordovician rocks: if the present specimen was really obtained *in situ*, the range of the genus *Huronia* is considerably extended, for it has hitherto been reported only from the Niagara group of North America.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician?

No. 312 S. Royal Ontario Museum of Palaeontology.

CYCLOCERAS (?), *sp. indet.*

Plate II, Figure 7.

One fragment of a cast: 25 mm. long, 15 mm. in diameter at anterior end and 14 mm. at posterior end. Surface marked by oblique and sharp crested annulations about 3 mm. apart. Straight or slightly coiled. A vertical section shows no internal structures.

As the test is not preserved, even the generic position of this fragment is doubtful, but it would fall under *Cycloceras*, *Spyroceras* or other related annulated genera.

The specimen bears some resemblance to *Spyroceras meridionale*, Whiteaves,¹ from the Silurian of Stonewall, Manitoba. Our form differs in the less rapid taper and the more uniform distance apart of the annulations.

The specimen bears considerable resemblance to *Cyrtoceras nitidium*, Barrande, from Etage E of Bohemia,² but perhaps the most striking comparison may be made with *Orthoceras anellum*, Conrad,³ from the

¹ Geol. Sur. Can., Palaeoz. Foss, Vol. III, p. 281, pl. 30, fig. 9.

² Système Silurien de la Bohême, pl. 198, figs. 21-35.

³ Proc. Acad. Nat. Sci., Phil., 1843, p. 334; Pal. N.Y., Vol. 1, p. 202, pl. XLIII, fig. 6; Geol. Rept. Wisconsin, Vol. 1, p. 442, 1862; *Ibid.*, Vol. IV, p. 226, pl. VII, fig. 13, 1882.

Trenton limestone of Wisconsin. If our specimen were more perfect, its reference to this species might be justified. Assuming a slight deformation whereby the annulations have been rendered oblique, our form might be compared with *Orthoceras olorus baffinensis*, Schuchert, from the Trenton of Baffin Land.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horison—Ordovician.

No. 332 S. Royal Ontario Museum of Palaeontology.

MELOCERAS, *sp. indet.*

Plate II, Figure 5.

Two fragments of a rather rapidly tapering, laterally compressed cyrticone. The curvature is slight and the form is apparently exogastric. The fragments are about 60 mm. long and show a greater (dorso-ventral) diameter of 32 mm. at the anterior, and 23 mm. at the posterior end.

Nine camerae are shown with a gradually decreasing width towards the posterior. On the convex side the first camera has a width of 6 mm. and the ninth a width of 3.5 mm. The sutures arch strongly forward on the siphonal (convex) side.

The rather slight curvature and the lateral compression of the shell suggest the genus *Meloceras* as emended by Foord. *Oncoceras articum*, Schuchert, from the Trenton of Baffin Land, appears to be a related form, but I cannot regard our specimen as of that species.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horison—Ordovician.

No. 328 S. Royal Ontario Museum of Palaeontology.

POTERIOCERAS TYRRELLI, *Parks.*

Plate II, Figure 2.

POTERIOCERAS TYRRELLI, *Parks.* Bur. of Mines of Ont., 22nd Rep., pt. 1, p. 191, 1913.

The species is founded on two specimens from the lower rapids of the Shamattawa river and on a photograph taken by Mr. Tyrrell of a third specimen of which he was unable to obtain possession.

The best preserved specimen from which the accompanying drawing was chiefly made shows a cast of the chamber of habitation and of nine air chambers. The whole shell is sac-shaped with a slightly greater convexity of the siphonal or ventral side: the shell is therefore to be described as exogastric. The transverse section is ovate and slightly compressed on the ventral side. The maximum diameter is at the

second camera, from which point the shell contracts anteriorly, but presents a sharp outward reflexion with erenulation at the aperture. The measurements of this specimen are given in column 1 below: those of the second specimen appear in column 2.

	1	2
Dorso-ventral diameter at second septum..	48 mm.	56 mm.
Lateral diameter at second septum.....	37 mm.	44 mm.
Dorso-ventral diameter at ninth septum..	35 mm.	
Lateral diameter at ninth septum.....	30 mm.	
Length of body chamber.....	38 mm.	47 mm.
Dorso-ventral diameter of aperture.....	37 mm.	43 mm.
Lateral diameter of aperture.....	22 mm.	37 (? , broken)
Average spacing of septa.....	4.5 mm. ¹	6 mm.

As no shell is preserved, the character of the surface cannot be ascertained. The casts show a row of bead-like markings along the posterior margin of the chamber of habitation; this feature, however, is not uncommon in casts of other species of the genus.

The first two septa posterior to the chamber of habitation are more closely set than is indicated in the figures given above: this is particularly well marked in the larger of the two specimens. The remaining septa are fairly evenly spaced. The forward arching of the septa is very slight. The siphuncle is small and marginal in position.

Whiteaves describes three species of *Poterioceras* from the Galena-Trenton and Black River formations of Lake Winnipeg—"P. nobile", "P. apertum", and *P. gracile*: the first of these species is much larger than our specimens and contracts much more rapidly towards the aperture; the second species is a less elongate form. With almost the same dorso-ventral diameter as our smaller specimen the height of the body chamber is only 31 mm. and the shell tapers more rapidly posteriorly. *P. gracile* could not possibly be mistaken for the present form, as it is extremely elongate with a chamber of habitation 115 mm. long and only 35 mm. wide.

Named for the collector, J. B. Tyrrell, Esq., of Toronto, chief of the Hudson Bay Exploring Expedition of 1912.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horiz.—Ordovician.

No. 320 S. Royal Ontario Museum of Palaeontology.

¹ Through a printer's error or otherwise, this measurement is given as 3.5 mm. in the original preliminary description.

² Trans. Royal Soc., Can., Vol. VII, sect. IV, pp. 77 and 78, pl. XIV, figs. 204; pl. XV, fig. 1, 1889; *Ibid.*, Vol. IX, sect. IV, pp. 87-88, pl. XI, figs. 2 and 3; pl. XII, figs. 4 and 4a, 1891. Also Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. III, pp. 216-220.

DISCOCERAS (?) SHAMATTAWENSE, *sp. nov.*

Plate I, Figure 1.

TROCHOCERAS INSIGNE, Parks. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 192.

The specimen consists of a well preserved mould of part of the exterior showing portions of four volutions. The whorls appear to be wound in a plane and to come in contact with each other without an impressed zone. The volutions increase very gradually in width and are ornamented with bold costæ, most strongly developed on the inner side, passing almost directly outward and becoming fainter with an orad inflection near the outer margin of the whorl. The mould gives the impression that the venter was rather narrow. The outer volution is not quite complete, but is probably 22 mm. wide; the second volution has a width of 12 mm. and the third a width of 7 mm. The costæ on the outer whorl are 5.5 mm. apart on the median line; on the second whorl they are 4 mm. apart and on the third whorl 2 mm. apart.

Having no knowledge of the later stages of growth, of the aperture, or of the siphuncle it is impossible to give this form a definite generic position. The manner of coiling, however, strongly suggests the genus *Discoceras* to which the species is provisionally ascribed.

In the preliminary report, I identified this specimen with *Trochoceras insigne*, Whiteaves, but a closer examination has induced me to alter my opinion. The original description of *T. insigne* (Ottawa Naturalist, Vol. XII, p. 124) carries the statement that the whorls are "closely contiguous", but the figure in Plate XLI, Vol. III of Palaeozoic Fossils, shows a shell with a gyroceran mode of coiling, not presented by our species. The costæ in Whiteaves' species are more widely spaced and turn apicad on the exterior margin, whereas in our species they are inflected slightly orad.

The specimen bears some resemblance to *Lituites bickmoreanus*, Whitfield, but that species is more closely costated and the costæ are directed apicad as they approach the venter. Further, the whorls expand much more rapidly in *L. bickmoreanus*.

A stronger resemblance is presented by *Coniatites? solitarius*, Barrande, as figured on Plate 464, Système Silurien de la Bohême; in fact the only difference seems to be a slightly more direct course in the costæ of our species. Barrande's specimen was obtained from Etage G, g1, at Hlubocep, which is too high for our specimen.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 325 S. Royal Ontario Museum of Palaeontology.

ASCOCERAS BOREALE, *Parks.*

Plate II, Figures 8 and 9.

ASCOCERAS BOREALE, *Parks*, *Bur. of Mines of Ont.*, 22nd Rep., pt. 1, p. 192, 1913.

The species is represented in the collection by one fairly well preserved specimen, showing the general shape and the septal markings. The anterior prolongation or neck of the body chamber is broken off and the apex is slightly worn.

The general form is sub-ovate and rather acuminate towards the apex when viewed from the dorsal or ventral aspects. Viewed from the lateral aspect the pointed apex is not observed, the outline being almost elliptical if the anterior prolongation of the chamber of habitation be disregarded. The greatest width is in advance of the mid-length and is 34 mm. dorso-ventrally and 55 mm. laterally, indicating a shell with considerable dorso-ventral flattening. The length from the anterior sigmoidal saddle to the apex is 46 mm., to which probably 2 mm. more should be added on account of the abrasion of the apex.

A vertical section shows portions of two camerae, the anterior of which is 1.5 mm. and the posterior slightly less. Camerae further apicad are lost. The sigmoidal saddles are not preserved in the interior.

The suture of the coalesced septa crosses the venter as a slight lobe; it then turns dorsal and orad until the two sides are within 12 mm. of each other on the dorsal side. A sharp inflection ventral and orad then occurs, with the septa still coalesced for a distance of 17 mm. Beyond this point four distinct dorsal saddles are indicated, showing intervals on the dorsum of 7 mm., 6 mm., and 3 mm. respectively from posterior to anterior.

This species is of the general type of *Ascoceras bohemicum*, Barrande,¹ and it closely resembles *A. costulatum* described by Whiteaves from the Galena-Trenton of Black island, Lake Winnipeg.² Whiteaves' form is larger, however, and is more rounded at the apex. The sutures of the sigmoidal saddles also appear to have a different course, as Whiteaves' figure shows two sutures approximately parallel as viewed from the ventral side, whereas such an appearance would be impossible in our form.

Ascoceras canadense, Billings³ is a comparable type, but our form is much less ventricose dorso-ventrally and the sutures of the sigmoidal saddles are united much more forward. *A. anticostiense* and *A. newberryi* of Billings are not at all comparable.

¹ Systeme Silurian de la Boheme, pls. 93, 94 and 96.

² Geol. Sur. Can., Palaeoz. Foss., Vol. III, p. 215, pl. XXII, fig. 1.

³ Geol. Sur. Can., Rep. for 1853-56, p. 310; *Ibid.*, for 1863, p. 218 with figure.

Whiteaves (*op. cit.*) states: "*A. costulatum* would seem to be near est to *A. canadense*, Billings, the type of Hyatt's genus *Billingsites*, and hence may be referable to that genus". This remark would apply with equal force to *A. boreale*.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 326 S. Royal Ontario Museum of Palaeontology.

TRILOBITA.

BUMASTUS, sp. indet.

One specimen embedded in matrix showing the interior of the thorax and a small portion of the pygidium; also a specimen showing a cast of the pygidium with three thoracic rings attached. No portion of a buckler is preserved.

The thorax of the larger specimen is fully 45 mm. wide with ten rings 4 to 5 mm. in width. The axis is about 35 mm. wide, but the axial furrows are faintly shown and the pleura are broken off. The pygidium is rounded and smooth with no evidence of trilobation.

This specimen evidently belongs to the genus *Bumastus*, and it resembles in a general way *B. trenlonensis*, Emmons, which Ulrich considers to be identical with *Illanus milleri*, Billings. The present form is, however, much larger and is possibly distinct. In the preliminary report these specimens were referred to *Illanus americanus*, Billings: the axis is too broad and the axial furrows too ill defined to confirm this identification.

Locality—Lower rapids, Shamattawa river, Manitoba.

Horizon—Ordovician.

No. 424 S. Royal Ontario Museum of Palaeontology.

II

ORDOVICIAN SPECIES FROM THE DRIFT

The following species were collected from the superficial deposits chiefly from near the mouth of the Shamattawa river. Most of the specimens represent a fauna similar to that at the lower rapids, but one specimen seems to indicate a higher horizon comparable with the Cincinnati.

Cf. RAFINESQUINA ALTERNATA, Emmons sp.

STROPHOMENA ALTERNATA, Emmons, Geol. Sur., N.Y., Rep. 2nd Dist., p. 395, fig. 3, 1842.

One cast of the convex valve resembling this species, but impossible of certain identification.

Locality—Drift, mouth of the Nelson river, Manitoba.

Horison—Ordovician probably.

No. 406 S. Royal Ontario Museum of Palaeontology.

WHITELLA, sp. indet.

Plate IV, Figure 15.

One imperfect cast of the interior of a left valve. The shell is about 43 mm. long and possibly 28 to 30 mm. high, but the ventral margin is not preserved. In the drawing this margin has been restored in a dotted line. The beaks are very prominent and incurved. The umbonal ridges are well developed and there is a defined depression dorsal to the beak extending forward, possibly to the extreme anterior margin of the shell. All these characteristics are typical of *Whitella*, and I have little doubt that the specimen belongs in this genus: it is too imperfect to justify a specific description.

Locality—Mouth of Shamattawa river, Manitoba (Drift).

Horison—Ordovician.

No. 423 S. Royal Ontario Museum of Palaeontology.

ISOTELUS, sp. indet.

One fragment of a large species of *Isotelus*. The eight thoracic rings show a length of about 60 mm. Small portions of the buckler and of the pygidium are preserved, but all distinctive characteristics are obliterated. This specimen is probably referable to *I. gigas*, De Kay.

Locality—Drift at Limestone rapids, Severn river, District of Patricia.

Horison—Ordovician.

No. 425 S. Royal Ontario Museum of Palaeontology.

One fragment from a boulder at the mouth of the Shamattawa river consists of a fine grained, argillaceous limestone of light brownish colour. The substance of the included shells has entirely disappeared, but moulds are preserved of some organisms which have been so flattened that exact determination is impossible. The most abundant species is a large Gastropod, 30 to 35 mm. in diameter, referable with reasonable certainty to *Liospira*. Species probably belonging to *Cymatonola* or *Orthodesma* occur, and *Byssonychia* or a closely allied genus is represented by one impression. The specimen also shows the impression of a *Cyrtoceras*. These fossils indicate a Cincinnatiian rather than a Mohawkian horizon. (No. 950 H.R. Royal Ontario Museum of Palaeontology.)

III

SILURIAN SPECIES

The greater number of the following species was obtained at the Limestone rapids of the Severn river, the Limestone rapids of the Fawn river or the Assina rapids of the Severn river. The fauna indicates a horizon comparable with the Guelph and shows many species common to the region of the Attawapiskat and Ekwan rivers.

ACTINOZOA

AMPLEXUS SEVERNENSIS, *Parks* sp.

Plate III, Figure 12.

TYRRELLIA SEVERNENSIS, *Parks*. Bur. Mines of Ont., 22nd Rep., p. 193, 1913.

This very beautiful and well preserved little coral is represented by three specimens in a single piece of stone from Limestone rapids on the Severn river.

The corallites are single, circular, gently expanding to a known length of 18 mm. and a width of 6 mm. Surface and calyx unknown.

The tabulæ are complete, flat or slightly arched in the centre, but turned down abruptly between the septa near the periphery. The spacing of the tabulæ is fairly regular, with an average distance apart of .5 mm. In some cases they are a little more closely set.

The septa number about 50 at the maximum diameter. The primaries reach the full length of the corallite near the periphery, but they are interrupted on the under sides of the tabulæ towards the centre and consequently appear as vertical plates on the upper sides of the tabulæ and do not extend to the tabula next above save at the periphery of the corallite. In the younger stages the septa are relatively much longer than in the later life of the coral. Near the apex they are in contact with each other on the upper centres of the tabulæ, and extend on the under surface of the tabula next above for about two-thirds of the diameter, thus leaving a V-shaped opening between the inner ends of the opposite septa. Near the top of the corallum, the septa are relatively very much shorter and apparently fail to extend, even on the upper surface of the tabulæ, more than a third of the way to the centre. The secondary septa are very short and appear only as longitudinal ridges between the primaries. No other endothecal structures are present.

The development of the septa in this species suggests an intermediate position between *Zaphrentis* and *Amplexus*: on this account I decided in the preliminary report to erect a new genus, *Tyrellia*, for its reception. Further consideration, however, has induced me to place the form under *Amplexus*. According to the definition of the two genera given by Milne-Edwards and Haime, our specimen is a *Zaphrentis* when young and an *Amplexus* when old, because in the younger stages the septa meet at the centre of the tabulae and in older stages they "do not extend to the centre of the visceral chamber and leave the upper surface of the tabulae naked and smooth in that part". It was on this account that I proposed to create a new genus. Lambe, however, defines *Amplexus* as differing from *Zaphrentis* "only in the feeble development of the septa". There is no difficulty in placing the form under *Amplexus* in view of this more generalized definition. I am also inclined to this decision by a comparison of our form with the figure of *Amplexus coralloides*, Sowerby, which appears in Plate XXXVI of Milne-Edwards and Haime's monograph of the British Fossil Corals.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 300 S. Royal Ontario Museum of Palaeontology.

Cf. CYSTIPHYLLUM NIAGARENSE, Hall sp.

CONOPHYLLUM NIAGARENSE, *Hall*, Pal., N.Y., Vol. II, p. 114, pl. 32, figs. 4a-n, 1852.

CYSTIPHYLLUM HURONENSE, *Billings*, Cat. Sil. Foss., Anticosti, p. 92, 1866.

CYSTIPHYLLUM NIAGARENSE, *Rominger*, Geol. Sur. Mich., Foss. Corals, p. 137, pl. XLIX, fig. 3, 1876.

CYSTIPHYLLUM NIAGARENSE, *Sherzer*, Bull. Geol. Soc. Am., Vol. III, p. 266, 1892.

CYSTIPHYLLUM NIAGARENSE, *Lambe*, Ottawa Nat., Vol. XII, p. 224, 1899.

CYSTIPHYLLUM NIAGARENSE, *Lambe*, Geol. Sur. Can., Cont. to Can. Palaeon., Vol. IV, pt. II, p. 190, pl. XVI, fig. 7, 1900.

The collection contains one small fragment showing the endothecal tissue and part of the calyx of a form evidently referable to *Cystiphyllum*. The calyx appears to have been fairly deep, and it shows traces of septa on the blisterly surface. General shape and size of the corallum not determinable. Very doubtfully referred to *C. niagarense* on account of the depth of the calyx.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 340 S. Royal Ontario Museum of Palaeontology.

HALYSITES CATENULARIA, *Linnaeus*.

Plate V, Figure 6.

- TUBIPORA CATENULARIA, *Linnaeus*, Syst. Nat., ed. 12, p. 1270, 1767.
 HALYSITES CATENULARIA, *Milne-Edwards and Haime*, British Fossil Corals, p. 270,
 pl. LXIV, figs. 1, 1a, 1b, 1c, 1850. (See this work extended
 synonymy.)
 HALYSITES CATENULARIA, *Lambe*, Geol. Sur. Can., Cont. to Can. Palaeon., Vol. IV,
 pt. 1, p. 68, pl. III, figs. 1, 1a, 1b, 2, 2a, 3, 3a, 1899.
 HALYSITES CATENULATUS, *Parks*, Bur. Mines of Ont., 22nd Rep., pt. 1, p. 196, 1913.

This rather common Silurian coral is represented by two specimens from the Limestone rapids of the Severn and Fawn rivers. It is possible that a variety might be founded on the specimen from the Severn river, as it possesses remarkably wide connecting tubes between the corallites proper: these smaller tubes are filled with numerous, arched, overlapping, closely set, delicate tabulæ. The variety resembles *H. catenularia nitida*, *Lambe* (*op. cit.*) but it differs in the great irregularity of the tabulæ in the small tubes.

