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THE OTTAWA NATURALIST.

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ANNUAL MEETING. O.F.N.C., TUESDAY, MARCH 14th, 8 p.m.
Y.M.C.A. Hall. Election of Officers and Reading of Reports.

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THE OTTAWA NATURALIST.

VOL. XII.

OTTAWA, MARCH, 1899.

No. 12.

ON SOME SPECIES OF CANADIAN PALÆOZOIC CORALS.

By LAWRENCE M. LAMBE, F. G. S.

(Continued from p. 226.)

To the notes on Canadian fossil corals published in the preceding part of this volume are added the following, with descriptions of two species that are regarded as new.

CYATHOPHYLLUM ANTICOSTIENSE, Billings.

Cyathophyllum Anticostiense, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. I, p. 109.

" *solitarium*, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 93.

Corallum simple, of moderate size, cylindro-turbinate, straight or very slightly curved, broadest near the upper end, attaining a length of about 18 cent. with a maximum diameter of over 6.5 cent. Epitheca very thin, preserved only in small patches, shewing indications of the structure beneath. Calyx rather shallow, its sides expanding outward in a gentle convex curve. Internally there is present a narrow tabulate zone, about one-fourth the diameter of the corallite, with a broad combined vesicular and septate zone surrounding it. Tabulæ thin, numerous, inosculating, in some coralla bent down at the margin, eight or ten occurring in a space of 5 mm. Septa straight, numbering from about one hundred to one hundred and twenty, of two definite lengths alternating with each other, one half reaching the centre of the visceral chamber, the remainder stopping short of the tabulæ, becoming weak and subordinate to the dissepiments near the periphery. Dissepiments strongly

developed, small, numerous, curving upward and outward between the septa, appearing in radial sections of the corallites as slightly convex plates enclosing narrow and comparatively long spaces. In tangential sections near the surface the dissepiments are seen to be angular midway between the septa, both halves of a dissepiment curving downward toward each other convexly. The dissepiments on either side of a septum generally correspond, so that at the surface with the scant development of the septa in that part, they appear as close-set horizontal wavy lines simulating the structure of *Chonophyllum*, more particularly that of *C. magnificum*, Billings.

Locality and formation.—South-west Point, Anticosti, division 4 of the Anticosti group, four specimens collected by J. Richardson in 1856. Portage Bay, Grand Manitoulin Island, Lake Huron, R. Bell and H.G. Vennor, 1865; Clinton and Niagara formations.

CYATHOPHYLLUM SPENCERI, sp. nov

Acerularia profunda, Billings. 1876. Geol. Surv. Canada, Rep. Progress 1874-75, p. 68.

Cyathophyllum profundum, Whiteaves. 1892. Geol. Surv. Canada, Contr. Canad. Palæont., vol I, pt. IV, p. 267.

“ *profundum*, var., Whiteaves. 1892. Ibid, p. 268, pl. XXXVI, figs. 4, 4a.

Corallum composite, formed of closely connected, crowded, polygonal generally hexagonal corallites that diverge from a small base and form thick somewhat explanate masses; largest specimen seen about 15 cent. broad and 6 cent. thick or high. Frequently spaces are left between the corallites at or near the edge of the corallum due to the less crowded growth of the corallites here and their assumption of a more nearly cylindrical form. A line of contact between contiguous corallites is recognizable, shewing that each corallite is contained inside its own walls, also some specimens have been preserved in such a manner as to admit of the corallites being separated from each other

along this line of contact. Surface of corallites irregularly ribbed transversely, with fine growth lines between, and longitudinally striated by shallow septal grooves. Corallites varying in size in the same individual and in different specimens, from about 8 to 12 mm. in the majority of specimens, and from 10 to 17 mm. in the largest specimen. Calyces polygonal in outline, their confluent margins prominently angular, depth about one-half the width, sides steep, bottom narrowly concave, septate to the centre. Septa of two lengths, from about forty-eight to fifty-six in number in different specimens, of which the longer meet at the centre of the visceral chamber and the remainder reach more than half way and often nearly to the centre, their sides not ornamented with arched carinæ. Tabulæ flat, close set, four or five in a length of 1 mm., moderately regular, their continuity in a horizontal plane often interrupted by the passage of the septa through them, narrow, forming a small but well defined central area from about one-fifth to one-third the diameter of the corallite in width. Vesicular zone surrounding the tabulate area, broad, made up of small vesicles of rather equal size, in eight or nine obliquely ascending rows, filling the interseptal loculi. Increase apparently by interstitial gemmation.

This species differs from *C. quadrigeminum*, Goldfuss, principally in having a much narrower tabulate area and a resultant broader vesicular zone, in having the two orders of septa more nearly of a size and in the absence of septal carinæ.

Locality and formation.—Dawson Bay, Lake Winnipegosis, J. W. Spencer, 1874 ; Lake Manitoba, on east side of Narrows, J. B. Tyrrell, 1888 ; and Lake Winnipegosis at Snake Island and in Dawson Bay also at Lower Salt Spring, Red Deer River, J. B. Tyrrell and D. B. Dowling, 1889 ; Devonian formation.

CYATHOPHYLLUM DAWSONI, sp. nov.

Zaphrentis Minas, pars, Dawson, 1868. Acadian Geology, second edition, p. 286 (longest specimen).

Corallum simple, elongate, slightly curved, in the type specimen broadest at mid-length, contracted near the top,

annulated somewhat irregularly by well marked ridges and constrictions and by minor ridges of growth, the whole outer surface when sufficiently well preserved shewing fine, close-set, transverse raised lines about twelve in the space of 1 mm. as well as longitudinal septal striations; type specimen 6 cent. long, as measured on the convex curve, imperfect below where the basal part, possibly about 3 or 4 cent. in length, has been broken off. Calyx shallowly concave, smooth at the bottom with the septa prominent on the margin and sides. Tabulæ broad, flat, usually bent down at the edge, close-set, forming a definite central area a little over 1 cent. in breadth. Septa rather crooked, of two lengths, the larger reaching the tabulæ and often encroaching on them, the smaller not quite half the length of the larger ones, irregular, rather poorly defined, numbering in all about sixty. Vesicular zone outside the tabulæ, averaging about 5 mm. in breadth, made up of unequal, arched, dissepiments directed upward and outward between the septa.

Locality and formation.—Kennetcook, Nova Scotia, collected by Professor How; lower Carboniferous formation; one specimen belonging to the collection of the Redpath Museum McGill University, Montreal.

DIPHYPHYLLUM CÆSPITOSUM, Hall, sp.

Diplophyllum cæspitosum, Hall. 1852. Palæont. New York, vol. II, p. 116, pl. XXXIII, figs. 1 a-r.

Cyathophyllum pelagicum, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. I, p. 108.

“ *pelagicum*, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 34.

Diplophyllum cæspitosum, Nicholson, 1875. Rep. Palæont. Prov. Ontario, p. 59.

Corallum aggregate, composed of upright, slender flexuous, cylindrical corallites, increasing by lateral gemmation and forming large colonies. Corallites varying in diameter from about 5 to 8 mm., frequently touching each other, covered by

an epitheca marked annularly by fine growth lines and longitudinally by faint septal striæ. Septa of two sizes alternating with each other, the primaries almost reaching the centre, the secondaries about half the length of the primaries, averaging in number according to the size of the corallite from about forty to fifty in all. Dissepiments arching upward, between the septa, against the outside wall, generally in a single series, their cut edges as seen in transverse sections assuming the appearance of an inner wall situate less than 1 mm. from the wall proper. Tabulæ large, numerous, stretching across the visceral chamber so as to reach the dissepimental zone on either side, flat or slightly concave at the centre, deflected downward near the periphery, about ten occurring in a space of 5 mm.

Locality and formation.—Becscie River Bay, Anticosti, division 2 of the Anticosti group, J. Richardson, 1856; according to Billings the colonies measure from 6 to 15 inches in diameter.