Locality—Limestone rapids, Severn river; Limestone rapids, Fawn river, District of Patricia, Ontario.

Horizon—Silurian.

Nos. 337 and 338 S. Royal Ontario Museum of Palaeontology.

PYCNOSTYLUS, *Whiteaves*.

- PYCNOSTYLUS, *Whiteaves*, Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. 1, p. 2, 1884.

Dr. Whiteaves' original description of this genus is as follows: "Internal structure very similar to that of *Amplexus*, the radiating septa being rudimentary and extending but a short distance from the inner surface of the outer wall, but the tabulæ, though well developed and complete, are entirely horizontal, and neither bend upwards at the periphery nor embrace each other with their reflexed margins. Corallum compound, consisting apparently of an aggregation of numerous, slender, cylindrical or sub-cylindrical polyp stems, which divide by calicular gemmation at distant intervals into sets of three, four or more ascending, sub-parallel, contiguous, flexuous branches. Structure of the calices previous to gemmation, and character of the basal portion of the corallum unknown".

Whiteaves describes two species, *P. guelphensis* and *P. elegans*: in the former the corallites are from 3 to 7 mm. in diameter and the epitheca is marked by transverse constrictions but is without longitudinal septal furrows. In the latter species the corallites are from 13 to 17 mm. in diameter and the outer surface is regularly and longitudinally ribbed.

The following statement is significant: "It is possible that the specimens for which the above name (*P. elegans*) is provisionally suggested may prove to be portions of the basal extremity of *P. guelphensis* denuded of their epitheca, but at present no intermediate examples between the two forms have been collected".

Our collection contains twelve specimens in an indifferent state of preservation, none of which show any features other than those of the ordinary portions of the corallites, *i.e.*, there is no evidence of the bifurcations, point of attachment or calyx. The average size of the corallites varies greatly, but they may be arranged in five groups as follows:

Diameter of corallites, average	5 mm.—Two specimens.
" " " "	7 mm.—One specimen.
" " " "	9 mm.—Two specimens.
" " " "	16 mm.—Five specimens.
" " " "	25 mm.—Two specimens.

In all the specimens the actual substance of the corallite—epitheca, septa, and tabulæ seems to be of extreme tenuity, and the preservation in each case is due to secondary deposits of calcite. Specific differentiation on the basis of mere size is very hazardous, and lacking epithecal characteristics we are deprived of the second means of identification. On the whole, however, it seems advisable, provisionally at least, to ascribe the 5 and 7 mm. types to *P. guelphensis*; the 9 and 16 mm. types to *P. elegans*, and to make a new species for the 25 mm. type.

PYCNOSTYLUS GUELPHENSIS, *Whiteaves*.

AMPLEXUS LAXATUS, *Billings*. Geol. Sur. Can., Rep. 1863, pp. 340 and 342, 1863.

AMPLEXUS? SP., *Nicholson*. Palaeontology of Ontario, p. 66, 1875.

PYCNOSTYLUS GUELPHENSIS, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. 1, p. 3, pl. 1, figs. 1, 1a and 1b, 1884.

PYCNOSTYLUS GUELPHENSIS, *Whiteaves*. *Ibid.*, pt. 11, p. 49, 1895.

PYCNOSTYLUS GUELPHENSIS, *Lambe*. Geol. Sur. Can. Cont. to Can. Pal., Vol. IV, pt. 2, p. 132, pl. X, figs. 4 and 4a, 1900.

PYCNOSTYLUS GUELPHENSIS, *Parks*. Bur. Mines of Ont., 22nd Rep., p. 193, 1913.

Three specimens containing in all about 40 corallites which vary in diameter from less than 5 to slightly more than 7 mm. The tabulæ are rather more widely spaced than in the type, for our specimens seldom show more than 4 tabulæ in a centimetre, whereas *Whiteaves* recognizes from 5 to 9 in his types. The absence of longitudinal ribs on the exterior, a characteristic of *P. guelphensis*, is clearly indicated by at least one of the corallites.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 301 S. Royal Ontario Museum of Palaeontology.

PYCNOSTYLUS ELEGANS, *Whiteaves*.

Plate I, Figure 3.

PYCNOSTYLUS ELEGANS, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. I, p. 4, pl. 1, figs. 2, 2a, 1884.

PYCNOSTYLUS ELEGANS, *Whiteaves*. *Ibid.*, pt. II, p. 49, 1895.

PYCNOSTYLUS ELEGANS, *Lambe*. Geol. Sur. Can., Cont. to Can. Pal., Vol. IV, pt. II, p. 133, 1900.

PYCNOSTYLUS ELEGANS, *Lambe*. *Cruise of the Neptune*, p. 326, 1906.

PYCNOSTYLUS ELEGANS, *Parks*. Bur. Mines of Ont., 22nd Rep., p. 193, 1913.

The specimens ascribed to this species vary from 9 mm. to more than 16 mm. in diameter. Most of the specimens are embedded in matrix and show only the internal characters. One specimen, probably decorticated, shows longitudinal ribbing and transverse striations. Another small specimen has the epitheca excellently preserved: its structure tends to confirm the identification and to strengthen *Whiteaves*' conclusions as to the specific difference of *P. elegans*. This epitheca (Pl. I, Fig. 3) shows delicate and fairly even transverse ridges, which are more crowded in some parts than in others. Vertical ridges or ribs are also well marked, and correspond in position with the very short septa. In the finer specimens (9 mm. diam.) the tabulæ are about 3 mm. apart, for the most part flat, but slightly arched in places. This smaller form might, with equal reason, be ascribed to *P. guelphensis*. The larger specimens show much variation in the spacing of the tabulæ: generally they are from 3 to 4 mm. apart, but in one instance an interval as great as 14 mm. separates them. In view of the extreme delicacy of the original tabulæ, and the consequent opportunities for destruction, too much reliance must not be placed on this feature. In this specimen also, the tabulæ are arched and slightly crenulated at the margins. There is also some indication of two orders of septa, which is a feature not admitted by *Whiteaves* in his description of the type.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 302 S. Royal Ontario Museum of Palaeontology.

PYCNOSTYLUS MAXIMUS, *sp. nov.*

Plate I, Figure 2.

This species is represented by two small fragments only, but they are sufficiently different from the known species to justify their reference to a new type.

The corallites attained a diameter of at least 25 mm. and probably exceeded that size in some cases. Although the specimens are very

short, there is evidence of a more rapid tapering than is shown by the other species. The septa, epitheca and tabulæ are all extremely delicate. Whether these structures were strengthened during the life of the organisms by deposits of stereoplasma, or whether the present condition of the specimens is due entirely to subsequent deposition of calcite, I cannot with certainty assert, but I am strongly inclined to the latter view.

The decorticated exterior (Pl. I, Fig. 2) shows vertical furrows 3.5 mm. apart at a diameter of 25 mm. In the second fragment, which evidently belongs to a larger specimen, these depressions are fully 4 mm. apart. Between these major furrows, is another scarcely less pronounced. A third order of furrows, somewhat less distinct, occurs between those of the first and second orders. Delicate transverse growth lines are also to be seen.

The major set of furrows corresponds in position with the primary septa, which in the larger specimen extend inwards 3 or 4 mm. At a diameter of 25 mm. about 22 primary septa occur. The secondary furrows probably represent the position of secondary septa, but only the slightest indication of these can be seen. The third order of furrows probably represents a third order of septa, but no evidence of their extension inwards is to be observed.

The tabulæ are complete, horizontal, and about 8 mm. apart. In the centre they are quite flat, but at the periphery they are sharply inflected downwards between the primary septa: this gives the line of junction between the tabulæ and the epitheca a crenulated appearance. The secondary septa produce an extremely slight upward inflection of this downward fold but the tertiary septa, if present, have no effect on the crenulation. Viewed from above, a tabula shows ridges marking the position of the primary septa and extending inwards a distance of 7 mm.

There can be no doubt that this form is close to the genus *Amplexus*: the downward inflection of the tabulæ and the continuation of the septa as ridges on the upper side of the tabulæ point strongly to that genus. On the other hand the general resemblance to *Pycnostylus elegans* is pronounced, especially in view of the fact that some crenulation of the margins of the tabulæ was observed in certain examples of that species (See page 40). If absolutely no crenulation of the tabular margins is permissible in *Pycnostylus* then the present form must be transferred to *Amplexus*.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 303 S. Royal Ontario Museum of Palaeontology.

FAVOSITES HISINGERI, *Milne-Edwards and Haime*.

FAVOSITES HISINGERI, *Milne-Edwards and Haime*. Polyp. Foss. des Terr. Palæoz., p. 240, pl. XVII, figs. 2, 2a and 2b, 1851.

FAVOSITES HISINGERI, *Lambe*. Geol. Sur. Can., Cont. to Can. Pal., Vol. IV, pt. 1, p. 6, 1899. (For extended synonymy see this work.)

FAVOSITES HISINGERI, *Parks*. Bur. Mines of Ont., 22nd Rep., p. 182, 1913.

One broken specimen indicating a hemispheric corallum about 70 mm. in diameter. The corallites are about 1.5 mm. in diameter. The mural pores are relatively large and are arranged in one or two rows on the sides of the corallites. The tabulæ are flat and vary from 2 to 3 or even 4 in one row. The long spiniform septa, characteristic of the species, are not as well shown as the other features, but in certain parts of the corallum they are distinctly discernible. Other similar specimens.

Locality—Limestone rapids and Assina rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

Nos. 304 S. and 343 S. Royal Ontario Museum of Palæontology.

Cf. FAVOSITES GOTHLANDICA, *Lamarck*.

FAVOSITES GOTHLANDICA, *Lamarck*. Hist. des An. sans Vert., Vol. II, p. 206, 1816.

FAVOSITES GOTHLANDICA, *Lambe*. Geol. Sur. Can., Cont. to Can. Pal., Vol. IV, pt. 1, p. 3, pl. I, fig. 1, 1899. (See this work for extended synonymy.)

Two specimens from different localities are provisionally ascribed to this species, but specific determination of Favositoid corals demands much better material than that in hand.

One specimen from the Limestone rapids, Severn river, is evidently part of a large corallum. The corallites are extremely variable in size, closely appressed, polygonal, reaching a diameter of over five mm. The tabulæ are flat or slightly wavy and closely set; they average somewhat more than a millimetre in spacing. No septa, septal spines, or mural pores are to be seen. Without these latter features, specific differentiation is of course impossible, but as *F. gothlandica* has been reported from the region it is a reasonable assumption that our form belongs to that species, although the tabulæ are more closely set than is usual in specimens with corallites of the present size.

The second specimen is from the Limestone rapids of the Fawn river: it shows corallites of about 3 mm. maximum diameter. The tabulæ are regularly arranged at a distance of 1 mm. from each other.

No septa, septal spines or pores are observable, even on polished surfaces.

Locality—Limestone rapids, Severn river; Limestone rapids, Fawn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 306 S. (Severn river), No. 307 S. (Fawn river) Royal Ontario Museum of Palaeontology.

PETRAIA (?), *sp. indet.*

A single badly crushed specimen presenting the following features: Corallum, straight, conical, 45 mm. long; width at top 27 by 14 mm., representing a probable diameter of about 20 mm. External surface shows transverse growth lines and well marked septal furrows. Septa probably about 65 in number.

A vertical section shows nothing but crushed and broken septa which suggests the genus *Petraia*. Although the specimen is greatly flattened the preservation is sufficiently good to justify the conclusion that other internal structures are absent. This conclusion is strengthened by the fact that the outer wall is little broken, although the specimen is crushed flat; this would indicate a lack of supporting structures in the interior.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 298 S. Royal Ontario Museum of Palaeontology.

STREPTELASMA *cf.* ROBUSTUM, *Whiteaves*.

STREPTELASMA CORNICULUM (?) *Hall*. Large and robust variety. *Whiteaves*, Geol. Sur. Can., Rep. Prog. for 1879-80, p. 57c. 1881.

STREPTELASMA ROBUSTUM, *Whiteaves* Can. Rec. Sci., Vol. VI, p. 391, 1896.

STREPTELASMA ROBUSTUM, *Whiteaves*. Pal. Foss., Vol. III, pt. III, p. 153, pl. XVIIII, figs. 1, 1a, 1897.

STREPTELASMA ROBUSTUM, *Lambe*. Geol. Sur. Can., Cont. Can. Pal., Vol. IV, pt. II, p. 109, 1900.

The specimen is very imperfect, but it indicates a *Streptelasma* of considerable size. The fragment is about 80 mm. long; it shows a strong curvature and a rapid expansion in diameter. At the top the diameter of the corallum is about 40 mm. The exterior is not shown, and the calyx is entirely broken away. A cross section shows about 70 primary septa, which reach close, if not quite to the centre. Secondary septa are absent or very slightly developed. Very numerous, close-set and inwardly arched dissepiments are seen in the interseptal loculi. A vertical section shows the strong development of dissepiments, which

are about .5 to 1 mm. apart. On the concave side of the corallum they turn upwards in a sigmoidal curve, at first convex upwardly and later concave. These elements seem to form a central spongy zone with the inner edges of the septa. On the convex side of the corallum the course of the dissepiments is shorter, but owing to mineralisation the structure is not well revealed.

The form is evidently a large species of *Streptelasma*, but its specific determination is impossible on account of the fragmentary nature of the specimen: it much resembles the figure given by Whiteaves for *S. robustum* on Plate XVII, Vol. III, Palaeozoic Fossils, but the absence of secondary septa makes the transverse section very different from that figured by Lambe for *S. robustum* on Plate VII, Vol. IV, Cont. to Can. Pal.

Streptelasma robustum is an Ordovician species, whereas the associations of the present example are Silurian. It is unlikely that we are dealing with a strictly co-specific type, but the condition of the specimen does not justify more than a comparison.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 289 S. Royal Ontario Museum of Palaeontology.

Cf. ZAPHRENTIS STOKESI, Milne-Edwards and Haime.

- ZAPHRENTIS STOKESI, *Milne-Edwards and Haime*. Polyp. Foss. des Terr. Palaeoz., p. 330, pl. 3, fig. 9, 1851.
 ?CANINIA BILATERALIS, *Hall*. Pal. N.Y., Vol. II, p. 41, pl. 17, fig. 3, and p. 113, pl. 32, fig. 3, 1852.
 ?POLYDILASMA TURBINATUM, *Hall*. Ibid. p. 112, pl. 32, fig. 2, 1852.
 ZAPHRENTIS STOKESI, *Billings*. Cat. Sil. Foss. Anticosti, p. 34, 1866.
 ZAPHRENTIS STOKESI, *Nicholson*. Pal. of Ont., pp. 43 and 58, 1875.
 ZAPHRENTIS STOKESI, *Rominger*. Geol. Sur. Mich., Foss. Corals, p. 144, pl. LI, three figures in lower row, 1876.
 ZAPHRENTIS STOKESI, *Lambe*. Geol. Sur. Can., Cont. Can. Pal., Vol. IV, pt. 21, p. 120, pl. IX, figs. 1, 1a and 2, 1900.

It is with considerable doubt that the specimens in hand are referred to this species: some of them are badly broken, while others, apparently in good condition, are so filled with secondary thickenings that the nature of the internal structures is not clearly revealed.

All the specimens show an intermediate stage between the typical structure of *Streptelasma* and that of *Zaphrentis*. The central reticulate area of *Streptelasma* is not seen, but on the other hand the continuous tabulæ of *Zaphrentis* are but ill defined.

One small and fairly well preserved specimen presents the following features: Corallum turbinate, 35 mm. long in a straight line; maxi-

mum diameter 22 mm.; tetrameral symmetry clearly shown in the scatal furrows on the exterior; at a diameter of 16 mm. there are about 45 primary septa showing well marked tetrameral symmetry and presenting very nearly the appearance of Plate IX, Figure 2 of Lambe's work. The long primary septa reach the middle, and although much thickened appear to be somewhat twisted together. The secondary septa are very poorly developed and can scarcely be observed in the stereoplasma connecting the peripheral ends of the primaries. The vertical section, owing to secondary thickening, is very poor and only faintly reveals the presence of irregular tabulæ.

Another specimen is somewhat larger than the above, and shows the same pronounced tetrameral structure. The inner ends of the septa are much curved, particularly the shorter ones, which seem in some cases to unite. Towards the periphery of the corallite, the interseptal elements more resemble upwardly directed dissepiments, but towards the centre of the coral they cannot be described as other than tabulæ, although they are very curved and incomplete.

None of the specimens afford any evidence of the character of the calyx. It is apparent that the form only distantly resembles *Z. stokesi*: the secondary septa are too short and the tabulæ are too badly defined; nevertheless I am of the opinion that our specimens approach more closely to this species than to any other described form: it seems advisable, in the absence of better material, to ascribe the specimens provisionally to *Z. stokesi*.

Locality—Assina rapids and vicinity, Severn river, District of Patricia, Ont.

Horizon—Silurian.

Nos. 292 and 293 S. Royal Ontario Museum of Palæontology.

INCERTÆ SEDIS

A fragment of limestone contains several broken corallites of the general aspect of *Pycnostylus* or *Amplexus*. The apparent internal diameter of the tubes is about 2 mm., while the external diameter varies up to 7 mm. This outer annulus consists of solid carbonate of lime quite structureless: it is impossible to say whether it is part of the corallite or whether it represents secondary calcite deposition. The tube is crossed by distinct, flat, tabulæ at intervals of 1.5 mm. Some of the corallites show short but distinct septa, while others are without these structures.

If we assume that the thick outer wall is due to secondary deposition the form may be ascribed to *Pycnostylus*, but to a species considerably finer in structure than *P. guelphensis*. It is possible that the

thick outer annulus represents a zone of vesicular tissue in which the structure has been destroyed by mineralisation: in this case, the habit of growth would suggest *Diphyphyllum*. The size of the corallites suggests *Aphylostylus gracilis*, Whiteaves,¹ but it is difficult to ascribe it to that species in the absence of the characteristic spines. It is quite possible, however, that in certain of the corallites these spines have been destroyed and that in one instance they have been so united by depositions of calcite as to resemble continuous septa.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 305 S. Royal Ontario Museum of Palaeontology.

One fragment of limestone from the Limestone rapids of the Severn river contains the casts and moulds of an unusual type of coral, possibly referable to *Pycnostylus*.

The largest example is 25 mm. long, circular in cross section and about 20 mm. in diameter at the anterior end. For about 17 mm. there is little diminution in diameter, but below that point the decrease in diameter is greater and there is some evidence of curving.

The only structures actually preserved are an exceedingly delicate epitheca, very short and delicate septa and possibly a few tabulæ at the posterior end of the specimen.

The epitheca is of extreme tenuity, marked vertically by septal furrows which are but little more than a millimetre apart, and raised into rows of blunt protuberances in the interseptal tracts. The external appearance is therefore very different from that of any coral with which I am familiar. A small portion magnified five times is shown in Plate I, Figure 4.

The septa are so delicate and short that their extension inward cannot be observed.

Towards the base of the specimen there is evidence of complete, upwardly arched, irregularly developed tabulæ. No other endothecal structures are to be seen. Unless more anterior tabulæ have been destroyed, the form must have possessed a calyx of extraordinary depth.

I have little doubt that these specimens represent a Rugose coral which should be ascribed to a new genus: the material, however, is much too imperfect to justify the erection of a genus at present.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 339 S. Royal Ontario Museum of Palaeontology.

¹ Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 278, pl. XXIV, figs. 1 and 1a, 1906.

STROMATOPOROIDEA

STROMATOPORA CONSTELLATA, Hall.

STROMATOPORA CONSTELLATA, Hall. Pal. N. York, Vol. II, p. 324, pl. LXXII, figs. 2a and b, 1851.

STROMATOPORA CONCENTRICA, Hall. Pal., N. York, Vol. II, pl. LXXIII, figs. 2, 2a and 2b, 1851.

COENOSTOMA CONSTELLATUM, Spencer. Bull. Univ. State of Miss. Vol. I, no. 1, p. 48, pl. VI, fig. 11, 1882.

STROMATOPORA CONSTELLATA, Whiteates. Can. Rec. Sci., Vol. VII, p. 137, 1896.

STROMATOPORA HUDSONICA, Dawson. Quart. Jour. Geol. Soc., Vol. XXXV, p. 52, pl. IV, figs. 9a and 9b; pl. V, fig. 10, 1879.

STROMATOPORA HUDSONICA, Nicholson. Mon. Brit. Strom., Pal. Soc., p. 172, 1891.

STROMATOPORA HUDSONICA, Nicholson. Ann. and Mag. Nat. Hist., p. 312, pl. VIII, figs. 1-3, 1891.

STROMATOPORA CONSTELLATA, Parks. Ottawa Nat., Vol. XXII, p. 28, 1908.

STROMATOPORA CONSTELLATA, Parks. Univ. of Toronto Studies, Geol. Ser., No. 5, p. 44, pl. XIII, figs. 7, 8 and 9, 1908.

Several specimens indifferently preserved, but one of which shows the astrophizae in an excellent manner.¹ Some of these examples were erroneously referred to *Actinostroma tenuifilatum* in the preliminary report.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 410 S. Royal Ontario Museum of Palaeontology.

CLATHRODICTYON CYSTOSUM, Rominger sp.

STROMATOPORA VESICULOSA, Rominger. Proc. Acad. Nat. Sci. Phil., p. 50, 1886.

STROMATOPORA CYSTOSA, Rominger. MSS. United States National Museum labels.

CLATHRODICTYON CYSTOSUM Parks. Univ. of Toronto Studies, Geol. Series, No. 5, p. 21, pl. VII, figs. 2, 3 and 4; pl. VIII, figs. 6 and 8, 1908.

CLATHRODICTYON CYSTOSUM, Parks. Univ. of Toronto Studies, Geol. Series, No. 6, p. 29, 1909.

This species is represented by a fragment from a large cœnosteum in which the structure is very well preserved. Sections indicate a close resemblance to the type of *C. cystosum*, but they also show some points of difference. The chief variation is seen in the vertical arrangement of the cysts in some parts of the cœnosteum whereby the vertical elements appear more pronounced than the horizontal; this effect is

¹ In the works above mentioned I have recorded the occurrence of the following species of Stromatoporoids in the Silurian of the Hudson Bay region: *Clathrodiction vesiculosum*, *C. drummondense*, *C. fastigiatum*, *C. cystosum*, *C. cystosum lineatum*, *C. cystosum cylindricum*, *C. striatellum*, *C. vesiculosum minutum*, *Actinostroma tenuifilatum*, *A. tenuifilatum inæctum*, *A. franklinense*, *A. tenuifilatum cylindricum*, *Stromatopora constellata*, *S. wilsoni*, *S. carteri*, *S. amii*, *S. indianensis*, *Actinodiction neptuni*, *A. keelei*, and *A. lowi*.

well seen on weathered surfaces. It is quite possible that this variation is of specific value, but having examined numerous examples of the species, I am of the opinion that too much attention to variation would result in the creation of a species for almost every specimen.

Locality—Assina rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 409 S. Royal Ontario Museum of Palaeontology.

BRYOZOA

FENESTELLA SUBARCTICA, *Whiteaves*.

FENESTELLA SUBARCTICA, *Whiteaves*. Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F, p. 39, 1904.

FENESTELLA SUBARCTICA, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 249, pl. 23, 1906.

FENESTELLA SUBARCTICA, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 192, 1913.

One small specimen showing the reverse side.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 418 S. Royal Ontario Museum of Palaeontology.

BRACHIOPODA

PLECTAMBONITES TRANSVERSALIS, *Wahlenberg* sp.

ANONITES TRANSVERSALIS, *Wahlenberg*. Act. Soc. Upsaliensis, Vol. III, p. 64, n. 4, 1821.

LEPTAENA TRANSVERSALIS, *Dalman*. Vet. Acad. Handl., p. 109, pl. I, fig. 4, 1828.

LEPTAENA TRANSVERSALIS, *Hisinger*. Pet. Suecica, p. 69, pl. 20, fig. 5, 1837.

LEPTAENA TRANSVERSALIS, *Murchison*. Sil. Syst., p. 629, pl. 13, fig. 2, 1839.

STROPHOMENA TRANSVERSALIS, *Hall*. Geol. Rep., N. York, p. 105, fig. 4, 1843.

LEPTAENA TRANSVERSALIS, *Hall*. Pal., N. York, Vol. II, p. 256, pl. LIII, figs. 5a-1, 1851.

PLECTAMBONITES TRANSVERSALIS, *Hall and Clarke*. Pal., N. York, Vol. VIII, pt. 1, p. 298, pl. XV, figs. 34-36, 1892.

One cast with a part of the shell adhering. The dorsal valve is very convex and the ventral valve deeply concave. The cardinal angles are broken off. The shell shows numerous distinct striae, with very delicate intermediate striae. Although the specimen is very imperfect the identification is made with some assurance.

Locality—Limestone rapids, Fawn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 407 S. Royal Ontario Museum of Palaeontology.

ATRYPA, *sp. indet.*

Two decorticated ventral valves presenting the general shape of *Atrypa*. The ornamentation consists of very fine radiating striae only.

Locality—Limestone rapids, Fawn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 408 S. Royal Ontario Museum of Palaeontology.

STROPHODONTA, sp. indet.

Plate IV, Figure 17.

One imperfect pedicle valve. About 25 mm. wide and 17 mm. high. Moderately convex. Cardinal line extended beyond the general width of the shell. Surface marked with very fine striae and an occasional stronger one.

Locality—Limestone rapids, Fawn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 413 S. Royal Ontario Museum of Palaeontology.

STROPHODONTA, sp. indet.

Plate IV, Figure 18.

One imperfect pedicle valve. Cardinal angles broken, but the shell was probably 35 mm. wide and 22 to 25 mm. high. Valve strongly convex. Surface lost, but indications remain of fairly coarse striae—much coarser than in the species described above. This form is possibly *Strophomena donnetii* mentioned by Salter as occurring on Griffith's island. (Journal of a Voyage, etc., App. p. cxxiv, pl. 5, figs. 11 and 12.)

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 414 S. Royal Ontario Museum of Palaeontology.

GLASSIA VARIABILIS, *Whiteaves*.

GLASSIA VARIABILIS, *Whiteaves*. Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F, p. 42, 1904.

GLASSIA VARIABILIS, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, 273 and 277, pl. 26, figs. 3, 4, 5, 7, 8, 9, 1906.

GLASSIA VARIABILIS, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. I, p. 192, 1913.

This species appears to be abundant, and is represented by thirteen specimens resembling the types of the species rather than the variety figured by *Whiteaves* in figures 7, 8 and 9 *op. cit.*

Locality—Above Limestone rapids, Severn river, District of Patricia.

Horizon—Silurian.

No. 385 S. Royal Ontario Museum of Palaeontology.

CAMAROTOECHIA EKWANENSIS, *Whiteaves*.

CAMAROTOECHIA EKWANENSIS, *Whiteaves*. Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F, p. 42, 1904.

CAMAROTOECHIA EKWANENSIS, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 252, pl. 25, figs. 4, 4a and 4b, 1906.

CAMAROTOECHIA EKWANENSIS, *Parks*. Bur. Mines of Ont., 2nd Rep., pt. I, p. 192, 1913.

One specimen is an internal cast, somewhat less gibbous but otherwise resembling Whiteaves' species.

Locality—Limestone rapids, Severn river, District of Patricia.

Horizon—Silurian.

No. 386 S. Royal Ontario Museum of Palaeontology.

GLASSIA VARIABILIS, *Whiteaves*, var.

Plate III, Figure 11.

One pedicle valve and one cast of the same. The specimen closely resembles the variety of *G. variabilis* described by Whiteaves from the Ekwana river in Volume III of Palaeozoic Fossils, page 252, Plate 26, Figures 6, 6a and 6b. Our specimen is larger and somewhat more elongate. Lacking any knowledge of the interior, I was at first inclined to ascribe the species to *Barrandella*, as it is distinctly more elongate, much more ventricose, and with a more prominent beak on the pedicle valve than the type of *Glassia variabilis*.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 400 S. Royal Ontario Museum of Palaeontology.

TRIMERELLA EKWANENSIS, *Whiteaves*.

TRIMERELLA EKWANENSIS, *Whiteaves*. Ottawa Naturalist, Vol. XVI, p. 141, pl. 2, figs. 1 and 2; pl. 3, fig. 1, 1902.

TRIMERELLA EKWANENSIS, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 249, pl. 24, fig. 7; pl. 25, figs. 1 and 2, 1906.

TRIMERELLA EKWANENSIS, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 192, 1913.

A single broken specimen of an internal cast, which, coming from this locality, may reasonably be referred to Whiteaves' species, although the definite specific characteristics can scarcely be made out.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 387 S. Royal Ontario Museum of Palaeontology.

RHYNCHOSPIRA LOWI, *Whiteaves*.

RHYNCHOSPIRA LOWI, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 277, pl. 25, figs. 8 and 9, 1906.

One mould of the pedicle valve with part of the decorticated shell adhering. Apparently belongs to this species.

Locality—Limestone rapids, Fawn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 388 S. Royal Ontario Museum of Palaeontology.

A more imperfect fragment of the brachial valve from the Limestone rapids of the Severn river is provisionally placed here.

No. 389 S. Royal Ontario Museum of Palaeontology.

PENTAMERUS OBLONGUS, Sowerby.

- PENTAMERUS LAEVIS, James Sowerby. Min. Con., Vol. 1, p. 76, pl. 28, 1813.
 PENTAMERUS OBLONGUS, J. de C. Sowerby. Silur. Syst., pl. 19, fig. 10, 1839.
 PENTAMERUS OBLONGUS, Hall. Geol. Rep. 4th Dist., N. York, p. 7, figs. 1-5, 1843.
 PENTAMERUS OBLONGUS, Whiteaves. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. II, p. 63, 1895. (See this article for extended synonymy.)

This well known species is represented by a single example which I am unable to differentiate from Sowerby's species. The form resembles almost exactly the example figured by Whitfield in Figure 4, Plate 17, Wisconsin Geological Survey, Volume IV.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 390 S. Royal Ontario Museum of Palaeontology.

CONCHIDIUM cf. DECUSSATUM, Whiteaves sp.

- PENTAMERUS DECUSSATUS, Whiteaves. Can. Rec. of Sci., Vol. IV, 295, pl. 3, figs. 3 and 4, 1891.
 CONCHIDIUM DECUSSATUM, Hall and Clarke. Pal. N. York, Vol. VIII, pt. 2, p. 235, pl. 65, figs. 1 and 2; pl. 66, fig. 15, 1894.
 CONCHIDIUM DECUSSATUM, Whiteaves. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 293, pl. 26, figs. 1 and 2, 1906.

The collection contains three fragments which are provisionally referred to this species. One fragment from the drift at the mouth of the Nelson river (No. 391 S) shows part of a brachial valve very closely resembling Whiteaves' figures. A second specimen from the same locality (No. 392 S) is an internal cast of a pedicle valve which resembles the type figures in a less satisfactory manner, as the strongly arched outline of the shell is not apparent in our specimen. A third specimen (No. 393 S), also from the Nelson river, is so deformed by pressure that its identity with the others is conjectural only. The fourth specimen (No. 394 S) is a cast of a brachial valve indicating a shell flatter than No. 391 S and apparently more finely striate. I very much doubt the identity of this fragment with the others.

Conchidium decussatum was described by Whiteaves from material obtained at the Grand Rapids of the Saskatchewan river, and it is not recorded by him in the lists of specimens from the Ekwan and Attawapiskat rivers.

In referring all the present examples to this species, I am exceeding their proved identity, but the material is much too imperfect to warrant description, and it seems better, provisionally, to place them all under this species.

Locality—Drift, mouth of Nelson river, District of Patricia.

Horizon—Probably Silurian.

Nos. 391 to 394 S. Royal Ontario Museum of Palaeontology.

BARRANDELLA (?) MESOPLICATA, *sp. nov.*

Plate III, Figures 8, 9 and 10.

Three imperfect casts of a small shell having a length of 11 mm. and a width of rather less than 10 mm., also another specimen probably of the same species but with a greater proportional width.

Both valves are prominently convex, with a beak of the larger valve incurved; it is probable that the shell would show scarcely any interval between the beaks. The umbonal region is smooth in both valves, but towards the anterior margin a broad sinus is developed in the larger valve marked in the centre by a rather sharp rib. Outside the more prominent ribs bordering the sinus are single, short, and faintly defined ribs. The corresponding crenulations on the smaller valve are rather less prominent. The greatest width of the shell is anterior to the mid-length and the outline of the larger valve is sub-trigonal. This valve is rather flat in the mid region, but the smaller valve is sharply convex with slight concavities towards the lateral margins.

With no knowledge of the interior, it is manifestly impossible to ascribe this species to its proper genus. The external appearance suggests a Merestelloid, Camarelloid, or Pentameroid shell. I am inclined to provisionally place the species under the latter type in the genus *Barrandella*. The form is remarkably like *Sieberella nucleus*, Hall and Whitfield, but in *Sieberella* the sinus is on the brachial valve. On this interpretation the larger valve is of course the pedicle. The specimens also suggest the genus *Parastrophia*, but they are probably too elongate for that genus. If the interior should reveal a Camarelloid structure the species should probably be removed to *Parastrophia*, in which case the larger valve is the brachial.

Locality—Assina rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 399 S. Royal Ontario Museum of Palaeontology.

SPIRIFER CRISPUS, *Hisinger sp.*

TEREBRATULA CRISPA, *Hisinger*. Act. R. Acad. Sci. Holmiensis, tab. VII, fig. 4, 1826.

TEREBRATULA CRISPA, *Hisinger*. Idem. Anteckn. IV, tab. VII, Fig. 4.

DELTHYRIS CRISPUS, *Dalman*. Vet. Acad. Handl., p. 122, tab. 3, fig. 6, 1827.

DELTHYRIS CRISPUS, *Hisinger*. Petref. Suecica, p. 73, t. XXI, fig. 5a and 5b, 1839.

SPIRIFER CRISPUS, *Sowerby*. Murichson's Sil. Syst., p. 624, pl. 12, fig. 8, 1839.

DELTHYRIS STAMINEA, *Hall*. Geol. Rep. 4th Dist., N. York, p. 105, fig. 3, and p. 106, 1843.

SPIRIFER CRISPUS, *Hall*. Pal., N. York, Vol. II, p. 262, pl. LIV, figs. 3a-k, 1851.

SPIRIFER CRISPUS (?), *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 253, pl. 27, fig. 1, 1906.

This common species occurs in the Niagara of America as well as in corresponding Silurian strata of Europe. It is also recorded in the Guelph and is referred to by many authors. The occurrence in the present association is rather to be expected, but we have only one specimen partly buried in matrix. Whiteaves (*op. cit.*) describes and figures a small form from the Ekwan river in which the ribs are narrow and angular instead of broad and rounded; our specimen is nearer the type than the variety figured by Whiteaves.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 395 S. Royal Ontario Museum of Palaeontology.

DELTHYRIS, sp. indet.

Plate III, Figure 13.

DELTHYRIS cf. SULCATUS, Parks. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 195, 1913.

A single cast of one valve partially imbedded in matrix. The general appearance suggests *Delthyris sulcatus*, Hisinger *sp.*, but the mesial fold is not developed. The shell is about 15 mm. wide and seven or possibly eight mm. in height; it is marked by three prominent rounded ribs in the median region and by three similar but smaller ribs towards the angles. The specimen is much too imperfect to warrant a specific name; provisionally it may be regarded as related to *Delthyris sulcatus*. It is on the basis of this resemblance only that the species is referred to *Delthyris*.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 397 S. Royal Ontario Museum of Palaeontology.

MERISTINA (?) EXPANSA, Whiteaves.

MERISTINA (?) EXPANSA, Whiteaves. Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F., p. 45, 1904.

MERISTINA (?) EXPANSA, Whiteaves. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 245, pl. 27, figs. 6, 6a and 7, 1906.

The collection contains three specimens of small size (about 20 mm. in diameter) which conform closely with Whiteaves' description. The shell is preserved, but the outer layer has exfoliated partially, but not enough to expose the concentric ornamentation figured by Whiteaves. The most perfect shell has a practically smooth exterior, and seems to indicate a perforation in the beak of the pedicle valve.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 398 S. Royal Ontario Museum of Palaeontology.

PELECYPODA

MODIOMORPHA (?) ACUMINATA, *Parks.*

Plate IV, Figures 12, 13 and 14.

MODIOMORPHA ACUMINATA, Parks. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 194, 1913.

This species is represented by nine specimens more or less complete. Some variation is shown in the general shape of the different examples, but this may be due partly to age; it is quite possible, however, that more than one species is represented.

The best preserved specimen is about 70 mm. long. The anterior end is very narrow and acuminate. The greatest height is well towards the posterior (about 35 mm.). The umbo is almost if not quite at the anterior end, and the hinge line is slightly arcuate. The surface is ornamented by lines of growth only; these are more pronounced at intervals. There is a very slight depression in the sides of the valves giving a sinuate ventral margin. The left valve of this shell is shown in Figure 12 and a cast of the right valve in Figure 13. This cast shows a simple pallial line, a large anterior adductor scar and evidence of a fairly wide and heavy hinge plate. Unfortunately the posterior scar is not shown, nor is the detail of the hinge preserved. The figure, therefore, is not to be regarded as a restoration, but as showing only what is revealed in the specimen. A second cast shows some evidence of a large posterior scar in the dorsal region. This cast also shows evidence of the continuation of the hinge plate posteriorly and a peculiar wrinkling of the median portion of the shell which does not appear on the exterior. The specimen figured as No. 14 is the interior of the left valve of a smaller shell which shows the hinge very well, but in which the tip of the beak is broken off as well as the posterior margin. The edge of the actual specimen is shown in the figure with the probable correct outline dotted. The ventral part of the shell is filled with matrix and does not show the pallial line. Other examples present an anterior outline even more acuminate than the one figured, and these shells show scarcely any lateral depression. Despite the variations, I am inclined to include all the specimens in one species and to refer them to the genus *Modiomorpha*. This genus is Devonian, but its essential features are presented by one or other of our specimens; it has a heavier hinge plate than typical examples of *Modiolopsis*, it possesses a fairly strong tooth over the muscular scar in the left valve and, in the type specimen at least, presents a slight depression in the lateral aspect with a consequent sinuosity of the ventral margin. It is freely admitted that more than one species may be represented, but the features revealed present common generic characteristics suggesting *Modiomorpha*; in view of this genus being

Devonian, and as all the characters are not presented by any one shell, I have made the reference to this genus provisional only.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 419 S. Royal Ontario Museum of Palaeontology.

SILURINA (?), *sp. indet.*

Plate V, figure 9.

The collection contains one extremely poor cast of the left valve of an ovate Pelecypod measuring 65 mm. by about 50 mm. The valves are rather flat, with the greatest thickness above and in front of the mid-point. The total thickness of a cast would not exceed 24 mm. There is no evidence of the beak or of the hinge line. The antero-ventral margin is distinctly crenulated as if the shell gaped a little at that point.

I have been unable to find any American Silurian shell with which this specimen is comparable except possibly *Ilionia* (*Pralucina*). Barrande figures a number of shells, mostly from his Etage e2, under the generic name *Silurina*. Some examples of *Silurina distorta*, particularly that figured as No. 23, Plate 42, Vol. VI, Système Silurien de la Bohême, approaches closer to our specimen than any other species I have been able to find. It is unfortunate that the specimen is so imperfect as to render its identification uncertain, but I cannot do better than to refer it provisionally to *Silurina*.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 429 S. Royal Ontario Museum of Palaeontology.

GASTROPODA

BELLEROPHON, *sp. indet.*

Plate IV, Figure 5.