Professor Nicholson mentions this species as occurring abundantly and in large masses in the Niagara limestone of Thorold, Ont (op. cit. p. 59).

DIPHYPHYLLUM MULTICAULE, Hall, sp.

Syringopora ? multicaulis, Hall. 1852. Palæont. New York, vol. II, p. 119, pl XXXIII, figs. 3a—g.

Eridophyllum Vennori, Billings. 1865. Canad. Nat. and Geol., vol. II, 2nd. series, p. 431.

Diphyphyllum multicaule, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 121, pl. XLV, figs. 3 and 4.

Corallum composed of upright, subparallel, cylindrical corallites, from about 2.5 to 5 mm. in thickness, that increase by lateral budding and form colonies sometimes over 12 cent. high and exceeding 10 cent. across. Corallites slender, flexuous, separated from each other by spaces equal to or less than their own diameters, connected at irregular and frequent intervals by horizontal acanthiform outgrowths or lateral spurs that are to all appearances not solid but shew traces of vesicular structure

within. Septa numbering from about thirty-two to thirty-eight in average sized corallites, alternately long and short, the longer passing to the centre, the shorter reaching about half-way. Curved dissepiments in the outer part of the interseptal spaces in a single or at times apparently in a double series. Tabulæ close-set, about twenty in a space of 5 mm., deflected downward at their margins, difficult to make out in the silicified specimens examined. Epitheca well developed, shewing faint annular markings and longitudinal septal lines.

The corallites of this species are more slender than those of the preceding and the septa are less numerous.

Locality and formation.—Grand Manitoulin Island, Lake Huron, collected by Alexander Murray in 1847; also by R. Bell and H. G. Vennor, 1865; by J. Townsend, 1883 and by R. Bell, 1891; Niagara formation.

Rominger mentions its occurrence in the Niagara rocks of Point Detour, Lake Huron.

DIPHYPHYLLUM SIMCOENSE, Billings, sp.

Eridophyllum Simcoense, Billings. 1859. Canad. Journ. vol., IV. new series, p. 132, fig. 27.

Diphyphyllum stramineum, Billings. 1859. Ibid, p. 135.

" *stramineum*, Nicholson 1874. Rep. Palæont. Prov. Ontario, p. 33, pl. v, fig. 6

Eridophyllum Simcoense, Nicholson 1874 Ibid, p. 34, pl. VI, fig. 5.

Diphyphyllum Simcoense, Rominger. 1876 Geol. Surv. Michigan, Fossil Corals, p. 122, pl. XLVI, figs. 3 and 4.

Amplexus or *Diphyphyllum*, Whiteaves, 1892. Geol. Surv. Canada, Contr. Canad. Palæont., vol. I, pt. IV, p. 270, pl. XXXV, figs. 2, 2a.

Corallum bushy, composed of flexuous, cylindrical corallites radiating upward from a small basal beginning and rapidly increasing by lateral budding so as to form colonies at times 25 cent. high and equally broad. Corallites varying in diameter

from 3 to 6 or 7 mm., frequently roughened by annular swellings of growth and constrictions, covered by an epitheca shewing minor growth markings and longitudinal septal furrows. There is a marked variation in different colonies in the number of horizontal spurs connecting the corallites: in some specimens they are numerous from about 2 to 4 mm. apart vertically, springing outward from all sides of the corallites, in others they occur at less frequent intervals whilst in some they appear to be almost absent. Septa short, bearing arched carinæ on their sides, divisible into two sizes, primaries and secondaries, numbering in all from about thirty to forty, the primaries seldom reaching half way to the centre of the visceral chamber, the secondaries very short, projecting but little inside of the single row of curved dissepiments in the interseptal spaces. In transverse sections of the corallites the dissepiments have the appearance of an inner wall about 5 mm. distant from the wall proper as in the Silurian species *D. cæspitosum*, Hall. Tabulæ well developed, flat, horizontal, bent slightly down at their edges; from ten to fifteen occurring in a space of 5 mm.

This species is somewhat similar in inside structure to *D. cæspitosum*, Hall from which it differs principally in having shorter and less numerous septa.

The coral from the Devonian (Stringocephalus zone) of Dawson Bay and vicinity, Lake Winnipegosis, described by Mr. Whiteaves (op. cit. pp. 270 and 271), and mentioned by him as bearing "a remarkably close resemblance in size, shape and internal structure" to "the *Diphyphyllum stramineum* of Billings," is here referred to *D. Simcoense* with which the writer considers *D. stramineum* to be conspecific, a view already expressed by Dr. Rominger in his excellent work on fossil corals.

Locality and formation.—Abundant in the Corniferous formation of Ontario; also from the middle Devonian of Lake Winnipegosis.

OMPHYMA ERIPHYLE, Billings, sp.

?*Omphyra subturbinata*, Milne-Edwards and Haime. 1855. Brit. Foss. Corals, p. 288, pl. LXVIII, figs. 1, 1 a—c.

Cyathophyllum Eriphyle, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. 1, p. 111.

Corallum simple, large, cylindro-turbinate. Outer surface marked transversely with shallow constrictions alternating with low growth-swellings, 5 or 6 mm. broad, representing successive calicular margins. Epitheca thin, with numerous transverse growth-lines and longitudinal depressed linear markings 2 or 3 mm. apart. Internal structure, as viewed in longitudinal and transverse sections, composed of a central tabulate area, about one-third the diameter of the corallite, surrounded by a broad vesicular zone. Tabulæ flat, close set, moderately regular, sometimes anastomosing, about twelve in a space of 1 cent. Vesicles unequal in size, from 1 or 2 mm. to over 1 cent. in length, made up of arched plates curving upward and outward. The tabulæ are at intervals continued obliquely outward over the vesicles so as to form in reality a succession of invaginated cups flat at the bottom with dilated convex sides. Septa discontinuous vertically, formed by the infolding of the sides of the cups, broad and angular at the periphery, becoming lamellar within, not encroaching on the tabulate area, numbering about eighty and apparently of equal length. Calyx moderately deep. Length from 10 to 25 cent., diameter from 5 to 6.5 cent.

Locality and formation.—Anse à la Vicille, Baie des Chaleurs, collected by Sir W. E. Logan in 1843; Lower Helderberg formation.

ARACHNOPHYLLUM DIFFLUENS, Milne-Edwards and Haime, sp.

Strombodes diffluens, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 431.

" *diffluens*, Milne-Edwards and Haime 1855. Brit. Foss. Corals, 294, pl. LXXI, figs. 2, 2a.

" *diffluens*, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 34.

" *pygmæus*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 131, pl. XLVIII, fig. 3.

Corallum forming laminar or discoidal expansions, composed of confluent corallites whose calyces open on the surface with scarcely any line of demarcation between them; reaching a breadth of 9 cent. and a thickness of between 2 and 3 cent. Calyces, varying in width from 8 to 12 mm., flat or shallowly concave in the marginal area, with a circular, elevated rim surrounding a central pit 3 or 4 mm. in diameter, from which radiate the septa as narrow convex ribs having a maximum breadth of about 5 mm. The elevated rims surrounding the pits stand, in some specimens, much more prominently above the surrounding sunken calycinal extension than in others, whilst at times they develop into salient, conical projections with the pit forming an excavation at the top. Lateral junction of contiguous calyces sometimes very slightly raised, more often seen as a plane surface in which no dividing line is apparent. Septa averaging thirty in number: as in other species of the genus, lamellar and continuous vertically in the vicinity of the central pit, converted on the flat calicinal margin into surface ribs that join those of neighbouring calyces; of two orders, alternating with each other within the pit, the primaries reaching the centre or leaving a narrow, circular smooth spot at the centre, the secondaries not continued beyond the sides of the pit. As in *A. pentagonum*, Goldfuss, a coalescence of the inner septal ends in sets of twos and their continuance as single septa is often observed. Double rows of pore-openings are present in the septal ridges. The dissepimental and vesicular structure is similar to that of *A. pentagonum* only proportionately smaller. Small flat tabulæ occur in the centre of the visceral chamber.