A single imperfect cast of the interior. The general form of the shell is globular, but it is somewhat extended towards the aperture, which appears to be but little expanded. No evidence is presented of the existence of a slit band or transverse markings, but towards the aperture the dorsum becomes much more acuminate than in the major portion of the shell. The whorls are closely wound and overlapping, leaving a small umbilicus. The inner lip was strengthened by a strong callosity which appears in the cast as a deep circular pit surrounding the stony matter filling the umbilicus. The outer side of this cavity

shows a distinct furrow, which must represent a considerable revolving ridge projecting inwards from the inner side of the whorl. This form shows considerable resemblance to *Bellerophon nautarum*, Salter.¹

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 356 S. Royal Ontario Museum of Palaeontology.

BELLEROPHON (CYMBULARIA), *sp. indet.*

Plate IV, Figures 6 and 7.

This species is represented by four fragmentary specimens, all casts of the interior, of which none show the characters of the aperture. Even the generic relations are therefore doubtful, but the general shape of the casts suggests *Bellerophon* as redefined by Ulrich. The forms resemble very closely some of the species referred to *Cymbularia* of Koken.

The forms are closely convolute with about three whorls and a very small umbilicus. The whorls expand rather rapidly to the aperture, which does not seem to be greatly enlarged. The dorsum is marked by a distinct but slightly elevated band, which increases in prominence towards the aperture. Transverse lines of growth cross the dorsum almost at right angles.

The specimens are all so fragmentary that a specific name would not be justified; the closest resemblance is presented by *Cymbularia rotunda*, Barrande *sp.* *Système Silurien de la Bohême*, Vol. IV, p. 154, Pl. 86, Figs. 14-17.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 355 S. Royal Ontario Museum of Palaeontology.

MEGALOMPHALA ROBUSTA, *Whiteaves.*

MEGALOMPHALA ROBUSTA, *Whiteaves.* *Geol. Sur. Can., Palaeoz. Foss.*, Vol. III, p. 257, pl. XXVIII, figs. 9 and 9a, pl. XXIX, fig. 1, 1906.

MEGALOMPHALA ROBUSTA, *Parks.* *Bur. Mines, Ont.*, 22nd Rep., pt. 1, p. 194, 1913.

The species is represented by a single broken cast of the interior, but I have little doubt as to the correctness of the identification.

Locality—Limestone rapids, Severn river, District of Patricia.

Horizon—Silurian.

No. 353 S. Royal Ontario Museum of Palaeontology.

¹Sutherland, *Journal of a Voyage, etc.*, app., p. ccxxiii, pl. 5, fig. 25.

HORMOTOMA cf. *WHITEAVESI*, Clarke and Ruedemann.

LOXONEMA MAGNUM, (Whitfield), Whiteaves. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. 1, p. 17, 1884; *Idem.*, pt. II, p. 87, pl. 13, fig. 2, 1895.

HORMOTOMA WHITEAVESI, Clarke and Ruedemann. New York State Mus., Memoir 5, p. 72, pl. 8, figs. 5-9, 1903.

HORMOTOMA WHITEAVESI, Whiteaves. Geol. Sur. Can., Palaeoz. Foss., Vol. III, p. 332, 1906.

Three casts of the interior remarkably like this species. Lacking any evidence of the external markings, etc., the forms are provisionally placed under *H. whiteavesi*.

The largest of the specimens shows a body whorl of about 30 mm. in diameter with a height of 20 mm. which is identical with the figures of Clarke and Ruedemann. Except for the smaller size the present specimens are very like *H. patriciaensis*, herein described. In fact they may possibly be the apical parts of the same species, but the apical angle is greater in *H. patriciaensis*, which inclines me to keep the species separate.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 364 S. Royal Ontario Museum of Palaeontology.

HORMOTOMA PATRICIAENSIS, Parks.

Plate I, Figure 8.

HORMOTOMA PATRICIAENSE, Parks. Bur. Mines of Ont., 22nd Rep., pt. I, p. 194, 1913.

This species is founded on a single cast of the interior showing three whorls, but the collection contains another specimen indicating nearly the same proportions. The type specimen is 100 mm. long with a body whorl about 50 mm. in diameter. The apical angle is 25 degrees. The outline of the whorls is gently convex from suture to suture, and shows no evidence of revolving band or ornamentation of any kind. Lacking the lip structures and any portion of the shell, the generic relations are impossible to determine, but the general aspect of the cast suggests *Hormotoma* or possibly *Fusispira*.

This form bears some resemblance to *Hormotoma winnipegensis*, Whiteaves,¹ in the general shape of the whorls, but it differs greatly in the relative height and width of the whorls. For a given height of whorl our species has a width of only two-thirds that of Whiteaves' species; it is undoubtedly close to *Loxonema magna*, Whitfield,² but that species

¹ Geol. Sur. Can., Palaeoz. Foss., Vol. III, p. 192, pl. XXI, fig. 1.

² Wisconsin Geol. Sur., Vol. IV, p. 317, pl. 24, fig. 1.

appears to have a smaller apical angle and the height of a given whorl to its width is 28 to 38, whereas the relation in our species is 28 to about 50.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 345 S. Royal Ontario Museum of Palaeontology.

Cf. COELIDIUM MACROSPIRA, Hall sp.

MURCHISONIA MACROSPIRA, *Hall*. Pal., New York, Vol. II, p. 346, pl. 83, fig. 5, 1852.

COELIDIUM MACROSPIRA, *Clarke and Ruedemann*. New York State Museum, Memoir 5, p. 65, pl. 7, figs. 2-8; pl. 10, fig. 13, 1903.

COELOCAULUS MACROSPIRA, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 333, 1906. (See this work for further synonymy.)

One fragmentary cast which is so near to this species that it may be provisionally referred to it.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 365 S. Royal Ontario Museum of Palaeontology.

Cf. COELIDIUM BIVITTATA, Hall sp.

MURCHISONIA BIVITTATA, *Hall*. Pal., N. York, Vol. II, p. 345, pl. 83, figs. 1a and 1b, 1852.

COELOCAULUS BIVITTATUS, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 334, 1916. (See this work for further synonymy.)

One fragmentary cast of the interior closely resembling this species in the shape and proportions of the whorls and in the nature of the spire. The characteristic structure of the species is doubtfully indicated in the interior; but lacking better material, our specimen may reasonably be referred to *C. bivittata*. Following Clarke and Ruedemann I have ascribed the species to *Coelidium* rather than to *Coelocaulus*.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 366 S. Royal Ontario Museum of Palaeontology.

COELIDIUM, *sp. indet.*

Plate I, Figure 6.

CLATHROSPIRA *sp.*, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. I, p. 194, 1913.

This species is represented by one broken east of the interior showing the body whorl in a fairly complete manner and portions of the succeeding two whorls. The figure is largely restored and is therefore open to objections, particularly with regard to the whorls represented by dots.

The body whorl has a width of 45 mm. and it is relatively large compared with the whorls of the spire. A slightly elevated band can be

made out on the periphery a little below the mid height. Above the band the outline is convex to the suture, and the same type of outline is observed below the band but with a rather steeper slant. The whorls decrease rapidly in size and the spire presents an apical angle of about 65 degrees. The aperture is probably fairly elongate, but there is no evidence as to the character of the lip.

It is manifestly impossible to ascribe such an imperfect specimen to its proper genus, but I have no doubt as to its specific distinctness.

In the original description (*op. cit.*) this form was placed under *Clathrospira* on account of its resemblance to *C. deiopeia*, Billings sp.¹ A more detailed examination and the construction of the restored figure shows that the apical angle is rather too small and the whorls of the spire not sufficiently depressed for the genera *Clathrospira* and *Eotomaria*.² In the general shape of the shell the present species is very like *Murchisonia vitellia*, Billings,³ but it differs in the absence of a concavity in the outline of the whorl above the revolving band. *Murchisonia vitellia* is considered to be a *Coelidium* by Clarke and Ruedemann⁴ while Whiteaves held the opinion that it might be ascribed to *Lophospira*.⁵ Our specimen shows no evidence of the degree of angularity which is seemingly required for the genus *Lophospira*, and in consequence it is provisionally placed under *Coelidium*. The genus *Plethospira* of Ulrich⁶ is in many respects very close to the present species. Except for the larger apical angle of our species it might be compared with *Murchisonia chamberlini*, Whitfield.⁷

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 346 S. Royal Ontario Museum of Palaeontology.

EOTOMARIA cf. GALTENSIS, Billings sp.

- PLEUROTOMARIA GALTENSIS, Billings. Geol. Sur. Can., Palaeoz. Foss., Vol. I, p. 154, fig. 136; *Ibid.*, Rep. 1863, p. 334, fig. 349.
- PLEUROTOMARIA GALTENSIS, Whiteaves. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. II, p. 75, pl. 11, fig. 7, 1895.
- EOTOMARIA GALTENSIS, Clarke and Ruedemann. N.Y. State Museum, Mem. 5, p. 70, pl. 10, figs. 10-12, 1903.
- EOTOMARIA GALTENSIS, Whiteaves. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 332, 1906.

¹ Geol. Sur. Can., Palaeoz. Foss., Vol. III, p. 75, pl. XII, fig. 1.

² Geol. and Nat. Hist. Sur., Minn., Palaeontol., Vol. III, pt. II, p. 954.

³ Geol. Sur. Can., Palaeoz. Foss., Vol. I, p. 156, fig. 138, p. 155.

⁴ New York State Museum, Memoir 5, p. 67, pl. 7, figs. 9 and 10.

⁵ Geol. Sur. Can., Palaeoz. Foss., Vol. III, p. 333.

⁶ Geol. and Nat. Hist. Sur., Minn., Vol. III, pt. II, p. 1008, fig. 7, p. 1009.

⁷ Geol. Sur., Wis., Vol. IV, p. 317, pl. 24, fig. 4.

A species of *Eotomaria* is represented by a single cast of the interior embedded in matrix. Two whorls are exposed; the maximum width of the first is 12.5 mm. and that of the second is 7 mm. The apical angle is the same as that of *E. galtensis*. The whorls show a sharp edge at the inferior periphery and a gently convex upper surface with a slight concavity just above the margin. The width of the upper surface from the sharp edge of the lower whorl to the suture is 7 mm. The under side of the whorl is convex but is rather less pronounced in this respect than *E. galtensis*. The under side of the whorl seems to increase in convexity towards the aperture, and as our specimen has lost a considerable portion of the body whorl, it is likely that the resemblance of a more perfect specimen to *E. galtensis* would be even more pronounced.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 357 S. Royal Ontario Museum of Palaeontology.

EOTOMARIA (?) *HOPKINSI*, *sp. nov.*

Plate I, Figure 5.

EOTOMARIA sp., *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 194, 1913.

This little species is represented by a single cast showing only parts of two whorls; its general shape and its resemblance to *Eotomaria durhamensis*, Whiteaves, induces me to ascribe it to that genus. In the preliminary report (*op. cit.*) I compared it directly with *E. durhamensis*, but on making a drawing I find that it differs considerably in the apical angle and that it apparently has a more elongated aperture.

The width of the body whorl is 15 mm. and its height 13 mm. The second whorl is very much smaller, with a width of only 8 mm. A distinct revolving ridge occurs about midway on the whorls, making a sharp angulation. Above the ridge the outline of the whorl is rather flat, but with a very slight concavity followed by a slight convexity to the suture. Beneath the band, the outline is rounded with only the slightest evidence of a concavity near the ridge. The outline of the body whorl below the band varies greatly as the aperture is approached, becoming much steeper in that direction. A more extended knowledge of this species might result in its transference to *Lophospira*: the general shape suggests a type like *Murchisonia mylitta*, Billings, which is now regarded as a *Lophospira*. Named for P. E. Hopkins, who was Mr. Tyrrell's assistant on the exploration of the Severn river.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 362 S. Royal Ontario Museum of Palaeontology.

EUOMPHALUS ROTUNDUS, sp. nov.

Plate VII, Figures 6 and 7.

This species is represented by two imperfect specimens, one showing a mould of the base and portions of the internal casts of the lower whorls and the other showing a mould of the apical side with parts of the shell adhering to the matrix. In addition are several fragments, probably referable to this species.

The maximum diameter of the larger shell is about 85 mm. The coiling is discoidal with three volutions. The umbilicus is wide open and about 18 mm. deep. On the apical side, the central point is depressed 7 mm. below the line joining the upper surfaces of the opposite sides of the body whorl. In Plate VII, Figure 7, this depression does not appear as great, but this is owing to the absence of the shell, which is much thicker (3 mm.) on the body whorl than on the small whorls near the centre. The whorls are almost circular in the east, having a lateral diameter of 24 mm. and a vertical diameter of 23 mm. at a point convenient for measurement. The apical portion of the whorls is filled with a white, organically deposited calcite arranged in convex diaphragms simulating the septa of a cephalopod. Neither of the shells show the slightest evidence of the surface characteristics, and there is no trace of a peripheral alation; in fact, the shape of the whorl is a reasonable basis for the assumption that such structures were not present. Some of the smaller pieces indicate that at least the inner sides of the whorls were marked by fine transverse lines of growth. Accepting Lindström's description of *Euomphalus* there can be no doubt that our species falls within that genus.¹

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

Nos. 348 and 349 S. Royal Ontario Museum of Palaeontology.

EUOMPHALUS MINOR, sp. nov.

Plate IV, Figures 8 and 9.

TREPOSPIRA cf. KOKENI, Lindström, Parks. Bur. Mines of Ont., 22nd Rep., pt. I, p. 194, 1913.

This species is represented by a fragmentary mould of the exterior and by an internal cast which apparently belongs to the same species. The shell is about 8 mm. wide with a low depressed spire. Four whorls in all can be made out indistinctly.

The mould shows a relatively large body whorl characterised by a gently rounded lateral aspect with a rather sharp carina in the superior

¹ Sil. Gast. and Pter. of Gotland, p. 136.

external position. Between the carina and the suture there is a distinct concavity followed by a gentle convexity. The whorls of the spire are largely hidden by the lower whorls, and the exposed portion shows only a gentle convexity with slight if any evidence of the carina.

The cast shows, in a much less distinct manner, the features given above. Near the aperture the carina and the superior concavity are visible, but about half way around the body whorl these features are obscured and the upper surface is flat, sloping gently upwards to the suture. The whorls of the spire are rounded and show no trace of angulation.

The generic position of a shell in which aperture, umbilicus and slitband are not observable must of necessity be doubtful. The outline of the body whorl suggests the genus *Helicotoma*, but the failure of the carina on the whorls of the spire is a departure from this genus. The form of the shell is also remarkably like that of *Euomphalus præcursor*, Lindström¹; in fact the only differences are the more marginal position of the elevated ridge and its *apparent* failure on the whorls of the spire. Ulrich regards *E. præcursor* as marking a stage in the development of *Ophileta* into the typical *Euomphalidae*. It would appear, therefore, that our species represents either a degenerate type of *Helicotoma* extending into the Silurian, or a species of primitive *Euomphalus* allied to *E. præcursor*. On the whole the latter conclusion is probably better justified, but our material is much too imperfect to warrant definite statements as to generic position.

In the preliminary report this species was referred provisionally to *Trepostira kokeni*, Lindström sp. A more detailed study has induced me to alter my opinion as above.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 396 S. Royal Ontario Museum of Palaeontology.

EUOMPHALUS, *sp. indet.*

Plate VII, Figure 10.

A single cast of the interior of a discoidally wound shell about 43 mm. in diameter. Three whorls are shown. The section of a whorl shows a generally rounded outline with a superior flattening and a peripheral angulation above the mid-height. The umbilicus is wide open and 11 mm. deep. The upper surface was probably very nearly flat or possibly slightly elevated.

There can be little doubt that this form belongs to *Euomphalus*, but the specimen is too poorly preserved to warrant a specific name. The

¹ Sil. Gast. and Pter. of Gotland, p. 140, pl. XVIII, figs. 9-11.

species can be easily differentiated from a young example of *E. rotundus* by the shape of the whorl and the lack of an apical depression.

Locality—Above Limestone rapids, Severn river, District of Patricia.

Horison—Silurian.

No. 369 S. Royal Ontario Museum of Palaeontology.

EUOMPHALOPTERUS TYRRELLI, Parks.

Plate III, Figures 15 and 16.

EUOMPHALOPTERUS TYRRELLI, Parks. Bur. of Mines of Ontario, 32nd Rep., pl. 1, p. 194, 1913.

This species is founded on a single fragmentary cast showing the interior of part of the body whorl and part of the alar expansion or carina of the first whorl of the spire. The extraordinary size of the specimen has induced me to attempt a restoration of the shell which is shown in Plate III, Figure 15. While this figure shows correctly the size and general shape of the shell, it is to be understood that the whole of the ornamentation has been restored from the markings disclosed on the mould of the alar expansion of the first whorl of the spire. The direction of the lines of growth on the alation and on the outer aspect of the volutions is correct, but the direction on the upper side of the volution was not disclosed in the specimen, and has been restored without any supporting evidence.

The cast indicates an actual width for the interior of the shell of 200 mm.; adding to this the extent of the alation the total diameter was at least 295 mm. and may have been greater, as there is no evidence in the specimen that the whole of the body whorl is preserved. The cast of the first volution at its maximum point shows a width of 51 mm. and a height of 36 mm. It is evenly rounded on the interior and rather flat on the upper surface to within about 20 mm. of the outer margin. At this point it falls off rapidly to a sharp edge almost at the base of the whorl. The under side shows a slight concavity within the outer margin and then a rather stronger convexity which fades into the evenly rounded interior aspect. The spire is gently ascending, as the base of the cast of the second volution is about on a level with the upper surface of the first volution, and is separated from it by an interval of 18 mm. Although nothing is known of the inner whorls, this method of coiling would indicate only three or four whorls in all.

A fragment about 100 mm. long shows the impression of the alation of the second whorl which bridges over the interval between the internal casts of the two whorls and reaches about half way across the upper flat surface of the outer whorl. The actual width of the alation at this

point is 57 mm. This fragment shows the lines of growth on the carina to curve gently forward, while on the outer aspect of the whorl they are inclined backwards. Unfortunately the direction of these lines on the upper side of the whorl is not revealed. The outer aspect of the whorl, besides the lines of growth, carries seven revolving striae.

In my original description (*op. cit.*) it is stated that the whorls are seven in number; a more detailed examination and a reconstruction indicate that they probably did not exceed four.

Besides the lines of growth the impression of the alation shows delicate, close-set lines running forward and outward; I interpret these marks as due to the presence of tubuli in the alation, and I have indicated their direction on the lower portion of the figure. These markings would not be visible on the exterior of the shell.

The generic position of this remarkably fine shell is of course somewhat doubtful, as the character of the aperture is not revealed. The low-set and wide alation with tubuli arching forward and outward as well as the general shape of the whorl correspond with *Euomphalopterus* as defined by Ulrich, but the open character of the coils proper and their restricted number seem to be departures from the generic type.

I am informed by Mr. Tyrrell that he observed numerous examples of this gigantic gastropod along the Severn river. It seems fitting that this, the most remarkable fossil of the collection, should bear Mr. Tyrrell's name.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 344 S. Royal Ontario Museum of Palaeontology.

EUOMPHALOPTERUS *cf.* VALERIA, *Billings* sp.

PLEUROTOMARIA VALERIA, *Billings*. Geol. Sur. Can., Palaeoz. Foss., Vol. I, p. 169, 1865.

PLEUROTOMARIA VALERIA, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, p. 23. pl. 4, figs. 1 and 1a, 1884; *Ibid.*, p. 71, pl. XI, figs. 2, 3.

EUOMPHALOPTERUS VALERIA, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, p. 339.

EUOMPHALOPTERUS VALERIA, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. I, p. 196, 1913.