Locality and formation.—Five miles west of Chicotte River, Anticosti, J. Richardson, 1856; Owen Sound, Ont., J. Townsend, 1874 to 1883; north end of Lake Temiscaming, Que., R. Bell, 1887; Niagara formation.

ARACHNOPHYLLUM EXIMIUM, Billings, sp.

Strombodes eximius, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 93.

Original description.—"Corallum composite, apparently forming large depressed hemispherical colonies. Corallites from 9 to 15 lines across, the calice slightly concave in the outer half of the width, the central depression three or four lines wide. There are about fifty septo-costal radii in a corallite 14 lines across." "This species differs from *Strombodes pentagonus* and *Strombodes striatus* (both of which occur in the same beds) in having much coarser radii."

Additional specimens were collected by J. Townsend on Grand Manitoulin Island in 1883; one specimen in particular shews the structure admirably.

Further details as to the growth of the corallum are here appended—Corallum composite, explanate, discoidal, sometimes over 13 cent. broad and 3 cent. thick, upper surface flat or slightly convex. Corallites upright, confluent, varying in breadth from 2 to 3 cent., with shallowly concave calyces whose boundaries are poorly defined and only slightly elevated. Calyces with a well marked, rather deep and comparatively broad central pit, averaging nearly 1 cent. in width, having steep at times almost vertical sides and a flat bottom. Tabulæ, forming a well defined axial area, flat or slightly convex, turned down at their edges, as broad as the pit is wide, about sixteen in a space of 5 mm. Septa, numbering from about forty to fifty-two, lamellar and uninterrupted in a narrow area surrounding the tabulæ, of two orders, the primaries reaching the centre of the tabulæ as carinæ, the secondaries not infringing on the tabulæ; beyond the confines of the central pit their vertical continuity is interrupted and they radiate outward as gradually broadening flatly convex ribs, reaching a maximum breadth of 2 mm. at the edge of the calycinal extension where they meet the septal ribs of adjacent calyces. Pore-openings in the septal ribs have not been recognized in specimens belonging to this species. The vesicular structure supporting the calycinal floors developed at intervals in the upward growth of the colony is composed of blister-like plates that are rather smaller and less convex than in other species of the genus, also the radially folded calycinal

floors appear to be developed with greater frequency and are consequently closer together than in *A. pentagonum*, Goldfuss, from which this species differs in many essential points. Between the lamellar septa arched dissepiments curve downward to meet the tabulæ.

Locality and formation.—West Point, Grand Manitoulin Island, Lake Huron, R. Bell, 1866, and Grand Manitoulin Island, J. Townsend. 1883; Niagara formation.

CLISIOPHYLLUM BILLINGSI, Dawson, sp.

Cyathophyllum Billingsi, Dawson. 1868. Acadian Geology, second edition, p. 287, fig. 84 b.

Corallum simple, turbinate, evenly curved, annulated by distinct ridges of growth, terminating above in a shallow calyx; nearly 5 cent. long as measured on the convex curve, 18 mm. broad near the top. Epitheca complete, thin, with very fine, close-set, transverse growth lines and longitudinal septal striæ. Internally a narrow peripheral, vesicular area, in breadth equal to about one-fifth the maximum diameter of the corallum and made up of small convex plates arching upward and outward, surrounds a broad inner zone of vesicles that are directed upward and inward and fill the interseptal spaces, the centre being occupied by a columella that appears at the bottom of the calyx as a thin, laterally compressed projection. Septa about seventy-two in number, of two sizes alternating with each other, the primaries well developed, a few of them passing to the centre the remainder almost reaching the centre, the secondaries very short. In the calyx the secondaries appear only at the periphery but the primaries are conspicuous as sharp-edged lamellæ converging toward the centre. On the surface where the epitheca has been removed by weathering the outer edges of the two orders of septa are exposed as longitudinal ribs of equal strength with the horizontal edges of the vesicular plates filling the spaces between them.

Locality and formation.—Lower Stewiacke, county of Colchester, Nova Scotia, collected by Mr. C. F. Hartt: lower

Carboniferous formation. One specimen the property of the Redpath Museum, McGill University, Montreal.

LONSDALEIA PICTOENSE, Billings, sp.

Lithostrotion Pictoense, Billings. 1868. Dawson's Acadian Geology, second edition, p. 285, fig. 83.

Corallum compound, fasciculate, composed of long, upright, flexuous, cylindrical corallites that increase freely by lateral calicinal gemmation and are separated from each other by spaces of variable width though frequently in contact. Corallites attaining a breadth of about 10 mm., the young ones beginning with a diameter of between 2 and 3 mm. Epitheca complete. Internal structure consisting of a circumferential vesicular zone, in breadth equal to about one-fifth the diameter of the corallite, defined within by a stout inner wall that encloses a tabulate area at the centre of which is a comparatively large columella about 1 mm. in thickness. From the inner wall converge short, strong, well defined septa that are occasionally extended outward into the vesicular zone and more rarely reach the outer wall. The septa extend only about half-way across the space between the inner wall and the columella; alternating with them are observed occasionally rudimentary septa which are also indicated in the outer wall in those exceptional instances when the primary septa traverse the peripheral vesicular area. Tabulae moderately regular, about twelve in a space of 5 mm., inclined slightly upward at their junction with the inner wall and rising suddenly and inosculating with each other near the centre so as to form the columella. Vesicles of the outer area long and narrow, formed by curved plates rather unequal in size, that are directed obliquely upward and outward and fill the space between the two walls.

Represented in the collection by a small fragment, roughly 4 cent. broad and over 2 cent. high, embedded in compact limestone that hides the exact characters of the surface of the corallites.

Locality and formation.—East River, Pictou, Nova Scotia, collected by Sir J. William Dawson; lower Carboniferous formation.

PHILLIPSTRÆA BILLINGSI, Calvin.

Phillipstræa gigas, Billings, 1859. Canad. Journ., vol. IV, new series, p. 128; incorrectly identified with *Arachnophyllum (Astrea?) gigas*, Owen.

“ *gigas*, Nicholson. 1875. Rep. Palæont. Prov. Ontario, p. 77.

“ *gigas(?)*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 128, pl. XXXVII, fig. 4.

“ *billingsi*, Calvin. 1893. Amer. Geologist, vol. XII, p. 111, pl. VI, figs. 1 and 2.

Corallum composite, large, discoidal, more or less convex above, rather flat below, formed of slightly divergent, confluent, polygonal corallites, from about 2 to over 4 cent. in diameter, that increase by marginal calicinal gemmation from a central basal beginning; attaining a breadth of over 40 cent. and a height of nearly 12 cent. Basal surface covered by a concentrically wrinkled epitheca. Corallites not bounded by a wall, their septa meeting and becoming confluent with those of the neighbouring corallites; opening on the upper surface in calyces having a broadly convex, exsert reflexed circular rim surrounding a deep, steep-sided pit measuring from about 8 to 10 mm. in diameter and 4 or 5 mm. deep. Septa well developed, numbering from about forty to sixty, of two alternating sizes, the larger reaching the centre and becoming somewhat twisted, or falling short of it, the smaller not extending beyond the sides of the central pit; they are decorated on their sides by arched carinæ curving upward and inward and appearing on their free edges in the central pit and reflexed calicinal margins as small transverse denticulations. Tabulæ, forming a narrow axial area, at times well developed, flat at the centre, turned down at the edge, the primary septa passing over them to the centre as carinæ, at

other times interfered with by the septal ends which cut into them and destroy their horizontal continuity giving them more the character of dissepiments than of tabulæ. Dissepiments filling the interseptal spaces and curving upward and outward in regular order, those in the peripheral region being generally larger than those nearer the centre; they are pierced at their junction with each other by oval or circular pore-openings forming a uniserial row midway between the septa.