This species is represented by a single, well preserved cast of the interior. The specimen is about 53 mm. in maximum diameter, and agrees so closely with *Whiteaves'* figure that it must be ascribed to *Euomphalopterus valeria*, although the determination of species from internal casts is necessarily hazardous. It should be noted (*op. cit.*) that *Whiteaves* considers that *E. valeria* is probably the same as *E. alatus*, *Wahlenberg*. A second specimen from the same locality is

probably a mould of the umbilical side of the same species; it shows lines of growth and evidence of an alar expansion.

Locality—Assina rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 352 S. Royal Ontario Museum of Palaeontology.

PYCNOMPHALUS COLEMANI, sp. nov.

Plate I, Figures 9 and 10. Plate VII, Figure 3.

This species is represented by a single imperfect specimen from which the upper part of the spire has been removed by erosion; it is nevertheless sufficiently preserved to justify the creation of a new species.

The specimen is about 85 mm. in diameter and shows an excellent cast of the base (Plate I, Fig. 10). The upper side is very imperfect and shows only the outer whorl and a trace of the margin of the second whorl; it will be understood, therefore, that Plate I, Figure 9 is largely restored. The casts of the whorls are of oval shape with a ratio of 5 to 3 in the lateral and vertical diameters.

A vertical section shows sufficient of the shell to indicate clearly the reference of the species to *Pycnomphalus*. The long and upwardly curved callosities are indicated in dotted lines on Plate VII, Figure 3. The upper callosity on the left and the one on the right of the figure are actually preserved; the lower one on the left is restored. The inner ring shown on Plate I, Figure 10 rests on the upper side of the basal callosity.

This species differs so distinctly from *P. salaroides*, Whiteaves, or from any of the species figured by Lindström from Gotland that no comparative remarks are required. Named for Dr. A. P. Coleman, Professor of Geology, University of Toronto.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 347 S. Royal Ontario Museum of Palaeontology.

PYCNOMPHALUS, sp. indet.

Plate VII, Figure 9.

This species is represented by one water-worn fragment, which is so ill preserved that nothing of the external characters is shown. A vertical section, however, shows that the shell is about 45 mm. in diameter, that the spire is but slightly elevated, that the volutions are rather sharply angulated at the periphery, rounded below, and slightly impressed above by the next whorl. The basal whorl bears a distinct

callosity which shows some evidence of being hollow, as it is bounded by shelly matter and filled with crystalline calcite; it is more likely, however, that the calcite has partially replaced the substance of the callosity. The second whorl shows a distinct thickening of the shell on the inner side, but a pronounced callosity as in the basal whorl is not observed. The specimen is much too imperfect for specific determination, but it appears to belong to the genus *Pycnomphalus*, and undoubtedly represents an undescribed species.

Locality—Assina rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 368 S. Royal Ontario Museum of Palaeontology.

GYRONEMA DOWLINGII, *Whiteaves*.

GYRONEMA DOWLINGII, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 259, pl. 29, fig. 3, 1906.

GYRONEMA DOWLINGII, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 193, 1913.

The species is represented by one broken cast which is sufficiently distinct to leave little doubt of the identification, and by several fragments of smaller individuals.

Locality—Above Limestone rapids, Severn river, District of Patricia.

Horizon—Silurian.

No. 354 S. Royal Ontario Museum of Palaeontology.

Cf. GYRONEMA SPECIOSUM, *Whiteaves*.

GYRONEMA SPECIOSUM, *Whiteaves*. Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F, p. 50, 1904.

GYRONEMA SPECIOSUM, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 258, pl. 29, fig. 2, 1906.

GYRONEMA SPECIOSUM, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 193, 1913.

One fragment of a body whorl probably referable to this species. The ornamentation of the under side of the whorl is like that of *G. speciosum*, but near the periphery the revolving ridges are distinctly wider spaced. The ornamentation of the upper side is not preserved. The specimen may represent a variety of *G. speciosum*, but it is much too imperfect for description.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 370 S. Royal Ontario Museum of Palaeontology.

A second specimen of very small size shows only a portion of one whorl, but it presents the ornamentation of *G. speciosum* in a manner which admits of less doubt in its determination.

No. 375 S. Royal Ontario Museum of Palaeontology.

POLEUMITA HUDSONICA, *Parks.*

Plate IV, Figures 1 and 2.

POLEUMITA HUDSONICA, *pars.*, *Parks.* Bur. Mines of Ontario, 22nd Rep., pt. 1, p. 194, 1913.

In the preliminary report the specimen referred to this species was included with those which I have now removed to *Euomphalus rotundus*, leaving a single specimen as the type of the present species. This example is very badly preserved, but it seems to differ from any others in the collection and is worthy of a brief description, which must be regarded as provisional only.

The fragment indicates a shell of about 56 mm. in maximum diameter; the body whorl is relatively very large with a height of about 22 mm. The spire is very low and small. There are not more than three whorls in a complete shell. The specimen is a cast of the interior only and shows no ornamentation on the whorls of the spire, but the body whorl shows four prominent revolving ridges separated by shallow concavities of which the upper is broader, the middle medium and the lower narrowest. The upper surface of the body whorl is flat and apparently smooth; the lower surface is not revealed except in one small spot, where it also appears to be smooth.

The low spire induces me to ascribe the species to *Poleumita* rather than to *Gyronema*, but the distinctness of the revolving ridges suggest a *Trochonemoides* shell. Although the specimen is very badly preserved, it is quite evident that it does not belong to any of *Whiteaves'* species of *Gyronema*, and it is certainly distinct from any other specimen in the collection with the exception of one of the fragments referred provisionally to *Gyronema speciosum*. It is quite possible that this fragment belongs to the present species, in which case the under side of the body whorl should be ornamented with revolving striae much closer set than the prominent lateral ridges shown in the figure.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 371 S. Royal Ontario Museum of Palaeontology.

STROPHOSTYLUS FILICINCTUS, *Whiteaves.*

STROPHOSTYLUS FILICINCTUS, *Whiteaves.* Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F, p. 54, 1904.

STROPHOSTYLUS FILICINCTUS, *Whiteaves.* Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 263, pl. 30, figs. 4, 5, 6, 1906.

One cast of the interior probably referable to this species. It most closely resembles figure 5 of Whiteaves' plate.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 358 S. Royal Ontario Museum of Palaeontology.

Cf. DIAPHOROSTOMA PERFORATUM, Whiteaves.

DIAPHOROSTOMA PERFORATUM, *Whiteaves*. Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F, p. 52, 1904.

DIAPHOROSTOMA PERFORATUM, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 261, pl. 29, figs. 7 and 7a, 1906.

One crushed and broken specimen with part of the shell preserved; it is referred to this species with much doubt.

Locality—Above Limestone rapids, Severn river, District of Patricia.

Horizon—Silurian.

No. 359 S. Royal Ontario Museum of Palaeontology.

Also two internal casts resembling this species but with a whorl rather drawn out on the inferior lateral margin. The whorl is consequently less symmetrical as to its superior and inferior lateral outline than in the other example referred to this species.

No. 383 S. Royal Ontario Museum of Palaeontology. Locality as above.

LIOSPIRA STEVENSONI, sp. nov.

Plate IV, Figures 10 and 11.

LIOSPIRA *sp. indet.*, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 194, 1913.

This species is represented by two casts of the interior. The spire is greatly depressed with an apical angle of about 125° . The body whorl is relatively large and the whorls of the spire small. The maximum diameter of the largest shell does not exceed 15 mm. The whorls present a sharp keel at about the mid height; above, the outline is at first concave and then convex to the suture, which is but slightly marked; below, the outline is very slightly concave and then rounded. Surface markings, umbilicus and aperture unknown.

These little casts are very different from any other species in the collection, and appear to belong to *Liospira*; the specific name is for Professor Geo. S. Stevenson of the University of Toronto, whose death occurred on the day this account was written.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 401 S. Royal Ontario Museum of Palaeontology.

TROCHUS (?), *sp. indet.*

Plate III, Figure 7.

Trochus sp., Parks. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 194, 1913.

This species is represented by a small and imperfect cast of a trochiform shell, somewhat resembling *Trochus gothlandicus*, Lindström.¹ Ulrich regards this species as a derivative from *Raphistominia* and expresses great doubt as to the systematic position of the whole assemblage of forms ascribed to *Trochus* by Lindström. That author himself is very doubtful as to these forms, and we may therefore regard these Silurian trochiform shells as of undetermined relations. Whatever may be the proper position of this type of shell, there is no doubt that they are well represented in the Silurian of Gotland, and that they are represented by two and possibly more species in our collection. *Murchisonia hercyna*, Billings, (*M. billingsana*, Miller) from the Guelph of Ontario is referable to the same general type.

The present specimen shows portions of three whorls only; the lower one is about 14 mm. wide and 4.5 mm. high. The apical angle is moderate (45°), the sutures but slightly impressed, and the outline of the whorl is almost straight from suture to suture. On one side the body whorl is much less inclined, but this feature may be due to deformation before the interior was filled with matrix. The specimen is quite indeterminate specifically, but it is worthy of mention as typical of this trochiform class of shells.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 367 S. Royal Ontario Museum of Palaeontology.

TROCHUS (?), *sp. indet.*

Plate III, Figure 14.

One cast of a small trochiform shell about 11 mm. wide and practically the same height. Volutions four or five. Probably imperforate. Apical angle 55 degrees. External face of whorls practically straight conforming to the shape of the shell. Base flat.

The species is quite indeterminate, but the form is evidently related to the species described above; it represents a second variety of trochiform shell and may be compared with some of the species described by Lindström from the Silurian of Gotland.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 402 S. Royal Ontario Museum of Palaeontology.

¹ Sil. Gast. and Pter. of Gotland, Lindström, Stockholm, 1884.

GASTROPODA, *indet.*

In addition to the more or less distinct and determinable Gastropoda already listed, the collection contains a number of fragments which evidently belong to still other species, but which are quite incapable of determination. Brief notes on these specimens follow:

Fragment of mould of the exterior. Indicates a shell of about 60 mm. in diameter and about 35 mm. high. Four whorls shown; probably six or seven in all. Whorls rounded above and slightly concave on the lower lateral aspect. A wide alar expansion extending at least 10 mm. from the periphery of the body whorl and marked by fine curved lines of growth. This expansion is not observed on the upper whorls, but its probable existence cannot be denied. There is some evidence of a raised band on the superior lateral aspect of the whorls. Apical angle about 70°.

Probably a *Euomphalopterus* of the type of *E. velaris*, Billings sp. or *E. valeria*, Billings sp. Silurian, Limestone rapids, Severn river. No. 372 S. Royal Ontario Museum of Palaeontology.

Fragment of the cast of a body whorl indicating a shell 48 mm. in diameter. The outline is very sloping above and obtusely rounded at the inferior edge. The height measured in the direction of the sloping side is 11 mm., while the direction at right angles, *i.e.*, the thickness of the whorl, is only 7 mm. None of the described species possess a body whorl of this character. Silurian, Limestone rapids, Severn river.

No. 373 S. Royal Ontario Museum of Palaeontology.

Fragment of a body whorl indicating a turreted type of shell. The whorl is 17 mm. high; it is distinctly concave on the superior lateral aspect for a width of 7 mm. from the suture to a sharply marked revolving ridge. Below the ridge the outline is again broadly concave to near the inferior lateral margin, beyond which it is convex. This shell is distinctly different from any other described in this contribution; it suggests the genus *Lophospira*. Silurian, Assina rapids, Severn river.

No. 374 S. Royal Ontario Museum of Palaeontology.

Two fragments of casts probably referable to *Coelidium* or to *Hormoloma*. One is slightly angulated a little above the mid-height, and the other shows a rounded whorl a little expanded in the lower half. The first of these specimens may belong to *Coelidium macrospira* and I should ascribe the second to *Hormoloma whiteavesi* except for the fact that the apical angle is larger than in the other specimens which I have placed in that species. Silurian, Limestone rapids, Severn river.

No. 376 and 377 S. Royal Ontario Museum of Palaeontology.

Mould of the exterior of a small trochiform shell. Basal diameter 16 mm. Height 11 mm. Sides flat. Sutures scarcely visible. Whorls marked by three rounded ridges separated by sharp depressions. Silurian, Limestone rapids, Severn river.

No. 378 S. Royal Ontario Museum of Palaeontology.

Fragment of the cast of a body whorl of a small shell of about 13 mm. in diameter. The whorl is rounded above and with a sharp peripheral keel at the lower margin. While much smaller than *Euomphalopterus valeria*, the fragment has almost exactly the outline of this species as figured by Whiteaves. (Geol. Sur. Can., Palaeoz. Foss., Vol. III, pl. fig. 1a. Silurian, Limestone rapids, Severn river.

No. 379 S. Royal Ont. Museum of Palaeontology.

Imperfect cast of a small shell with rounded whorls and deep sutures suggesting the genus *Holopea*. Silurian, Limestone rapids, Severn river.

No. 380 S. Royal Ontario Museum of Palaeontology.

One distorted internal cast suggesting *Strophostylus flicinctus*, Whiteaves. See page 67. Silurian, Limestone rapids, Fawn river.

No. 381 S. Royal Ontario Museum of Palaeontology.

Fragments of moulds of the apical side of a large shell which may possibly be the form herein described as *Pycnomphalus colemani* but which could not be referred to any other species of this report. Silurian, Limestone rapids, Severn river.

No. 382 S. Royal Ontario Museum of Palaeontology.

Fragment of a cast of a small *Euomphalus* about 15 mm. in maximum diameter. The spire is slightly ascending. The body whorl is obtusely sub-angular above and rounded below. Apparently differs from any other species in the collection. Silurian, Severn river.

No. 411 S. Royal Ontario Museum of Palaeontology.

MULTISPIRAL OPERCULA OF GASTROPODS.

The collection contains three multispiral opercula derived from two different species. One type shows a diameter of 16 mm. with about six coils; the other is somewhat larger, 26 mm. in diameter with an indeterminate number of coils.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 416 S. Royal Ontario Museum of Palaeontology.

CEPHALOPODA

ENDOCERAS HUDSONICUM, *Parks.*

Plate V, Figure 10.

ENDOCERAS HUDSONICUM, *Parks.* Bur. Mines of Ont., 22nd Rep., pt. 1, p. 195, 1913.

This species is founded on one broken and very unsatisfactory fragment. A restoration of the outline presented by the fragment would indicate an elliptical shell about 110 mm. by 75 mm. Although the specimen is broken and probably somewhat deformed, I am of the opinion that the shell was elliptical rather than round.

The septa are rather closely placed for a shell of this size—about 7 mm. apart: at a point where the siphuncle is 20 mm. from the shell the septa extend 20 mm. forward to their sutures.

The siphuncle is apparently round and about 35 mm. in diameter; it is within 20 mm. of the shell on one side and 50 mm. at 90°. Directly opposite to the first measurement the distance cannot be ascertained. The siphonal funnels are tubular and reach almost if not quite to the septum next apicad.

Vertical sections show considerable displacement of the funnels and the complete absence of an inner sheath or other endosiphuncular structures. In view of the fragmentary nature of the specimen it is perhaps unwise to establish a species but the inaccessible nature of the locality of occurrence must serve as an excuse for so doing. I am further impelled to this action by the fact that the genus *Endoceras* is rare if not absent among Silurian *Cephalopoda* hitherto described. It should be noted however that Whiteaves records the occurrence of *Endoceras* or *Nanno* from the Silurian rocks of the Ekwon river. We are perhaps dealing with the same species referred to by him on page 263, Volume III of *Palaeozoic Fossils*.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 322 S. Royal Ontario Museum of Palaeontology.

ORTHO CERAS (?), *sp. indet.*

One small fragment of a brevicone, but worthy of mention because quite distinct from any other form in the collection.

Shell circular, 13 mm. in diameter at anterior end. In a length of 10 mm. it decreases to a diameter of 7 mm. Septa about 1.5 mm. apart. Sutures straight. Siphuncle not observed. Shell absent.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 341 S. Royal Ontario Museum of Palaeontology.

ORTHO CERAS, *sp. indet.*

Several fragments of an orthoceracone indicating a diameter of from 30 to 40 mm. Septa about 6 mm. apart. Siphuncle only faintly indicated; sub-central in position.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 334 S. Royal Ontario Museum of Palaeontology.

ORTHO CERAS, *sp. indet.*

Plate V, Figure 12.

One fragment of a small orthoceracone or cyrtoceracone. The chamber of habitation is 26 mm. long; it is apparently round with a diameter of 15 mm. There is evidence of a very slight curvature and a slight contraction towards the aperture. The septa are strongly curved and about 2 mm. apart. The sutures are not discernible but a central siphuncle seems to have been present. The form is possibly identical with *Orthoceras ommanneyi*, Salter. (See "Sutherland's Journal, etc.")

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 335 S. Royal Ontario Museum of Palaeontology.

ACTINOCERAS HEARSTI, *Parks.*

Plate VI, Figure 5.

ACTINOCERAS HEARSTI, *Parks.* Bur. Mines of Ont., 22nd Rep., pt. 1, p. 195, 1913.

This species is founded on one well preserved specimen showing the siphuncle, portions of eight camerae, and part of the outer shell.

The shell is apparently round and very gently tapering, having in the specimen a diameter of 112 mm. The septa average 11.5 mm. apart; on the siphonal side of the siphuncle they are bent sharply orad but on the anti-siphonal side their curvature is more gentle.

The siphuncle shows a maximum width of 50 mm.; it is strongly nummuloid with the rings inclined at a slight angle to the axis. On the internal side the rings are evenly rounded, while on the external side they have an orad aspect in conformity with the highly curved septa. The siphuncle is marginal in position lying within 3 mm. of the shell at the posterior end and 6 mm. at the anterior end of the specimen.

The endosiphuncle is narrow, apparently about 6 mm. wide; it is somewhat excentric being placed nearer to the internal side of the siphuncle. The radiating tubuli seem to have been carried on infundibuliform membranes as in *Huronina inflecta* (page 75); but in the present species these structures do not arise at so low an angle from the endo-

siphuncle and they seem to terminate towards the centre of the rings. Although there is no direct evidence that the tubuli communicated with the cameræ I have every reason to believe that such was the case by comparison with another example of the species (*vide postea*).

This species is of the type of *Orthoceras (Actinoceras) crassiventre*, Wahl. as figured by Barrande in Plate 233, *Système Silurien de la Bohême*. It differs in the much greater width of the siphuncle for a given height of segment. *Actinoceras hearsti* is also closely related to a species from the Trenton of Manitoba ascribed by Whiteaves to *A. richardsoni* and figured in Volume IX, Section IV, *Transactions of the Royal Society of Canada*. The Royal Ontario Museum contains specimens of this form which have been cut and polished; they resemble Whiteaves' figures, but they show neither the calcareous lamellae or the direct tubuli characteristic of *A. richardsoni*. The species is named for the Honourable W. H. Hearst, Premier of Ontario, on whose initiative the Hudson Bay Exploring Expedition of 1912 was organized.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 314 S. Royal Ontario Museum of Palaeontology.

ACTINOCERAS, *sp. nov.*

Plate II, Figure 3.

ACTINOCERAS *sp.*, Parks. Bur. Mines, Ont., 22nd Rep., pt. I, p. 196, 1913.

The specimen consists of two siphuncular rings, very different from any others in our collection and from any figured by Bigsby or Stokes.

The segments are elliptical with a greater diameter of 55 mm. and a shorter diameter of 45 mm. On the inner side the rings are evenly rounded and 11 mm. thick; on the outer side they are much flattened posteriorly and have a thickness of 13 mm. This flattening of the rings indicates a marginal position for the siphuncle, and the greater thickness may indicate a curved shell with the siphuncle on the convex side. The rings are inclined at an angle of more than 45 degrees to the axis of the siphuncle; this could occur only in a shell with septa arched forward to a remarkable degree.

The endosiphuncle seems to have been a distinct tube, 12 mm. wide and apparently possessed a proper wall.

This form is unique in our collection and apparently represents an undescribed species, I hesitate, however, to give it a specific name in view of the very incomplete nature of the specimen.

Locality—Assina rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 313 S. Royal Ontario Museum of Palaeontology.

HURONIA INFLECTA, *sp. nov.*

Plate VI, Figure 4.

Cf. HURONIA . . . Stokes. Transactions Geol. Soc., ser. II, Vol. V, pl. 3, p. 710, pl. XL, fig. 2, 1840.

Cf. HURONIA sp., Barrande. Syst. Sil. de la Bohême, pl. 231, fig. 2, 1866.

Cf. ACTINOCERAS BIGSBYI, Whiteaves. Trans. Royal Soc. Can., Vol. IX, sec. IV, p. 84, pl. X, fig. 2, 1891.

This species is represented by one specimen in our collection, which is undoubtedly very close to that figured by Stokes and copied by Barrande. Both these authors have hesitated to found a species on a single siphuncle but the discovery of another practically identical specimen at quite a different locality seems to justify that action at the present time.

The specimen consists of a portion of a siphuncle 85 mm. in length showing parts of six siphuncular rings. Nothing is known of the shell. The rings have a height of 15 mm. and a diameter of 45 mm.; they are disposed at a low angle to the axis of the siphuncle. In vertical section the septa are seen to extend well inward and to be in contact with the posterior face of the ring next orad, almost to the outer limit of the ring; along this line of contact there is a slight inward inflection of the septum. From the point where the ring parts from the septum behind it, it is evenly rounded and with an orad aspect. On coming in contact with the septum next orad, there is a sharp, tongue-like inflection apicad. This peculiar arrangement of rings and septa gives a strong forward inclination to the latter, which are only 10 mm. apart normal to their direction, while the actual height of a ring is 15 mm.

The endosiphuncle is narrow and rather indistinct with an average diameter of 7 mm. Annular outgrowths of the endosiphuncle spring at a low angle, sweep gently apicad and then turn outwards in a graceful curve terminating near the little tongue-like inflection of the siphuncular rings. From the point of origin of one of these outgrowths to its most posterior extension is 23 mm. Judging from the continuity of these structures, they appear to represent infundibuliform membranous or calcareous outgrowths, rather than radiating tubuli. It is of course likely that the membranous expansions carried tubuli, but there is no evidence that they penetrated the siphuncular sheath, although the exterior of the rings is well shown in parts of the specimen.

Our specimen differs from that figured by Stokes only in proportions, as Stokes' figure shows rings 20 mm. high for a width of 32 mm., while our specimen has rings 15 mm. high for a width of 45 mm.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 310 S. Royal Ontario Museum of Palaeontology.

OOCERAS, sp. indet.

A cast of the chamber of habitation and of a portion of the septate region of a small, laterally compressed, rapidly tapering cyrtoceracone. The two specimens doubtfully belong to the same species.

The body chamber of one specimen is 19 mm. long. At the posterior end, it measures 12.5 by 10 mm. Transverse section ovate, with the narrow part on convex side of shell. Contracts rapidly towards aperture. Nature of aperture not indicated.

The second fragment is 20 mm. long. Section elliptical or slightly ovate. Anterior diameter 12 mm. (dorso-ventral) and 9 mm. (lateral). Posterior diameters 8.5 and 7 mm. respectively. Medium curved. Exogastric. Septa 1.6 mm apart. Sutures with a slight lateral lobe and dorsal and ventral saddles.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 336 S. Royal Ontario Museum of Palaeontology.

OOCERAS (?) , sp. nov.

Plate III, Figure 4; Plate VI, Figures 3 and 8.

Two fragments probably referable to the same species; they indicate a medium sized, laterally compressed, slowly tapering, exogastric cyrtocone. The cross section is elliptical rather than ovate. The smaller specimen is 33 mm. long and shows 14 camerae in that distance. The anterior diameter is 25 mm. (dorso-ventral) and 20 mm. (lateral). The posterior diameter is 20 mm. by 16 mm. On the convex side the anterior septa are 3 mm. apart and the posterior septa are scarcely 2 mm. apart.

The sutures are fairly even, with perhaps a slight lateral lobe. The siphuncle is of fair size, nummuloidal, and marginal in position.

The second specimen is larger and shows part of the body chamber, which is at least 43 mm. long with a diameter of 31 mm. The septa average 3 mm. apart. The siphuncle is nummuloidal, marginal, and 10 mm. in diameter. There is some evidence of a contraction of the living chamber towards the aperture.

These two specimens indicate shells of similar structure, and they are possibly but not certainly of the same species. Both show characters pointing to the genus *Ooceras* as emended by Foord, or to *Maelonoceras* of Hyatt. In the absence of any striking specific peculiarity it would be ill advised to establish a species on material of such imperfect preservation.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horison—Silurian.

No. 330 S. Royal Ontario Museum of Palaeontology.

PHRAGMOCERAS WHITNEYI, Parks.

Plate III, Figure 5; Plate VI, Figure 2.

PHRAGMOCERAS WHITNEYI, Parks. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 194, 1913.

This example is a remarkably large representative of the genus; in fact I have seen no greater figured. The species is founded on one cast of the chamber of habitation obtained by Mr. Tyrrell at the Limestone rapids, Severn river, and a portion of the septate shell found at Assina rapids on the same stream. There is no immediate proof that the two specimens belong to the same species, but the general agreement in size, the absence of more likely associations, and the similarity of the stone point to the identity of the two specimens.

The dorso-ventral diameter of the shell at the apex for scutum is 108 mm. The lateral diameter at the same part is 30 mm. and it may possibly be a little greater, as one side of the cast is somewhat worn. The height of the body chamber is 130 mm. and the maximum width from "ear" to "ear" is 150 mm. The ventral margin of the body chamber is strongly concave and well extended toward the aperture. The dorsal margin is convex, but the curvature is less pronounced than on the concave side. The aperture is reduced to a narrow slit on the belly; on the ventral side it is about 25 mm. wide, and it is not preserved on the dorsal side. The maximum lateral diameter of the body chamber is 50 mm. The cast shows faint indications of vertical fluting with the furrows about 4 mm. apart.

The first septum is strongly curved; a straight line joining the dorsal and the ventral extremities of this septum passes 27 mm. above the point of greatest curvature.

The septate portion measured along the median line shows a length of 200 mm. but this by no means represents the whole length of the septate shell, as the specimen does not show the apex. In this length are 14 camerae which do not indicate a lessening spacing of the septa towards the apex. The first and second camerae are about 10 mm. high; the sixth and seventh are 15 mm. high; owing to breaking and the consequent impossibility of ascertaining the median line, the height of the more apical camerae cannot be given.

This fine species is doubtless related to *P. lineolatum*, Whiteaves (Page 78), but it differs in the very much greater size and in the fact that the cross section does not show the attenuated ventral margin figured for *P. lineolatum*.

The species is named for the late Honourable Sir James Pliny Whitney, Premier and President of the Council, Province of Ontario.

Locality—Limestone rapids and Assina rapids, Severn river, District of Patricia, Ont.

Horizon—Silurian.

Nos. 318 and 319 S. Royal Ontario Museum of Palaeontology.

PHRAGMOCERAS LINEOLATUM, *Whiteaves*.

PHRAGMOCERAS LINEOLATUM, *Whiteaves*. Geol. Sur. Can., Ann. Rep., Vol. XIV, pt. F, p. 57, 1904.

PHRAGMOCERAS LINEOLATUM, *Whiteaves*. Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 265, pl. 34, figs. 1, 1a, 2 and 3, 1906.

PHRAGMOCERAS LINEOLATUM, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 195, 1913

This species is probably represented by three specimens—one showing a chamber of habitation, and two exhibiting parts of the septate region.

Our specimens are large, slightly exceeding in size the largest one figured by *Whiteaves*. At the anterior septum our specimen measures 64 by 40 mm. The septa are 11 mm. apart on the convex or dorsal margin, and only 3 mm. apart on the ventral margin.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 317 S. Royal Ontario Museum of Palaeontology.

PENTAMEROCERAS RARUM, *sp. nov.*

Plate III, Figure 6.

One small specimen showing the body chamber with part of the test preserved. The character of the aperture is well shown by the cast of the interior, which projects beyond the preserved portion of the shell.

The chamber of habitation is of elliptical shape, with a maximum diameter of 18 mm. and a minimum diameter of 15.5 mm. The shell contracts rapidly towards the aperture, producing a narrow hyponomic sinus, a median dorsal sinus and two lateral sinuses. The cast of the hyponomic sinus indicates a length of 12 mm.; the median sinus a length of 5 mm.; and the lateral sinuses lengths of 4.5 mm. (ventral) and 6 mm. (dorsal).

The test shows delicate, flexuous, transverse striations.

The type of the genus *Pentameroceras*, Hyatt, is *Gomphoceras mirum*, Barr. (Système Silurien de la Bohême, Pl. 478, Fig. XII, 1 and 2. Pl. 82, Figs. 17-25; Pl. 91, Figs. 7-14; Texte, Vol. II, Partie IV, p. 134.) The type of aperture characteristic of this genus seems to be extremely rare, for *Barrande* states "Cette forme de l'ouverture n'a été observée que dans une seule espèce, *Gomphoc. mirum* de la Bohême. . . Tous ces spécimens ont été trouvés sur l'horizon de notre bande e2; les 3 petits, à Hinter-Kopanina et les 3 plus grands, à Lochkow".

Our species is remarkably like *P. mirum* and is comparable with the larger forms figured by *Barrande*. The most noticeable difference is

the relatively greater length of the hyponomic sinus in our specimen. Mr. Tyrrell is to be congratulated on the discovery in Patricia of a representative of this exceeding rare genus.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian—Compare *e2* of Barrande.

No. 324 S. Royal Ontario Museum of Palaeontology.

SEPTAMEROCERAS, *sp. indet.*

A single cast of a small form, showing some evidence of the type of aperture characteristic of *Septameroceras*. Dorso-ventral diameter of chamber of habitation about 18 mm.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario. (Loose boulder not certainly local.)

Horizon—Silurian?

No. 327 S. Royal Ontario Museum of Palaeontology.

GOMPHOCERAS (?), *sp. indet.*

One fragment of a chamber of habitation showing a much contracted aperture, the character of which is not discernible. This seems to be a large form, probably 50 mm. or more in diameter.

Locality—Above Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 331 S. Royal Ontario Museum of Palaeontology.

BARRANDEOCERAS (?), *sp. indet.*

Plate VII, Figure 8; Plate V, Figure 11.

BARRANDEOCERAS *sp.*, *Parks*. Bur. Mines of Ont., 22nd Rep., pt. 1, p. 195, 1913.

A fragment of an internal cast without septa or siphuncle. The specimen is 130 mm. long and shows an increasing curvature towards the posterior. The cross section is broadly ovate with the narrow end internal. The anterior dimensions are 29 and 25 mm. The posterior dimensions are 19 and 17 mm. The reference of the fragment to *Barrandeoceras* is of course conjectural only.

Locality—Limestone rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian.

No. 342 S. Royal Ontario Museum of Palaeontology.

TRILOBITA

BUMASTUS *cf.* IOXUS, Hall.

Plate IV, Figure 19.

BUMASTUS BARRIENSIS, Hall. Pal., N. York, Vol. II, p. 302, pl. LXVI, figs. 1-15, 1851.
 ILLAENUS (BUMASTUS) IOXUS, Hall. 20th Rep., N. York State Mus., p. 420, pl. XXII,
 figs. 4-10, 1867.

One broken cephalon agreeing fairly well with Hall's species. The character of the facial suture seems to be slightly different from that shown in Hall's figures.

Locality—Limestone rapids, Severn river, District of Patricia.

Horizon—Silurian.

No. 426 S. Royal Ontario Museum of Palaeontology.

ENCRINURUS *cf.* PUNCTATUS, Brunn. sp.

Plate IV, Figure 20.

TRIOBUS PUNCTATUS, Brunn. Kjobenh. Selsk. Skrivt. nye Samml., Vol. I, p. 394.
 ENCRINURUS PUNCTATUS, Emmrich. Neues Jahrbuch für Min. Geol. and Pal., p. 42,
 1844.
 ENCRINURUS PUNCTATUS, Vogdes. Trans. San Diego Soc. Nat. Hist., Vol. I, no. 2, p. 67,
 pl. 1, 1907. (See this article for extended synonymy and revision of the genus.)

Represented by one broken and exfoliated pygidium. The lateral margins and the extremity are not preserved; these are restored in the figure, but it must be understood that the characteristics of the tip of the pygidium and the pleural margins are not known.

The whole pygidium is about 9 mm. long and of about the same width at the anterior margin. The outline is triangular with a sharp posterior termination, but the presence or absence of a spine is not revealed. The axis is rather more than 4 mm. wide at the proximal end; it contains at least 20 segments and probably a few more. The distinct pleura are eight in number, but there is a little space in which possibly one more may occur. The specimen shows a deep and elongate pit between the segments towards the outer margin of the axis. As the specimen is decorticated the tubercles are very faintly shown, but there is evidence of their occurrence on the fifth, eighth and eleventh ring and less distinctly on the fourteenth. The pleural portion shows no sign of tuberculation, but considering the condition of the specimen, it cannot be concluded that no tubercles occur. In the number of the divisions of the axis and pleurac, the form is near *Encrinurus punctatus*, Brunn. The occurrence of tubercles does not seem to be a constant feature, and Salter mentions forms of the species from the Ludlow presenting only four, as in our specimen. The apparent absence

of pleural tubercles is the chief objection to ascribing our form to *E. punctatus*. The specimen cannot be ascribed to *E. laevis*, Anselm (*E. arcticus*, Salter), as the number of segments in the axis of the pygidium is much too great.

Locality—Limestone rapids, Fawn river, District of Patricia, Ontario.

Horison—Silurian.

No. 427 S. Royal Ontario Museum of Palaeontology.

IV.

SPECIES FROM THE SILURIAN DRIFT.

ACERVULARIA AUSTINI, *Salter* sp.

STREPHODES? AUSTINI, *Salter*. Sutherland's Journal of Captain Penny's Voyage to Wellington Channel, etc., Vol. II, appendix, p. CCXXX, pl. 6, figs. 6, 6a, 1852.

ACERVULARIA AUSTINI, *Lambe*. Cruise of the Neptune, p. 322, 1906.

ACERVULARIA AUSTINI, *Parks*. Bur. Mines of Ont., 22nd Rep., pp. 192, 196, 1913.

The collection contains four specimens from different localities differing only in the size of the corallites which vary from 3 to 11 mm. in diameter. In one specimen the maximum diameter is 7 mm. In *A. austini* the maximum diameter is 8 mm. and *Lambe* states that the maximum of the specimens brought by Mr. Low from Beechey island is 10 mm. The finest of our specimens corresponds remarkably with *A. gracilis*, *Billings*, as redefined by *Lambe*. It is very likely that the mere size of the corallites is not of specific value and that *A. gracilis* is a synonym for *A. austini*, which antedates it. (See *Lambe, op. cit.*)

Salter's original description is as follows: "This fine coral which we dedicate with great pleasure to the gallant commander of the Expedition, is one of the most frequent species. It occurs in the form of rounded masses from an inch to several inches in diameter, covered on all sides with stellate cells—at first sight looking very like the *Astrea* of the present seas. The internal structure, however, as of nearly all the corals of the older rocks, is quite of another order. Prof. McCoy, to whom I submitted these figures of the corals with drawings and notes has kindly given me his opinion on several of them. He would prefer to regard this as *Clisiophyllum* rather than *Strophodes* from the internal structure.

"Surface covered by hexagonal or pentagonal cells, of various sizes, the larger ones frequently four lines across, the smaller ones in groups of two, three, or more at the angles of the others. The extreme edges of the cups are thin and crenulated, their sides thickened and sloping steeply. In a large star they are radiated by about 30 or 40 equal blunt lamellæ, which extend to the base, and about half of them are there united in bundles of three or four, and are twisted on the surface of a low boss which rises from the centre. The lamellæ are united everywhere by frequent vesicular plates. A transverse section below the cup shows narrow but distinct divisional walls between the cells; and the lamellæ twisted in the middle and united loosely by the vesi-

cular tissue. The intermediate ones in the section appear longer than they are in the cup. A longitudinal section shows the vesicular plates arched a little upwards in the middle under the boss, then downwards and again inclined upwards in the outer area in two or three rows of cells. In these sections both the lamellæ and the transverse plates are thin, and the former are wavy."

Localities—Drift, Mouth of the Nelson river; Drift, Mouth of Machichi river; Assina rapids, Severn river, District of Patricia, Ontario.

Horizon—Silurian?

Nos. 294 S., 295 S., 296 S. Royal Ontario Museum of Palaeontology.

PHRAGMOCERAS NELSONENSE, *sp. nov.*

Plate I, Figure 7; Plate III. Figures 1 and 2.

This species is founded on four fragments showing living chambers and one showing a portion of the septate shell.

The dimensions of the living chamber at the anterior septum are as follows in the different specimens:

	1	2	3	4
Dorso-ventral diameter.	25 mm.	29 mm.	25 mm.	25 mm.
Lateral diameter.	19 mm.	19 mm.	19 mm.	18 mm.

The height of the body chamber in the median line is from 30 to 35 mm. In no case is the outer shell preserved, but some of the casts show a bead-like ornamentation of the posterior margin with faintly marked longitudinal ribs extending upward therefrom. Both the ventral and the dorsal outlines of the living chamber are convex. The dorsal aperture is much the larger and the ventral aperture much smaller and situated at the extremity of a sharply drawn out, tube-like prolongation of the shell.

The septate region is rather sharply curved ventrally just beyond the living chamber, but the whole form of the septate shell is not revealed. The anterior septa on the dorsal margin are about 2.5 mm. apart. On the ventral side, they are slightly closer together and present a faint ventral saddle.

The siphuncle is small and is situated close to the ventral margin.

The indications of vertical fluting on the living chamber suggest *P. nestor canadense*, described by Dr. Whiteaves from the Guelph formation at Hespeler, Ont.¹ The present example, however, is much smaller, the dorsal aperture is more extended and the septate region is more curved.

¹ Geol. Sur. Can., Palaeoz. Foss., vol. III, p. 39, pl. 7, figs. 1, 1a and 1b.

A somewhat similar form from the Attawapiskat river was described by Whiteaves as *P. lineolotum*¹ but our specimens differ strongly in the convex instead of concave outline of the ventral margin of the living chamber.

A much closer resemblance is presented to *P. parvum*, Hall and Whitfield;² not so much to the type figure as to later drawings, e.g., that by Whiteaves (PL VII, Fig. 2, Vol. III, Pal. Foss.) and those by Clarke and Ruedemann (Guelph Fauna in the State of New York, Mem. 5, N.Y. State Museum, pl. 21, figs. 1-8.) The sharply drawn out, ventral apertural tube, which is considered typical of *P. parvum*, as well as the general shape of the body chamber, is common with our species. On the other hand, *P. parvum* does not show the sharp curvature of the septate region, which is a striking feature of the new species.

Locality—Drift, near mouth of Seal river, Nelson river, District of Patricia, Ontario.

Horizon—Doubtful, but probably Silurian.

No. 316 S. Royal Ontario Museum of Palaeontology.

Two slabs of whitish-grey fine grained argillaceous limestone from the drift at York. The stone is full of impressions and casts of Ostracoda. The recognizable species are as follows:

ISOCHILINA GRANDIS LATIMARGINATUS, Jones. Geol. Sur. Can., Cont. to Can. Micro-Pal., Vol. I, pt. 3, p. 78, pl. 10, figs. 1a, b and c, and 3 and 4, 1891.

No. 421 S. Royal Ontario Museum of Palaeontology.

LEPERDITIA WHITEAVESII, Jones. Geol. Sur. Can., Cont. to Can. Micro-Pal., Vol. I, pt. 3, p. 87, fig. 6, p. 87, pl. 12, figs. 11, 12, 13 and 14, 1891.

No. 422 S. Royal Ontario Museum of Palaeontology.