Locality and formation.—Corniferous formation of Ontario.

PHILLIPSASTRÆA VERNEULI, Milne-Edwards and Haime.

Phillipsastrea Verneuli, Milne-Edwards and Haime. 1851.

Polyp. Foss. Terr. Palæoz., p. 447, pl. 10, fig. 5

“ *Verneuli*, Billings. 1859. Canad. Journ., vol. IV, new series, p. 127, fig. 24.

Phillipsastræa Verneuli, Rominger. 1876. Geol. Surv. Michigan,

Fossil Corals, p. 127, pl. XXXVIII, fig. 2.

Phillipsastrea affinis, Billings. 1874 Geol. Surv. Canada, Palæoz.

Fossils, vol. II, pt. I, p. 11.

Phillipsastræa Verneuli, Nicholson. 1875. Rep. Palæont. Prov.

Ontario, p. 78.

Corallum forming large discoidal masses over 30 cent. broad and 8 cent. thick or high, upper surface flat, lower surface irregular, strongly marked by concentric foldings or wrinkles of growth and covered by an epitheca. Septa numbering from about thirty to forty-six. Corallites varying in diameter from 10 to 16 mm. Central pit of the calices from 3 to 5 mm. in diameter. In no particular does this species differ from *P. Billingsi* except in the smaller size of its corallites and in a diminution in the number of the septa. In transverse sections and in weathered specimens it is observed that a single row of pore-openings occurs between each pair of septa, the pores piercing the dissepiments where they rest on each other, the distance apart of the pores in a single row thus depending on the size of the dissepiments. This pore structure which

appears not to have been noticed previously in species of this genus and which is well shewn in some specimens of *P. Billingsi* in the collection is apparently somewhat analogous to that which is seen in some species of the genus *Arachnophyllum*.

Locality and formation.—Corniferous formation of Ontario; Indian Cove, Gaspé, in the Gaspé limestone, No. 8 (Oriskany formation), collected by R. Bell in 1862; also three loose specimens from the Devonian area south of Hudson Bay, collected by R. Bell in 1877 at Long Portage, Missinaibi River to Moose Factory. Of the Long Portage specimens one has corallites of average size but the other two have corallites and calicinal pits that are considerably larger than those of specimens usually assigned to this species and approach in size those of the smaller forms of *P. Billingsi*. Measurements taken from the two last mentioned specimens give the following results—diameter of calyces from 17 to 20 mm., diameter of central pits 6 or 7 mm. In all three specimens the septa number from about forty to forty-four and the pore-openings can be detected in natural transverse sections.

Mr. Whiteaves records* the occurrence of this species in the Hamilton formation on the authority of Mr. Schuchert who collected a good specimen of it at Bartlett's Mills in 1895,

CHONOPHYLLUM NYMPHALE, Billings, sp.

Cyathophyllum nymphale, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. I, p. III.

Corallum simple, short, broadly expanded, concave on the lower surface, convex above; dimensions of the type and only specimen known, height at centre 4 cent., breadth about 9 cent. Basal surface apparently provided with an epitheca. Calyx shallow, convex at the centre, with broadly expanding reflexed margins exhibiting about eighty low, rounded septal ribs that increase in breadth outwardly. In a radial section a central area, about 1 cent. in breadth, is disclosed; it is made up of small slightly convex plates arching upward and inward so as to form

*Geol. Surv. Canada, Contr. Canad. Palæont., vol. 1, pt. v, p. 365.

an axial vesicular mass whose surface appears in the calyx as a rounded protuberance. Surrounding the central area is a broad vesicular zone in which can be detected the gradual growth upward of the corallum by the superposition of vesicular layers, 2 or 3 mm. in thickness, each layer terminating above in a thin covering of flexuous, continuous laminæ representing the position of the surface of previous calyces. The convex plates composing the vesicular layers are small, generally 1 mm. or less in length. The septa, starting at the confines of the central vesicular area, radiate outward as thin vertical laminæ and disappear in the peripheral region; they are represented on the calicular surface by the gradually broadening superficial convex ribs that are connected with each other laterally. In tangential sections at the margin of the calicular expansions the cut edges of the septal ribs, here about 3 mm. in breadth, appear as horizontal continuous parallel wavy lines. What appear to be septal carinæ or possibly structures analogous to the supporting processes of the septal laminæ as developed in some species of the genus are seen in the radial section of the corallum.

Locality and formation.—Anse à la Vieille, Baie des Chaleurs, one specimen collected by Sir W. E. Logan in 1843; Lower Helderberg formation.

ZAPHRENTIS GIGANTEA, Lesueur, sp.

Caryophyllia gigantea, Lesueur. 1820. Mém. du Mus., t. VI, p. 296.

Zaphrentis gigantea, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 340, pl. IV, figs. 1, 1a-c.

" *gigantea*, Billings. 1859. Canad. Journ., vol. IV, new series, p. 121,

" *gigantea*, Nicholson. 1874. Rep. Palæont. Prov. Ontario, p. 22, pl. III, figs. 1, 1a.

" *Eriphyle*, Billings. 1875. Canad. Nat. and Geol., vol. VII, 2nd. series, p. 233.

" *Hecuba*, Billings. 1875. Ibid, p. 234.

" *gigantea*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 145, pl. LII.

“ Polypier cylindro-conique, très-long, à bourrelets d'accroissement larges et peu saillants ; fossette septale proportionnellement un peu petite, située très-près de la muraille ; au moins 70 cloisons égales, minces, arrivant sur la partie supérieure des planchers jusqu' à une petite distance du centre, où elles sont légèrement flexueuses ; un égal nombre de cloisons rudimentaires ; planchers très-grands, envahissant les loges intercloisonnaires, où l'on ne voit pas de traverses vésiculuses indépendantes, et lisses en dessous dans une grande étendue. La longueur est fréquemment de 40 à 50 centimètres ou même plus, le diamètre du calice de 7 ou 8” (Milne-Edwards and Haime).

The description given by Rominger of this species is a thorough and accurate one and makes allowance for the variations that exist in this species in common with most other species; it appears in the following words :—“ Conico-cylindrical, horn-shaped polyparia, attaining in some specimens a size of two and a half feet in length, by a diameter of three inches. Some enlarge their diameter rapidly to a certain thickness, and then grow on in a uniformly cylindrical shape ; others are in the young state, slender, flexuose, and irregularly constricted stems, and grow gradually to larger diameters. The surface of the polyparia is covered by an epitheca with shallow annular wrinkles of growth and longitudinally ribbed by septal striæ, which, however, are not in all specimens equally distinct. Calyces spacious, with erect walls, and acute, wedge-like margins ; bottom broad, marginally depressed and flat in the centre. In one place of the circumference the diaphragms are more deeply depressed by a septal fovea. Radial lamellæ stout, linear, alternately long and short, but appearing nearly equal on the margins of the calyces, where the sharp crested leaves of the inside expand into low rounded rugæ. The extension of the radial crests toward the centre is subject to variations ; in some the central part of the diaphragms remains smooth, and the crests are confined to their peripheral circumference ; in others the crests reach as low carinæ to the centre and become irregularly entangled in their convergence, but these central portions of the crests are merely

superficial, and do not intersect the diaphragms to form continuous vertical leaves. The number of lamellæ in calyces of about two and a half inches diameter is 150 to 160, half of which are of the smaller size. Found in the upper Helderberg limestones of Michigan, Canada, Ohio, and in the Western States."

Locality and formation.—At Rama's farm, Cayuga, and at other localities in Ontario; Corniferous formation.

.ZAPHIRENTIS MINAS, Dawson.

Zaphrentis Minas, pars, Dawson. 1868. *Acadian Geology*, second edition, p. 286 (small specimens,) fig. 84a.