LEPERDITIA HISINGERI, Schmidt. Mem. Acad. Imp., St. Petersburg, ser. 7, Vol. XXXI, no. 2, p. 16, figs. 22 and 23, 1873; *Ibid.*, Vol. XXXI, no. 5, p. 14, pl. V, figs. 5-7, 1873.

LEPERDITIA HISINGERI, Jones. Geol. Sur. Can., Cont. to Can. Pal., Vol. I, pt. 3, p. 82, pl. 10, figs. 5 and 7; pl. 12, figs. 8 and 15; pl. 13, figs. 1, 2, 3, 4, 5, and 9. (See this article for extended synonymy.)

No. 420 S. Royal Ontario Museum of Palaeontology.

The slab contains several casts of *Leperditia* referable to the last species, but probably to be ascribed to some of the varieties described by Jones (*op. cit.*). *L. hisingeri fabulina* is probably present with others of Jones' varieties.

There can be little doubt that these slabs were derived from a Silurian horizon very similar to that at the north end of Lake Winnipegosis, Cedar lake and the Grand rapids of the Saskatchewan.

¹ Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 265, pl. 34, figs. 1a, 2 and 3, 1906.

² Pal. of Ohio, Vol. 2, p. 151, pl. 8, fig. 10, 1875.

V.

SPECIES FROM THE DRIFT OF UNCERTAIN HORIZON.

ZAPHRENTIS, sp. indet.

A single specimen with the following characteristics: Corallum conical, almost straight with a slight curvature near the apex only, 35 mm. long, rapidly expanding to a diameter of 33 mm. in the length given. Exterior marked with transverse lines of growth and distinct septal furrows.

A vertical section shows septa and wavy, somewhat oblique but entire tabulæ in the lower third only. Assuming that no internal structures are lost, which is very doubtful, the calyx is remarkably deep with an oblique and almost straight floor. This form is externally very like *Petraia* sp. described as No. 298 S. It is possible that the two specimens are identical, but the evidence of the internal structure, bad as it is, points to a dissimilarity.

Locality—Drift, Mouth of Nelson river, District of Patricia, Ontario.

Horizon—Doubtful.

No. 299 S. Royal Ontario Museum of Palaeontology.

CYATHOPHYLLUM, sp. indet.

One fragment of a cylindrical and gently tapering corallite of about 25 mm. in diameter; it is silicified and very imperfect, but reveals the typical structure of *Cyathophyllum*.

At a diameter of 25 mm. 33 long primary septa extend almost to the centre of the corallite. Well developed septa of the second order alternate with the primaries and extend inwards two-thirds of the distance to the centre.

A peripheral zone, corresponding in thickness with the length of the secondary septa is filled with vesicular tissue, which appears in transverse sections as outwardly arched dissepiments. The central third of the corallite is closely tabulate.

A distinct epitheca is present and shows strong annular rugosities or lines of growth.

Locality—Drift, Mouth of Nelson river, Manitoba.

Horizon—Doubtful.

No. 290 S. Royal Ontario Museum of Palaeontology.

ACTINOCERAS *cf.* CLOUEI, *Barrande*.

Plate II, Figure 6; Plate VI, Figure 1.

ORTHOCERAS CLOUEI, *Barrande*. Syst. Sil. de la Bohême, pl. 432, figs. 1-6; pl. 433, figs. 1 and 2; pl. 434, figs. 1-5, 1870.

ORTHOCERAS CLOUEI, *Barrande*. Syst. Sil. de la Bohême, texte, Vol. II, partie III, p. 718, 1874.

Our specimen, which consists of a portion of a siphuncle only, is referred to this species with considerable assurance, although the identification of such material must be more or less doubtful.

The siphuncle shows nine nummuloidal rings in a length of 53 mm. These rings do not taper gradually, for the first has a diameter of 23 mm., the seventh a diameter of 21 mm., and the ninth a diameter of 23 mm. The rings are evenly rounded with a slight oral aspect and are somewhat oblique to the axis of the siphuncle. A vertical section shows that the constrictions between the rings are embraced by stout calcareous deposits which form a system of internal rings alternate with the true siphuncular expansions. These internal rings are separated by outwardly directed, slightly curved tubuli which seem to penetrate the siphuncular sheath. The interior of the siphuncle is thus constricted to a diameter of about 6 mm. in which, unfortunately, the endosiphuncle has been destroyed.

The very great similarity presented by *Barrande*'s figures and the fact that the type of *Actinoceras clouei* was obtained from Newfoundland leads me strongly to believe that the specimens are co-specific.

Our form also presents a striking resemblance to the siphuncle figured but not named by *Bigsby* as Fig. 5, Pl. 30. Trans. Geol. Soc., Series II, Vol. I, 1824.

The present example differs from *Actinoceras keewatinense*, *Whiteaves*, in the relatively greater width and less height of the siphuncular rings, also in the slighter obliquity of the segments and in the absence of the regular taper of *Whiteaves*' species.¹

Locality—Drift at York Factory.

Horison—Doubtful.

No. 311 S. Royal Ontario Museum of Palaeontology.

OOCERAS CORDATUM, *sp. nov.*

Plate III, Figure 3.

This species is founded on a single fragment of a slowly tapering, laterally compressed cyrtocone. The transverse section is ovate with the narrow end external. Exogastric. The outer margin of the shell

¹ Geol. Sur. Can., Palaeoz. Foss., Vol. III, pt. IV, p. 246, pl. XXX, figs. 7 and 8, 1906.

is prominently marked by a longitudinal elevation which suffices for the determination of the species.

The specimen shows a portion of the septate region only. In a length of 40 mm. are 13 camerae. At the fifth septum the dorso-ventral diameter is 22 mm. and the lateral diameter is 19 mm. The specimen is slightly distorted; a restoration would probably increase the dorso-ventral diameter. The sutures show a slight lateral lobe and a ventral saddle. The slow tapering, the lateral compression, the acute ventral shape, and the external siphuncle suggest the genus *Ooceras* as emended by Foord.

The peculiar elevated ridge along the venter is quite characteristic and seems to justify a specific name.

Locality—Drift of Nelson river, Manitoba.

Horizon—Uncertain.

No. 329 S. Royal Ontario Museum of Palaeontology.

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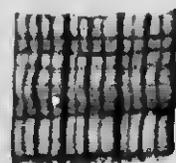
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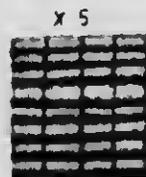


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x 5

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5



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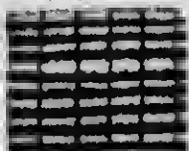


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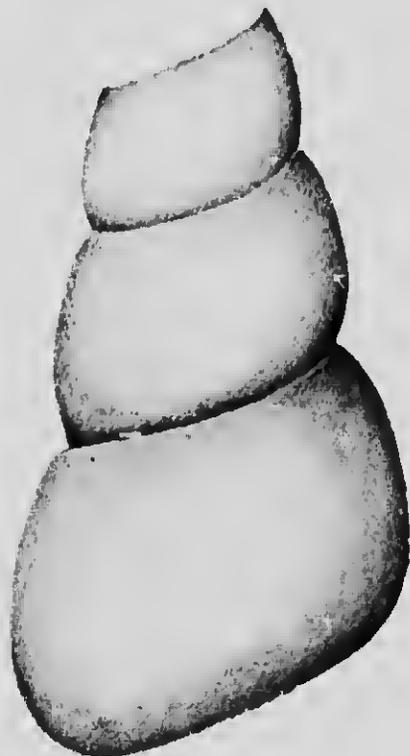


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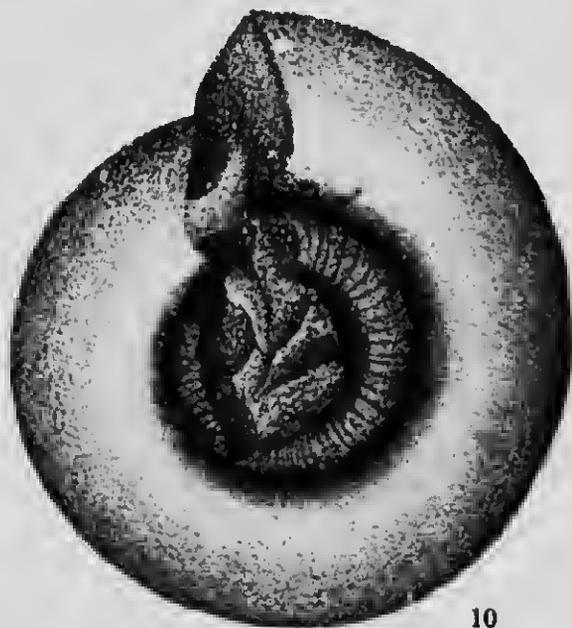
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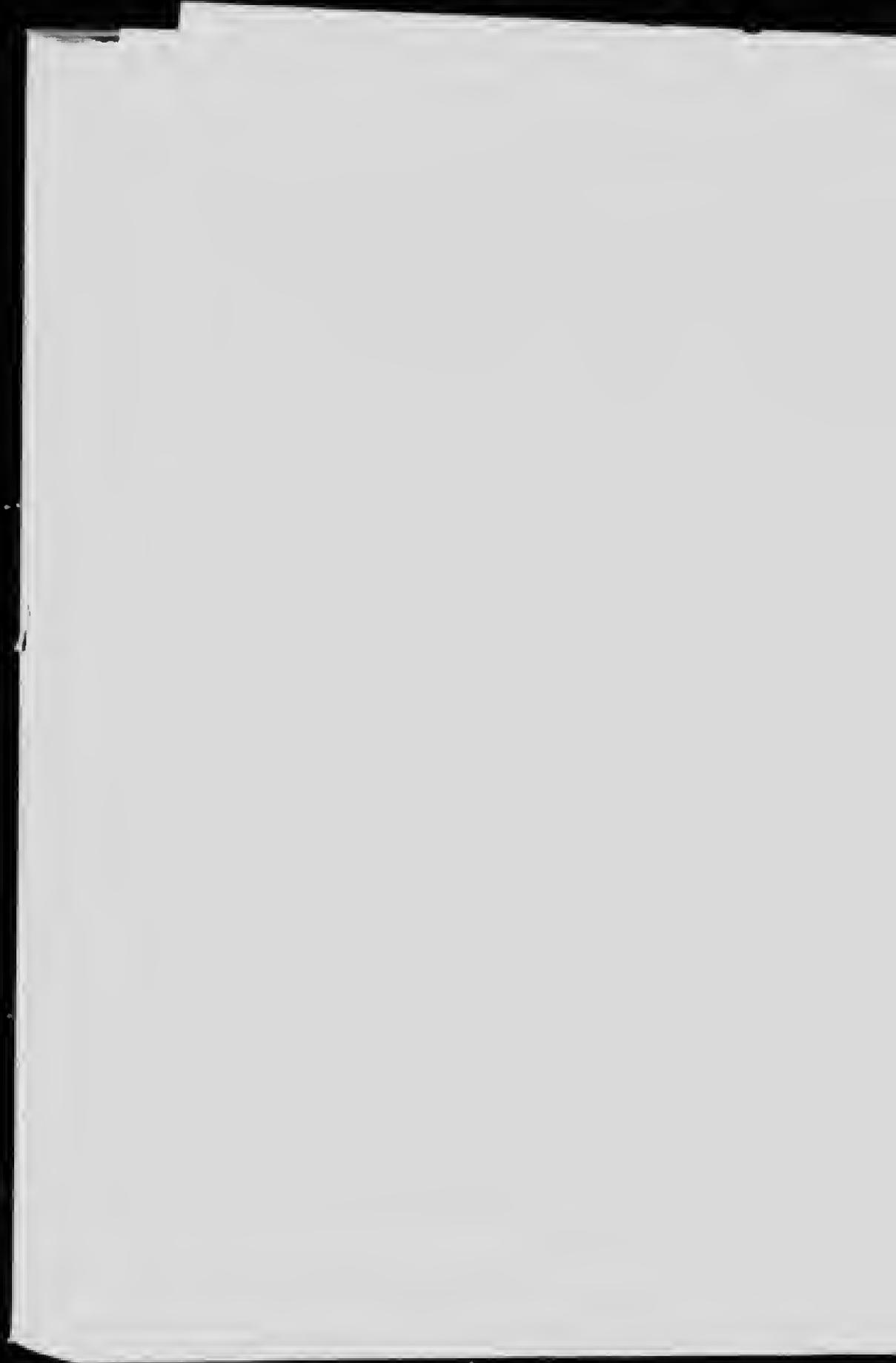
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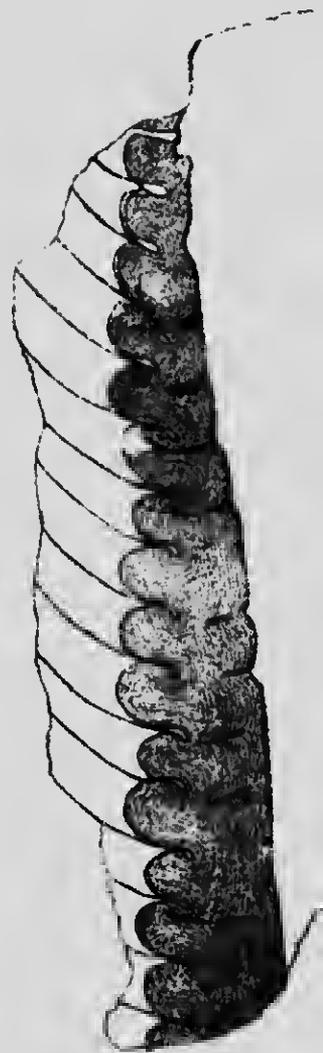
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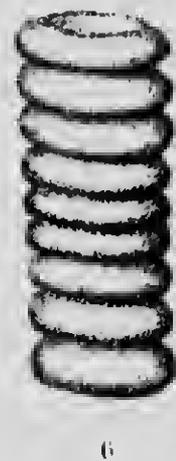
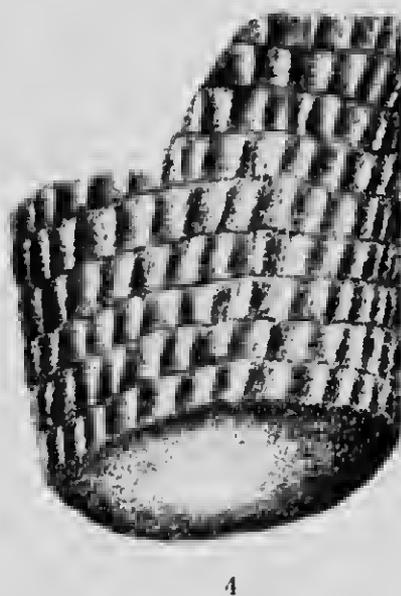






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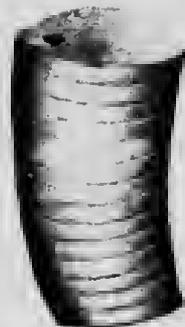








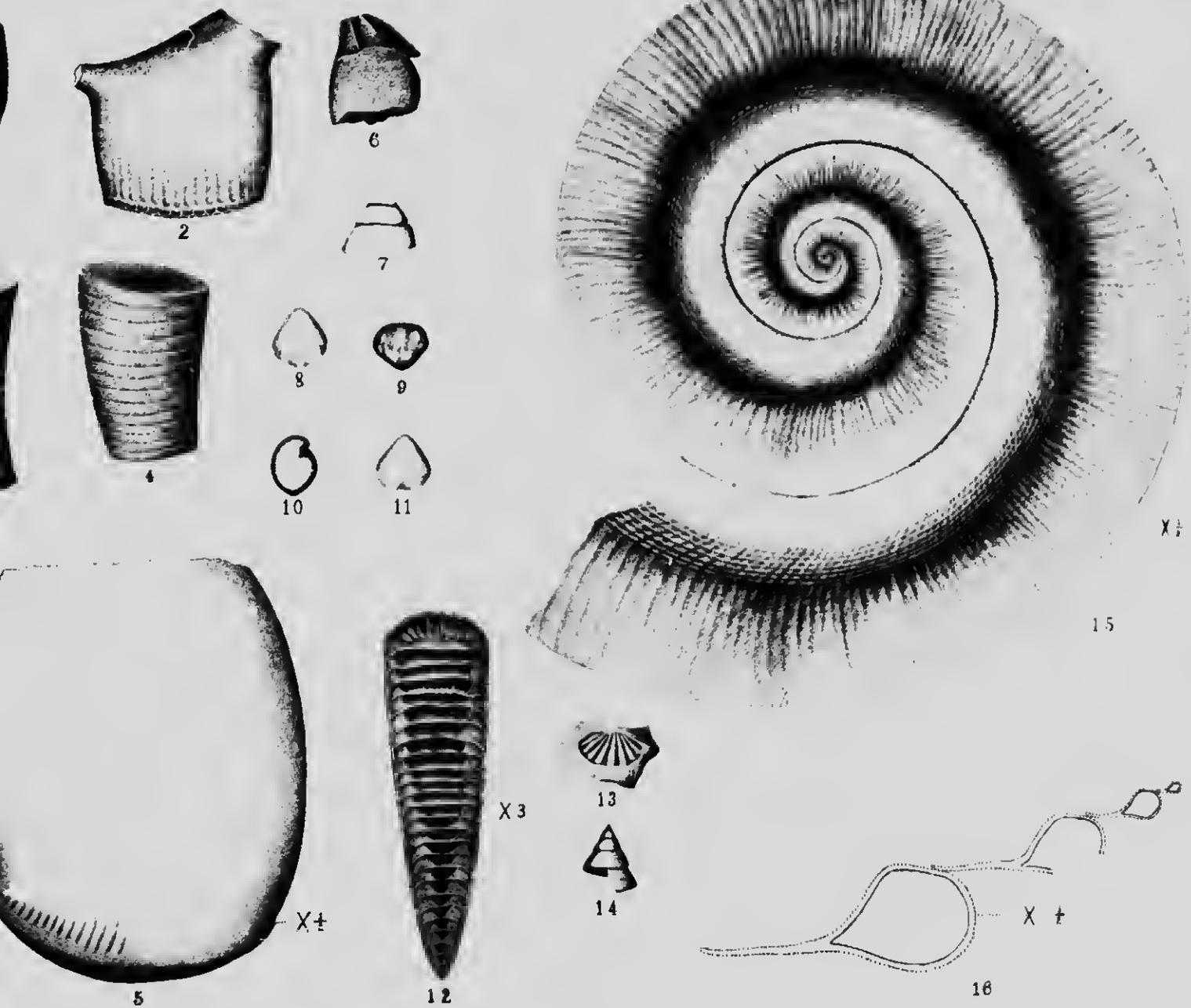
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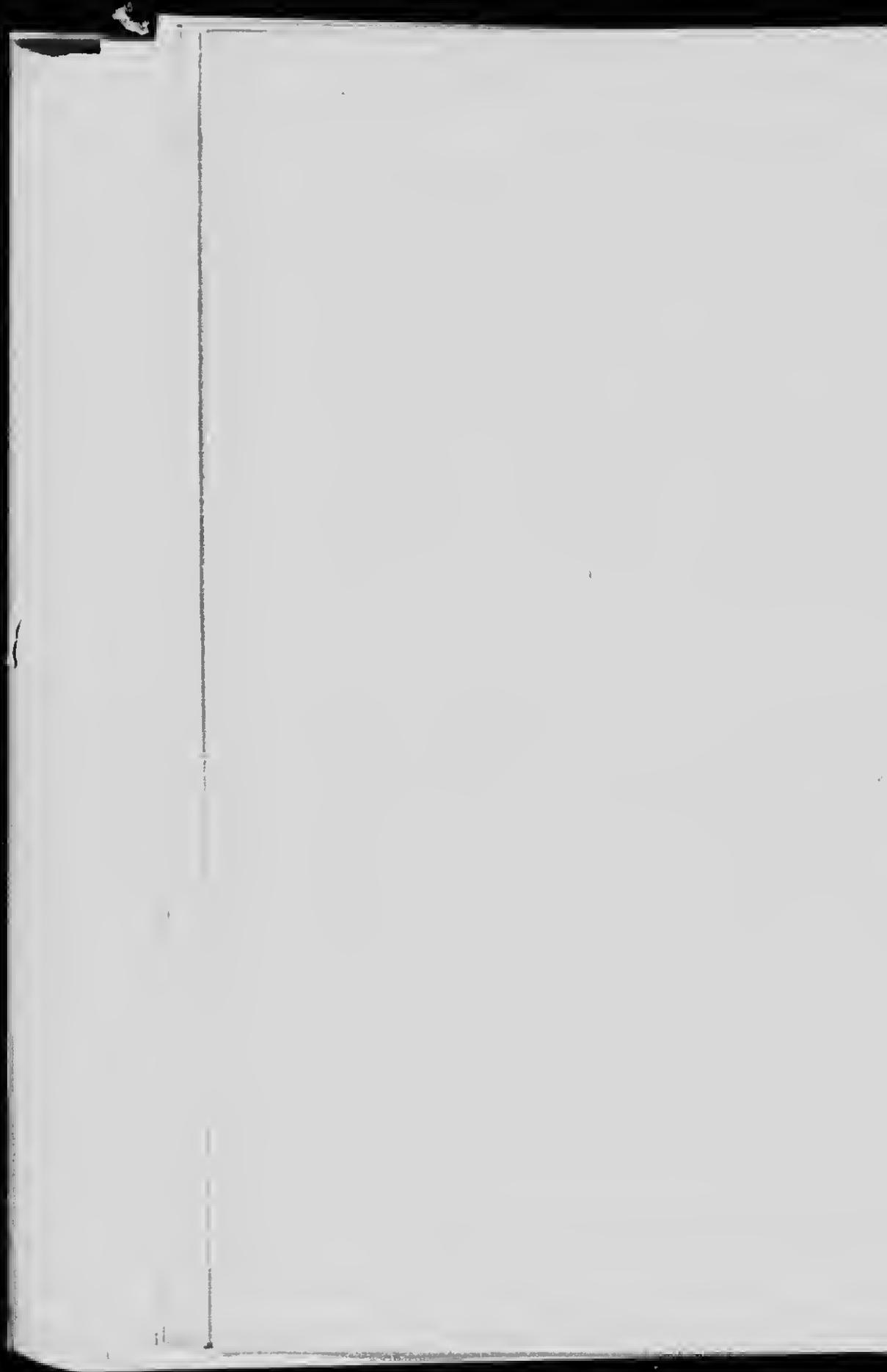