Corallum simple, turbinate, small, slightly curved, about twice as long as broad, pointed below and obscurely marked transversely by low accretion ridges. Epitheca complete, with distinct longitudinal septal furrows and fine, close-set, transverse growth lines shewing on the surface. Calyx deep, with thin vertical walls and a moderately flat bottom, the depth equal to more than one-half the width. Tabulæ rather irregular, crossing from side to side, with minor incomplete tabulæ at times resting on the principal ones. Septa, from about sixty-five to seventy-five in number, alternately long and short, the long ones passing to the centre, the remainder only about 1 mm. in length; on the walls of the calyx the primaries are reduced to thin sharp edged ridges and the secondaries become almost obsolete. Fossette of moderate depth, extending outward to the wall on the flat or concave side of the coral.

The figure accompanying the original description does not convey a correct idea of the depth and form of the calyx; the specimen from which the drawing was evidently made is 40 mm. in length along the convex curve, about 23 mm. in maximum breadth near the top and the calyx, as seen in a longitudinal section of the corallum, is about 12 mm. deep.

Locality and formation.—West River, Pictou, N.S., collected by Professor How; lower Carboniferous formation. Two small specimens and the basal extremity of a third the property of the Redpath Museum, McGill University, Montreal.

This species is very closely related to if not identical with *Zaphrentis Enniskilleni*, Milne-Edwards and Haime (Brit. Foss. Corals, p. 170, pl. XXXIV, fig. 1) of the Carboniferous limestone of the north-west of Ireland.

ZAPHRENTIS MIRABILIS, Billings, sp.

Amplexus mirabilis, Billings. 1875. Canad. Nat. and Geol., vol. VII, 2nd. series, p. 232.

Zaphrentis invenusta, Billings. 1875. Ibid, p. 233.

" *Egeria*, Billings, pars. 1875. Ibid, p. 234 (the third specimen mentioned in the description).

" *subrecta*, Billings. 1875 Ibid, p. 235.

" *Leda*, Billings. M.S.S.

Original description. — "Corallum sometimes abruptly curved in different directions, expanding to a width of from fifteen to twenty lines in a length of four or five inches from the base; above which it becomes more nearly cylindrical. Surface with fine engirdling striæ, in general four or five in the width of two lines, but in some places the same number occur in the width of one line. There are also numerous angular rings of growth, distant from two to fifteen lines from each other, with sub-concave spaces between. Septal costæ rounded, distinctly defined by sharp striæ between them, seven or eight in the width of three lines near the base, and four or five in the same near the calice. There are about forty large septa at the calice, where the diameter is about eighteen lines, with the same number of small ones between them. The larger have a depth of three or four lines and the smaller one line. All of the septa are more or less curved, sometimes very tortuous. The tabulæ have not been observed."

"The above description was drawn up from a specimen, eleven inches in length, measured along all the curves. It is fifteen lines in diameter at five inches from the base, and about eighteen lines at the cup. The septal costæ are very distinctly defined at the base but become more flattened and obscure up-

wards. In external characters it resembles *A. exilis*, but the much greater development of the septa distinguishes it therefrom."

This species is regarded as belonging to the genus *Zaphrentis* on account of its well developed septa : it appears to differ from *Z. gigantea*, Lesueur principally in being more slender, in having fewer septa and also in being typically more strongly annulated. In the type specimen a longitudinal section through the cup shews complete, slightly concave tabulæ stretching across the visceral chamber from wall to wall and abruptly turned down at their edges.

Z. invenusta, *Z. Egeria*, and *Z. subrecta* are believed to be identical with *Z. mirabilis*, and to the same species are assigned a number of specimens in the collection that possess the slender form and the comparatively few septa that are characteristic of the species.

Using the type specimen as a basis *Z. mirabilis* may be described as follows—

Corallum simple, long, cylindrical, slender, pointed at the base, generally curved or variously twisted, ending above in a moderately deep cup with thin vertical side walls and a flat or slightly undulating bottom ; reaching a length of 30 cent. or more and apparently not exceeding between four and five cent. in diameter. Septa of two sizes, alternating, the primaries somewhat flexuous, reaching generally rather more than half way to the centre, the secondaries somewhat variable in their length being in different specimens from less than one-third to about three-fourths as long as the primaries ; numbering in all from about sixty to one hundred. On the surface of the corallum the position of the outer ends of the septa is indicated by distinct, shallow, longitudinal furrows. Tabulæ complete, numerous, flat or undulating, turned down at their edges. A small septal fovea is generally discernable near the lateral margin to one side of the convex curve.

Locality and formation,—Corniferous formation of Ontario.

CYSTIPHYLLUM VESICULOSUM, Goldfuss, sp.

- Cyathophyllum vesiculosum*, Goldfuss. 1826. Petref. Germ., vol. I, p. 58, pl. XVII, figs. 5a-e, and pl. XVIII, figs. 1a-d.
- Cystiphyllum cylindricum*, Hall. 1843. Geol. New York, pt. IV, p. 209, figs. 1, 2. Non Lonsdale.
- " *vesiculosum*, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 462; and 1853, Brit. Foss. Corals, p. 243, pl. LVI, figs. 1, 1a, 1b.
- " *Americanum*, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 464, pl. 13, figs. 4, 4a.
- " *Senecaense*, Billings. 1859. Canad. Journ., vol. IV, new series, p. 137.
- " *grande?* Billings. 1859. Ibid, p. 138.
- " *Americanum*, Billings. 1859. Ibid, p. 139.
- " *Americanum*, Nicholson. 1874. Rep. Palæont. Prov. Ontario, p. 36, pl. VI, fig. 8; and *C. vesiculosum*, Nicholson, 1874, ibid, p. 37, fig. 8.
- " *superbum*, Nicholson. 1875. Palæont. Prov. Ontario, p. 73, pl. I, fig. 1.
- " *Americanum*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 137, pl. L, upper row and right-hand half of lower row.
- Americanum*, Hall. 1876. Illustr. Devonian Fossils, pl. XXVIII, figs. 1-7.

Corallum simple, varying from turbinate to conico-cylindrical, pointed at the base, straight or curved, flexuous or geniculated, sometimes long and slender, at other times comparatively short and thick. Annulated by growth expansions and constrictions, in some specimens much more pronounced than in others, frequently contracted at the calicular end. Epitheca complete, thin, shewing minor rings of growth, the whole marked by fine transverse lines of which, in well preserved specimens, as many as twenty-four can be counted in a space of 2 mm: faint

longitudinal indications of linear septal markings are also not unfrequently developed. Calyx of variable depth, in short, turbinate coralla comparatively shallow, often with broad margins, in more cylindrical forms generally somewhat deeper in proportion to the diameter and with steeper sides. Surface of calyx blistered and often marked radially by interrupted, more or less distinct, superficial septal ridges. Inner structure entirely vesiculose, composed of convex blister-like plates resting on each other and directed obliquely outward and upward to the periphery; at the centre of the visceral chamber the vesicles are more nearly horizontal and as a rule larger than the others.

This species is very variable in shape and size, sometimes in the stout, short forms reaching a diameter of over 10 cent. with a length of about 27 cent., in the slender forms an equal length may be attained with a thickness of only 3 or 4 cent. In his description of *C. Senecaense* Billings mentions a variation in length of from three inches to two feet with a diameter of three-quarters of an inch to one inch and a half. The same authority in referring to the size of *C. grande* says "There are fragments of this species in the collection of the Geological Survey of Canada, five inches in diameter; and one specimen, still lying in the rock, is known which is three feet long."

Examples of twin corallites with a common epitheca are not uncommon.

Locality and formation.—Abundant in the Corniferous and Hamilton formations of Ontario.

NOTES ON THE BIRDS OF KING'S CO., NOVA
SCOTIA.—PART III.

By HAROLD TUFTS, Esq., Wolfville, King's Co., N.S.

Progne subis (*Linn.*), PURPLE MARTIN.

One was seen at Windsor, Hants Co., August 18th, 1898, and as this was only at the distance of some four miles from the boundary of Kings Co., I feel justified in including it under the present list, as no doubt it has also appeared in this county.

Petrochelidon lunifrons (*Say*), CLIFF SWALLOW.

Common summer resident.

Chelidon erythrogaster (*Bodd.*), BARN SWALLOW.

Common summer resident. This species is the last to arrive in spring, but is also the last to depart in the fall, specimens being seen as late as Sept. 28th, 1897, several weeks after the other species had gone south.

Tachycineta bicolor (*Vieill.*), TREE SWALLOW.

Common from the last of April to September,

Clivicola riparia (*Linn.*), BANK SWALLOW.

An abundant summer resident.

Ampelis cedrorum (*Vieill.*), CEDAR WAXWING.

Fairly common from June to September. One was taken here about the first of January, 1896.

Lanius borealis (*Vieill.*), NORTHERN SHRIKE.

Rather an uncommon migrant. Sometimes a winter resident.

Vireo olivaceus (*Linn.*), RED-EYED VIREO.

A common summer resident.

Vireo solitarius (*Wils.*), BLUE-HEADED VIREO.

Fairly common from May 15th to October.

Mniotilta varia (*Linn.*), BLACK AND WHITE WARBLER.

Fairly common summer resident. A nest containing four eggs was taken June 3rd, 1896; it was placed in a cavity at the

base of a rotten stump and was composed of fine grasses and bark fibres.

Helminthophila ruficapilla (*Wils.*), NASHVILLE WARBLER.

A rather uncommon summer resident.

Compsothlypis americana (*Linn.*), PARULA WARBLER.

A fairly common summer resident.

Dendroica æstiva (*Gmel.*), YELLOW WARBLER.

A common summer resident.

Dendroica coronata (*Linn.*), MYRTLE WARBLER.

They arrive here some seasons as early as April 20th, three weeks ahead of the other warblers. The nest is usually placed in a small spruce or fir, near the trunk and is lined with feathers so placed as to curl over the nest, thus protecting the contents during the birds' absence. A set of eggs from this locality is now in the Government Museum at Ottawa.

Dendroica maculosa (*Gmel.*), MAGNOLIA WARBLER.

A fairly common summer resident. A nest taken last June was placed in a small spruce bush a foot or two above the ground, and was composed of grasses and hairs. The four eggs which it contained are now in the Government Museum at Ottawa.

Dendroica pensylvanica (*Linn.*), CHESTNUT-SIDED WARBLER.

A rather uncommon summer resident.

Dendroica striata (*Forst.*), BLACK-POLL WARBLER.

Rather rare.

Dendroica virens (*Gmel.*), BLACK-THROATED GREEN WARBLER.

An abundant summer resident. A set of eggs from this locality is now in the Government Museum at Ottawa.

Dendroica palmarum hypochrysea *Ridgw.*, YELLOW PALM WARBLER.

A rather uncommon migrant.

Seiurus aurocapillus (*Linn.*), OVEN-BIRD.

A fairly common summer resident.

Seiurus noveboracensis (*Gmel.*), WATER THRUSH.

Fairly common summer resident.

Geothlypis trichas (*Linn.*), MARYLAND YELLOW-THROAT.

A common summer resident.

Sylvania pusilla (*Wils.*), WILSON'S WARBLER.

An uncommon summer resident.

Sylvania canadensis (*Linn.*), CANADIAN WARBLER.

A rather uncommon summer resident.

Setophaga ruticilla (*Linn.*), AMERICAN REDSTART.

An abundant summer resident. A set of eggs from this locality is now in the Government Museum at Ottawa.

Anthus pensylvanicus (*Lath.*), TITLARK.

Abundant on the Grand Prè during the migrations.

Galeoscoptes carolinensis (*Linn.*), CATBIRD.

A fairly common summer resident.

Troglodytes hyemalis (*Viell.*), WINTER WREN.

Not very common.

Certhia familiaris americana (*Bonap.*), BROWN CREEPER.

Resident in small numbers throughout the year.

Sitta carolinensis (*Lath.*), WHITE-BREASTED NUTHATCH.

Resident except in mid-winter.

Sitta canadensis *Linn.* RED-BREASTED NUTHATCH.

Resident throughout the year.

Parus atricapillus (*Linn.*), CHICKADEE.

Abundant throughout the year. A set of eggs taken in Gaspereau is now in the Government Museum at Ottawa.

Parus hudsonicus (*Forst.*), HUDSONIAN CHICKADEE.

Common throughout the year but especially in winter. A set of eggs from this locality is now in the Government Museum at Ottawa.

Regulus satrapa (*Licht.*), GOLDEN-CROWNED KINGLET.

Common throughout the year.

Regulus calendula (*Linn.*). RUBY-CROWNED KINGLET.

Much less common than the preceding species.

Turdus fuscescens (*Steph.*), WILSON'S THRUSH.

A fairly common summer resident.

Turdus ustulatus swainsonii (*Cab.*) OLIVE-BACKED THRUSH.

Not very common.

Turdus aonalaschkæ pallasii (*Cab.*), HERMIT THRUSH.

A fairly common summer resident.

Merula migratoria (*Linn.*), ROBIN.

Abundant from April 1st to November, and a few are sometimes observed in winter.

The following species were accidentally omitted, or have been observed since. In their proper order they belong in the first paper, on the Water Birds.

Urinator lumme (*Gunn.*), RED-THROATED LOON.

Transient visitant.

Larus delawarensis *Ord.* RING-BILLED GULL.

Common in Minas Basin during the spring migration.

Anas boschas (*Linn.*), MALLARD.

Rare migrant.

Charitonetta albeola (*Linn.*), BUFFLEHEAD.

Transient visitant. Observed in Minas Basin.

Clangula hyemalis (*Linn.*), OLD SQUAW.

Transient visitant in Minas Basin.

ANALYSES OF ICE FROM THE OTTAWA DISTRICT.

By R. F. RUTTAN, B.A., M.D., C.M.,
Professor of Chemistry, McGill Medical College, Montreal, Que.

The following notes obtained in the analyses of three samples of ice sent me from the Ottawa District marked respectively: I, II and III, may not be uninteresting to the readers of THE OTTAWA NATURALIST and are herein submitted as recorded at the Chemical Laboratories, McGill College, Montreal, January 7th, 1893..

Sample 1.—From the Gatineau River above Roman Catholic Church.

Sample 2.—From Gilmour's Point, Ottawa River, Quebec side.

Sample 3.—Above Chaudière Falls, Ottawa River, 500 feet from shore, Ontario side.

Appended to this note will be found the tabulated results of the analyses. In general terms, I may say, that all three samples are perfectly wholesome and may be used with safety for domestic purposes.

Not only did I make a chemical analysis but obtained what I consider more important from a sanitary point of view, a bacteriological analysis of the three samples. The bacteriological analysis entirely confirmed the chemical one.

All three samples were practically free from bacteria of any kind. From sample No. 2 only one single living bacterium was detected in the experiments made. The relative purity of these samples as compared with Ottawa or St. Lawrence water may be appreciated when it is considered that the same number of samples would have yielded from either of these waters in the experiments made upwards of 1,000 bacteria in the three cubic centimetres used.

The single bacterium in sample No. 2 may or may not indicate a less degree of purity in this particular sample. The single bacterium might easily be obtained from the atmosphere as a necessary error of experiment.

With regard to the chemical analysis, the results are decidedly in favour of sample No. 3 over samples 1 and 2.

Samples 1 and 2 contain a stratum of bubbly ice through the middle. The bubbles being long and spindle-shaped and would indicate that the ice was grown in shallower water than that from which No. 3 was obtained. This, of course, is not so favourable a condition for the formation of pure ice as where the volume of water is very large compared with the thickness of the ice formation.

None of the samples contained more than *traces* of solid substance held in suspension. Sample No. 2 however, alone gave indications of any dust particles.