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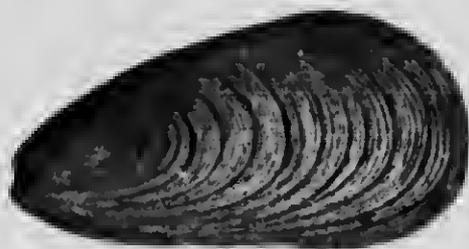
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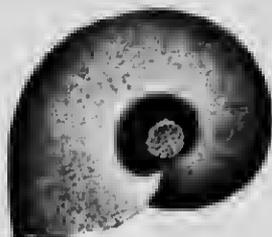
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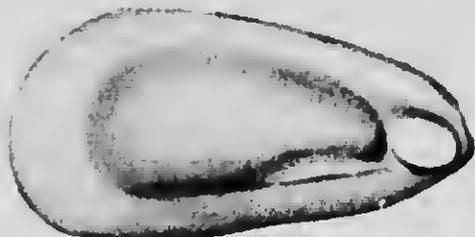
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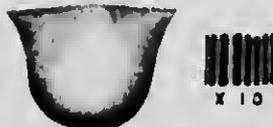
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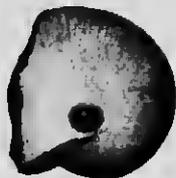
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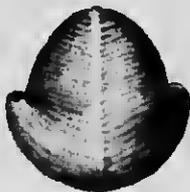
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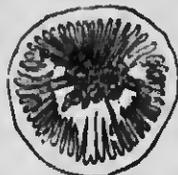
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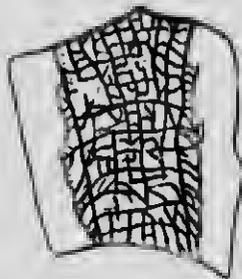




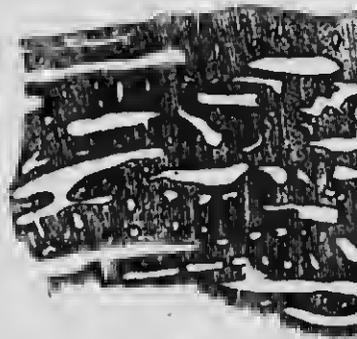
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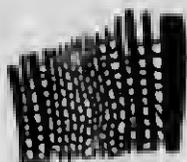


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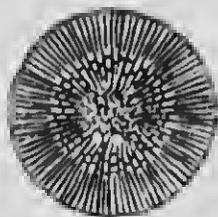


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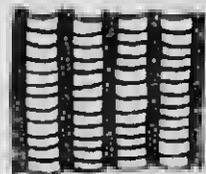
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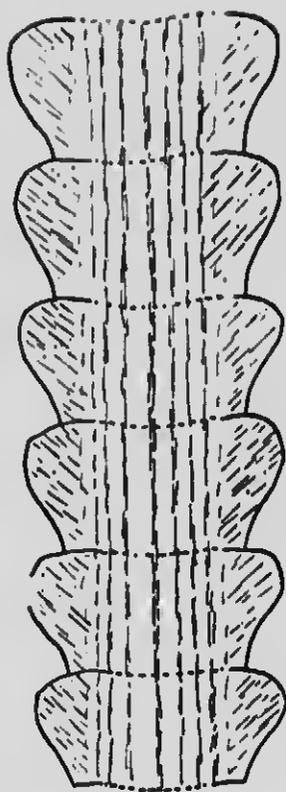


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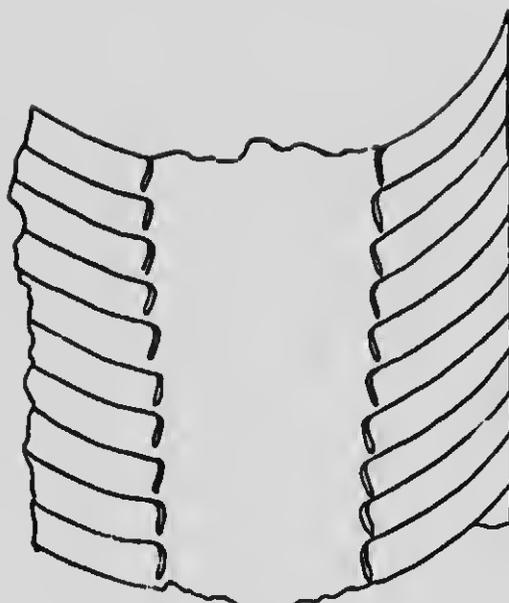


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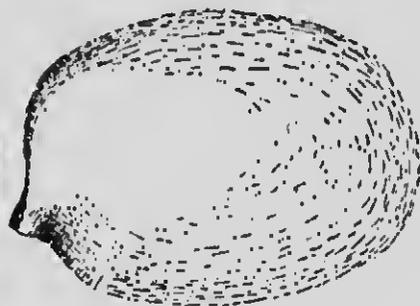
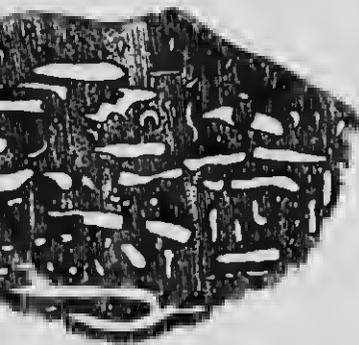
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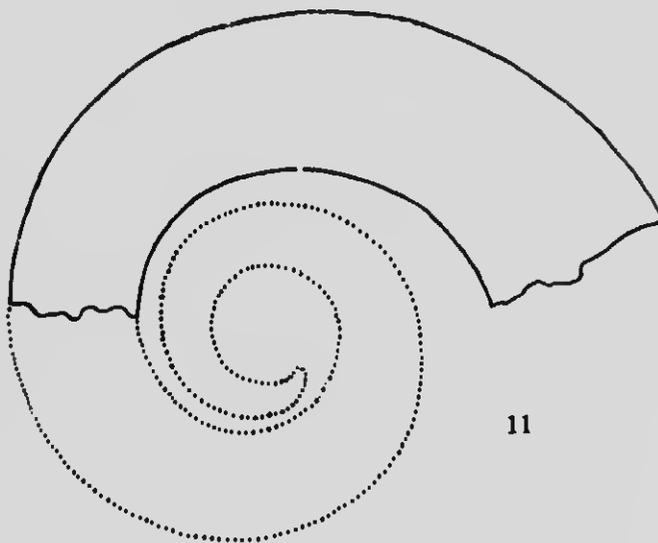
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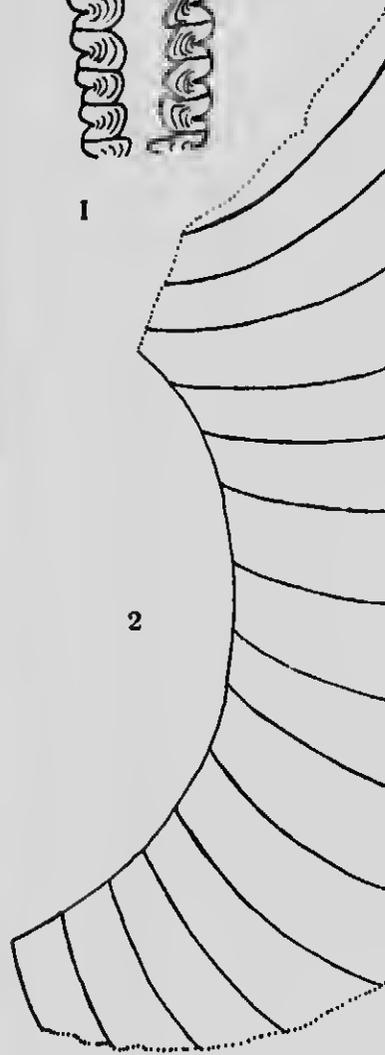
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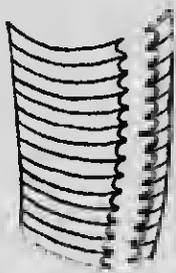
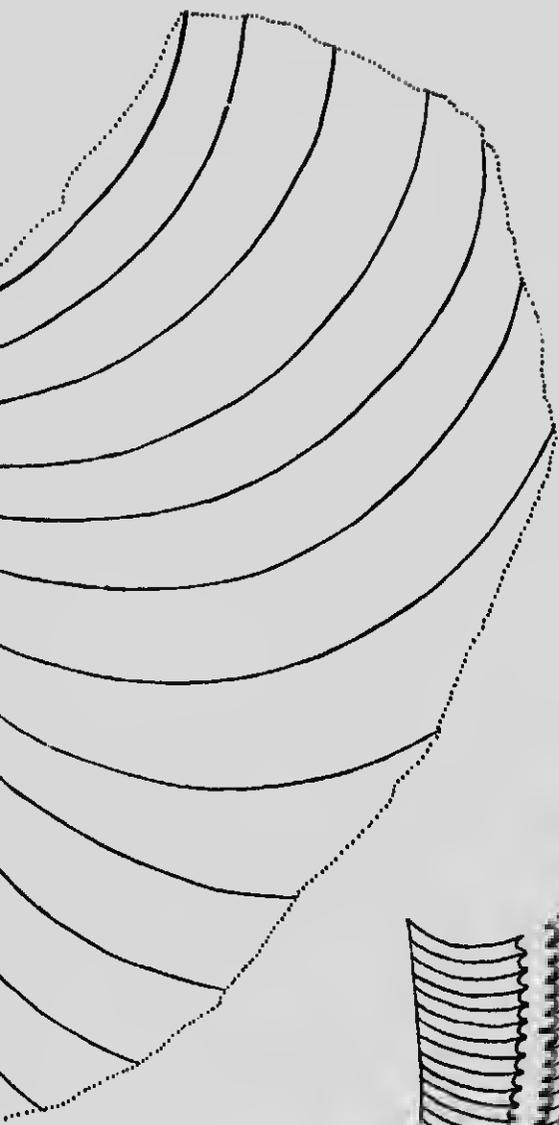
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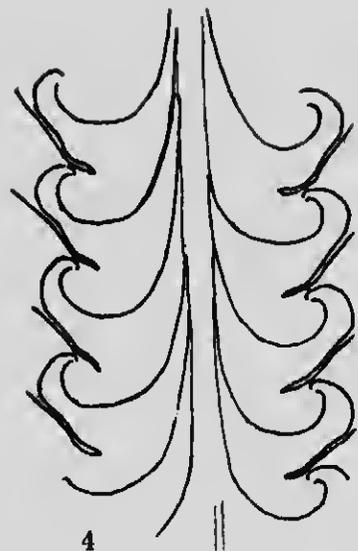


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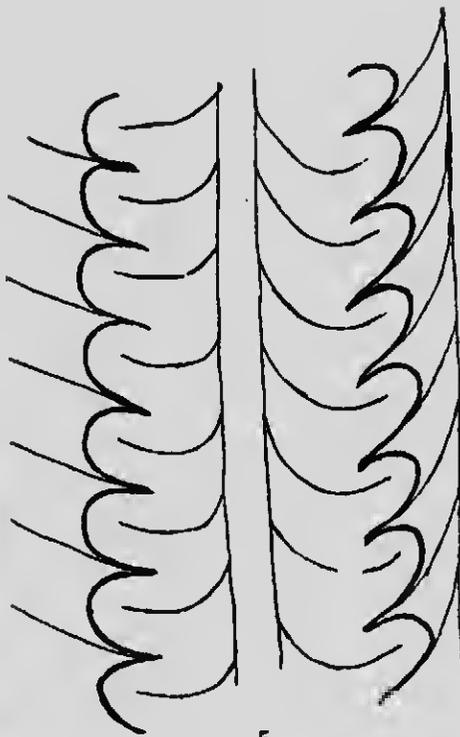
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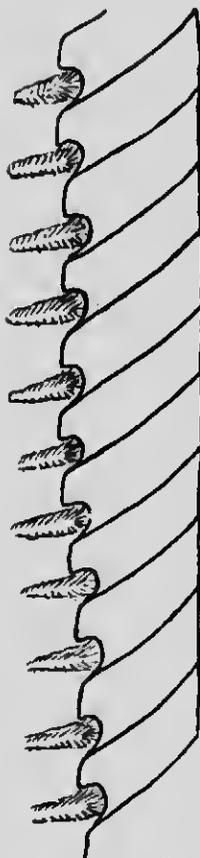
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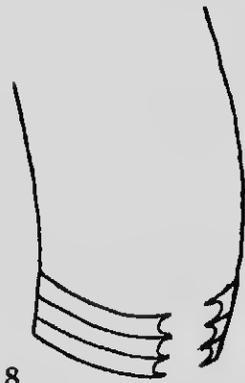
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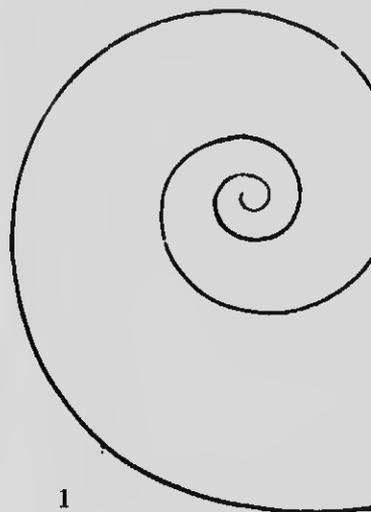
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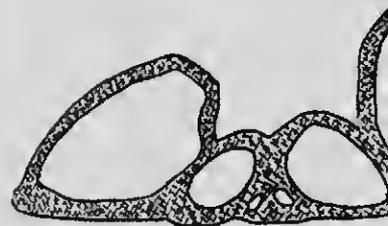
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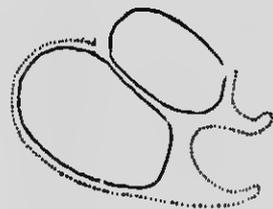




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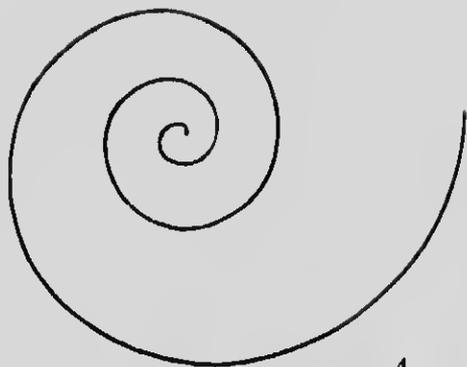
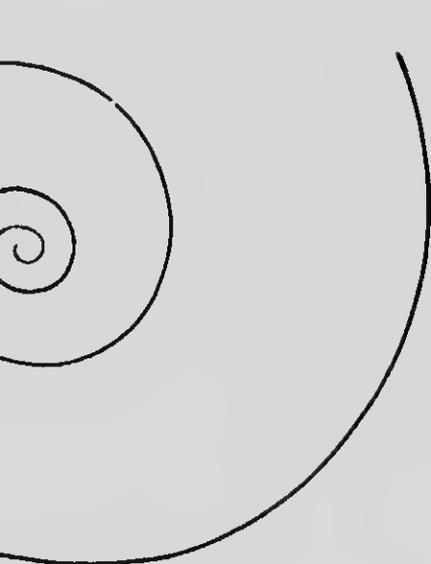
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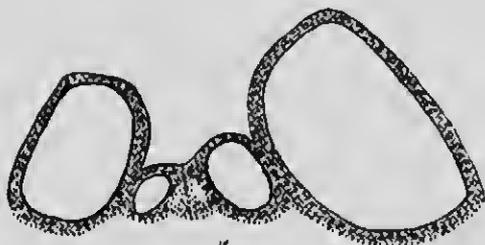
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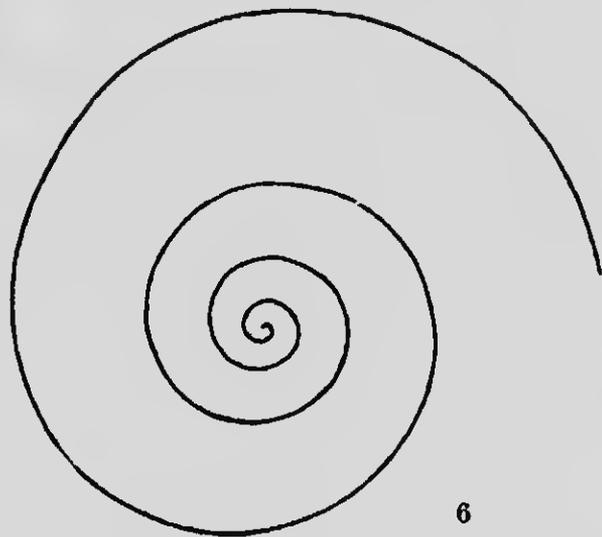
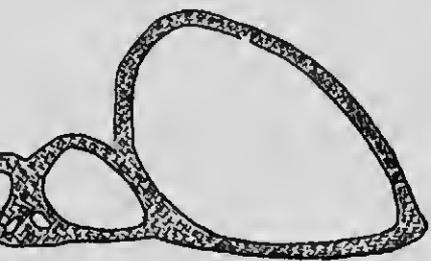
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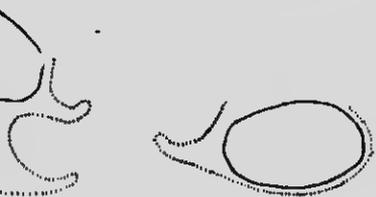
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