Sample No. 2 contains slightly more organic matter than either of the others as shewn by the quantity of albuminoid ammonia obtained by distillation of the melted ice. On igniting the very minute residue left after evaporating the samples to dryness, samples No. 1 and No. 2 scintillated indicating thereby the fact that these samples contain minute particles of solids in suspension.

No such phenomenon was observed in the case of No. 3.

On the whole I may repeat that although all three samples are perfectly safe for domestic use, sample No. 3 is on the whole to be preferred.

TABULATED RESULTS OF ANALYSES OF ICE FROM NEAR OTTAWA, ONT.

RESULTS GIVEN IN PARTS PER MILLION.	Designation of Sample. I Gatineau Point above R.C. Ch. Reference No. 1215.	Designation of Sample, II Gilmour's Point O.tawa River. Reference No. 1216.	Designation of Sample, III Above Chaudiere Falls, 500 feet from shore. Reference No. 1217.
Total Solids.....	9.6	19.3	12.3.
Phenomena on ignition.....	Scintillates.	Scintillates.	No ! lackening.
Free ammonia.....	0.070.	0.080.	0.068.
Albuminoid ammonia .. .	0.085	0.103.	0.065.
Albuminoid ammonia after . filtering through paper	0.066	0.085.	0.058.
Oxygen consumed by organic. matter in 4 hours at 80° F...	0.246.	0.240.	0.000.
Chlorides .. .	Trace.	Trace.	Trace.
Bacteria per cubiccentimeter.	None.	One in 3 c. c.	None.
Colour of melted ice	0.40 Blue.	0.36 Blue.	0.55 Blue.
Column of 2 feet	0.45 Yellow.	0.50. Yellow.	0.65 Yellow.
(Lovibond's Scale).....	0.00 Red.	0.00 Red.	0.00 Red.

REPORT OF THE ORNITHOLOGICAL BRANCH OF THE OTTAWA FIELD NATURALISTS' CLUB FOR 1898.

As most, or in fact nearly all, of the results of the work of the Ornithological Branch have appeared in *THE NATURALIST* during the past year, it is only necessary here to give a brief résumé of what has been done.

Birds arrived early last spring, the Horned Lark, which was seen in 1897 for the first time on the 22nd of February, being noted in 1898 on the 17th. The Song Sparrow was seen on the 18th of March in 1887, and on the 11th in 1898. The Robin on the 12nd of March in 1897, and on the 15th in 1898. From these few dates it will be observed that the birds came about one week earlier this year than in 1897.

All those who had opportunities for taking the dates of the arrivals of birds kindly sent them to the ornithological editor and by consulting the lists which appeared in the April, May, June, July and August numbers of *THE NATURALIST* it will be found that several members of the Club have continued to show an interest in ornithology and have done their part in bringing this branch of science before the public.

In all, 123 species of birds were recorded this year, which is seven more than in 1887, when 116 species were noted.

Two new birds were added this year having been taken by Mr. F. A. Saunders. On the 17th of June he shot a specimen of the Short-billed Marsh Wren in the Mer Bleue, and on the 24th he saw the Grasshopper Sparrow near Hull and again near the Experimental Farm on 26th and 27th, one specimen being shot on the 28th; the Grasshopper Sparrow was not taken previously nearer than the St. Clair Flats.

One albino bird and one semi-albino were taken this year. The first was an albino Cliff Swallow taken by Mr. Geo. R. White, a description of which appears in *THE NATURALIST* for January 1899. The second was a semi-albino Song Sparrow taken by Mr. C. H. Young on the 26th of March, 1898, a description of which appears in the May number for 1898.

Notes have been briefly furnished during the year by persons living in different parts of Canada, among whom may be mentioned Mr. Wm. E. Saunders, London, Ont., Mr. Allan Brooks, Vernon, B.C., Mr. Harold Tufts, Woltville, N.S., and Mr. L. J. Boughner, Long Island, Lake Erie.

An interesting observation this winter was made by Mr. C. H. Young, who noted a Robin on the 2nd of January. One of the legs of this bird was stiff and apparently useless, but it could fly quite readily. No grossbeaks had been noted up to February 4th 1899. Birds have been very scarce this winter.

W. T. MACOUN, A. G. KINGSTON, GERTRUDE HARMER,	}	Leaders.
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SECOND WINTER SOIRÉE, 1898-1899.

The evening of Jan. 10th, 1899, was wholly devoted to geology, Prof. Prince, the President, was in the chair and there was a fair attendance of members.

"Notes on an herbivorous Deinosaur from the Cretaceous of Western Canada."

by Mr. Lawrence M. Lambe, was the first paper presented. In the course of his remarks the lecturer pointed out the methods pursued in obtaining the remains of these extinct giants from the stratified rocks of the Red Deer River district in Alberta. The general results obtained during the summers of 1897 and 1898 comprised portions of several skeletons, representing four species of deinosaur, three herbivorous and one carnivorous.

Trachodon (Hadrosaurus) mirabilis, Leidy, from the Canadian Cretaceous was then described, giving the more salient features of the great group of herbivorous-deinosaur or reptiles to which it belongs. The paper was copiously illustrated by specimens and diagrams. A hearty vote of thanks, proposed by Dr Ami, seconded Mr. Walter R. Billings, was unanimously tendered to Mr. Lambe for his excellent paper.

Dr. Ells then asked that his paper be taken as read. It is entitled: "The Minerals of the Ottawa Valley." The paper is to be published shortly in *The Ottawa Naturalist*. Specimens of Minerals from the Ottawa Valley were then exhibited and examined by members present.

The "Report of the Geological Branch," for 1898-1899 by the Leaders, H. M. Ami, W. J. Wilson and R. W. Ells, was then submitted to the meeting and taken as read: it will also appear in a forthcoming number of the NATURALIST.

FOURTH WINTER SOIRÉE 1898-1899.

The meeting was held on Tuesday, Feb. 7th, 1899, in the Y.M.C.A. Hall, Prof. E. E. Prince, President of the Club in the chair.

1 "Some native herbaceous perennials worthy of cultivation," was the theme upon which Mr. W. T. Macoun first spoke at some length. After exhibiting an extensive series of flowering perennials from various parts of Canada, giving notes on the results of experiments made in cultivation upon them at the Central Experimental Farm, Mr. Macoun referred to a number of showy local species which he recommended members of the Club to grow and observe. Plants belonging to the genera *Hepatica*, *Anemone*, *Sanguinaria*, *Thalictrum*, *Dicentra*, *Trillium*, *Lobelia*, *Lilium*, *Gentiana*, *Aster*, *Solidago*, *Cypripedium*, and many others worthy of cultivation.

Discussion.—Prof. Macoun pointed out that it was imperative to give as nearly as possible the natural conditions of environment to the plants on trial which the botanist found in nature. He also remarked that *Anemone patens*, exhibited by Mr. W. T. Macoun was found by himself (Prof. Macoun) in bloom on the 17th of April on the Peace River in N. lat. 56°. He had also collected the same plant in bloom as late as 28th October in the same district, which, added Prof. Macoun, is destined to be one of the most fertile and greatest wheat-producing regions of the Canadian North-West, Messrs. R. B. Whyte, Dr. Fletcher, Dr. Ami, Mr. Harrington, and several others took part in the discussion giving results of experiments with native species.

2 "On the burrowing habits of *Cambarus*—the Cray-fish," by H. M. Ami, was the next paper on the programme. While digging for the remains of a mastodon in Norfolk County, Ontario, Dr. Ami had observed several holes traversing the peat, shell-marl and other Pleistocene deposits to a depth of some *thirty* inches.

At the bottom of some of the holes were found living examples of the Cray-fish, which on closer examination proved to belong to the genus *Cambarus*, and a form which in all probability is new to science. The holes were evidently excavated deep enough by the Cray-fish to reach a water supply in order to maintain their existence, upon which the life of Cray-fish necessarily depends. Two live specimens were captured and one reached Ottawa alive in the fall of 1897. They were both healthy specimens and the *abdominal legs* of one of these, (upon which naturalists who follow Hagen, the highest authority on the Astacidæ, base their determination and identification of the species), which in some respects resembling those of *Cambarus Bartonii*, are nevertheless much stouter and shorter with the secondary hooklet more prominent and inclined at a different angle than in *C. Bartonii*.

More extended notes and results of observations on this form will be given later in THE NATURALIST.

3. "Some Ottawa Fresh-water Polyzoa," by Mr. Walter S. Odell, was the title of the third paper of the evening. He described in general terms the group called Polyzoa, and mentioned the various forms found at Ottawa, giving descriptions by means of which they may be detected and recognized. Microscopic preparations of the statoblasts of *Fredricella*, *Pectinatella*, and other genera of Ottawa Polyzoa, collected by Mr. Odell in the Rideau Canal, the Ottawa and Gatineau rivers, were then examined under a microscope.

The "Report of the Ornithological Branch for 1898-9" was then presented by Mr. W. T. Macoun on behalf of the Leaders in Ornithology, himself, Mr. A. G. Kingston and Miss Harmer. This Report as well as the preceding paper by Mr. Odell, THE NATURALIST hopes to be able to publish at no distant date. H. M. AMI.

FIFTH WINTER SOIRÉE

"*The Archaeology of Lake Deschenes,*" by T. W. F. Sowter, of the Club, included descriptions of investigations on Lighthouse Island, the site of seven Algonquin villages. Kettles, knives, hatchets and spears of French manufacture have been unearthed and serve to illustrate an early phase of European influence in America. Huron Indians had lived there also. Mr. Sowter urged upon the members present to follow up investigations in this very promising field.

"*The extra-limital Insects found at Ottawa,*" by Mr. W. H. Harrington F.R.S.C. came next. He dwelt upon the alarming increase in the number and variety of the destructive insects imported in various ways from Europe. The parasites which prey upon these pests had not yet been found in Canada. This paper was illustrated by a choice series of mounted specimens which were greatly admired.

"*The report of the Entomological Branch, 1898-99,*" was then submitted by Dr. James Fletcher on behalf of the Leaders.—J. Fletcher, W. H. Harrington, W. Simpson.

SIXTH WINTER SOIRÉE.

"*Natural History in Art*" by Professor James Mavor, M.A., of Toronto University was the attractive title of a most interesting paper. Prof. Mavor opened with a clear and concise definition of Art and traced Natural History forms such as flowers, animals, and anthropomorphic representations in the art productions of primitive races of the world. Egyptian, Mexican, Peruvian and Indian antiquities afforded numerous examples of representatives of the lotus-flower, the crocodile and alligator, the bear, the frog and other creatures in architecture, pottery and other arts.

"*The Life-history of the Salmon,*" by Professor E. E. Prince B.A., F.L.S., was then discussed. The speaker referred to the different species of salmon peculiar to Canada both in the Atlantic and Pacific slopes. Copious slides skilfully prepared in colours or from actual photographs served to illustrate a most interesting topic which we hope to give at a future date in the pages of THE OTTAWA NATURALIST.

VOTE OF THANKS.—At the last meeting of the Council of the O.F.N.C. a unanimous vote of thanks was passed to the Ottawa Electric Co. for their generosity and kindness in installing the magnificent electric table lamps for microscopes and wires for projection microscope *gratis*.

NOTES, REVIEWS AND COMMENTS.

GIANT RIPPLE MARKS.—At the New York meeting of the Geol. Society of America last December, Prof. G. K. Gilbert of the United States Geol. Survey drew the special attention of the fellows to a very interesting phenomenon which he had observed in the Medina Sandstone. There were giant undulations in the strata which marked extraordinary ripple marks varying in width from 10 to nearly 30 feet. Having discussed the mechanical forces at work in the production of ordinary ripple marks, their orientation, the accompanying phenomenon of cross-bedding, he calculated the height of the waves required to form such giant ripple marks. These he described as waves which must have measured at least sixty feet in height.

The occurrence of these in sandstone strata had been noticed, but not previously accounted for. This structure interferes very materially with the workability of many a sandstone quarry in the United States.

During the summer of 1897 Dr. Ami noted the occurrence of similar structures in the upper Carboniferous or Permo-Carboniferous of Pictou Connty, Nova Scotia as exemplified in McKean's Quarry, east of Pictou town, in Macpherson's Quarry on the West River, and in the sandstones of the same age near Little Harbour. They can be readily compared with the giant ripple marks as described from the Medina of Lockport by Prof. Gilbert.

FINE MICROSCOPICAL MATERIAL.—At the close of the Fourth Soiree of the Club, on behalf of Mr. George Bryce Scott, a most enthusiastic microscopist of Moncton, New Brunswick, Dr. Ami distributed a large quantity of fine microscopical material in the shape of foraminiferal mud or marl most promising indeed. The material was collected at the northern extremity of the Bay of Fundy in a heap of refuse material—probably used as ballast by some of the vessels which visit that portion of Canada in search of 'plaster' or gypsum so abundant around Hillsboro and vicinity. Any member of the Club or person interested in Foraminifera can obtain more of this material from the undersigned until the supply runs out. More than sixty distinct species of Foraminifera have been detected already. The exact locality whence this ballast came has not yet been ascertained, but the marine shells

and associated fauna may help to throw light upon the district from which the material originally came.—H. M. AMI, Geol. Survey Dept., Ottawa.

The Editor has received from Mr. C. C. James, Deputy Minister of Agriculture, Ontario, a copy of the 14th Annual Report of the Superintendent of Farmers' Institutes for Ontario. This Volume comprises many papers of special value to farmers. The topics dealt with embrace cultivation, soil fertility, manures, drainage, bee-keeping, poultry raising, and other lines of activity. 3,270 addresses have been delivered through the Province by representative gentlemen, amongst names furnished we note that of Mr. W. T. Macoun, of our Club. The result of experiments made in different European countries and in the United States, by which important additions are made to our knowledge are also added. The Institute has a membership of 16,351 members. The Department is to be congratulated upon its work during 1898 in the Report just issued.

MR. C. W. NASH, of Toronto, Ont., contributes an interesting paper "*On the Birds of Ontario in Relation to Agriculture*" which, is worthy of special mention. Its author, gives much useful information as to the habits and food of our birds showing how they aid the farmer by the destruction of vermin and insects. It is adorned by 32 excellent illustrations of Ontario birds, drawn from life by Mr. Nash.

OBITUARY,

DR. G. J. ALLMAN, M.D. F.R.S.. Emeritus Professor of Natural History in the University of Edinburgh, whose death was so recently chronicled in nearly all the British Scientific Magazines was one of the most brilliant of zoologists and at the same time one of the most genial and kindly of men.

Hydrozoa formed his chief field of labour and his magnificent Monograph on the "Tubularian Hydrozoa" published in 1872 will make his name famous for all ages in zoological circles.—H.M.A.

NEW MEMBERS, O. F. N. C.

Sir Henri Joly de Lotbinière, K.C.M.G., Inland Revenue Dept., Ottawa; R. W. Brock, Esq., B.A., F.G.S.A., Geol. Survey Dept., Ottawa; W. C. McCalla, Esq., Geneva St., St. Catharines, Ont.; Theo. Denis, Esq., B.A.Sc., Geol. Survey Dept., Ottawa; A. B. Rowan-Legg, Esq., 403 Bay St., Ottawa; A. H. Belliveau, Esq., Marine and Fisheries Dept., Ottawa; J. H. Grisdale, Esq., Central Experimental Farm, Ottawa; R. Stuart Breckenridge, 104 Queen St., Ottawa; Joseph Keel, Esq., B.A.Sc., Geol. Surv. Dept., Ottawa; Clarence R. Church, M.D., C.M., Elgin St., Ottawa; Harold Tufts, Esq., Wolfville, Nova Scotia.

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