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The Devonian of the Acadian Provinces.

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The publication in a recent number of this journal of a paper by Mr. David White on "Certain Palæobotanic Aspects of the Upper Palæozoic in Nova Scotia"[1] appears to call for some comment in regard to certain statements therein made. The paper seems, as a whole, to be written in an apologetic spirit rather than from the argumentative standpoint, and does not add greatly to our knowledge regarding a somewhat complicated problem presented in certain rock formations which occur both in Nova Scotia and New Brunswick.

Several other papers bearing upon this question have recently appeared in the transactions of the Nova Scotia Institute of Science[2] and elsewhere, and it is to be deplored that a controversy should have arisen on what, in the natural order of geological investigation, should be a comparatively simple question.

1 Can. Rec. Sci., Vol. VIII., No. 5, Jan., 1901.

2 Trans. N. S. Inst. Sci., Vol. X., pp. 162 and 235, Amer. Assoc., Aug., 1899. Ottawa Nat., Vol. XIII., pp. 207, 256, Vol. XIV., pp. 1 and 99.

The study of certain rock formations in Southern New Brunswick, which have long been known under the head of Devonian, was undertaken by several local geologists, notably Hartt, Matthew and Bailey, nearly forty years ago, and a statement of the results then obtained will be found in a report by Professor Bailey entitled "Observations on the Geology of Southern New Brunswick" and published in 1865. The details of the Devonian formations were at that time but little worked out, a large part of what has since been recognized as pre-Cambrian in the south-eastern portion of the province being included. The stratigraphical relations of certain divisions of the Devonian rocks, both to the underlying upper Silurian and the overlying lower Carboniferous, were, however, early recognized, and the finding of a rich flora in the strata at a number of points added greatly to the interest of the investigation. To the late Sir William Dawson, then presumably the ablest Palæobotanist on this side of the Atlantic, was assigned the task of deciphering the correct horizon of the plant remains thus discovered.

That Sir William was especially fitted for this work cannot be denied. He had just completed a series of investigations on the flora and fauna found in the Devonian of Eastern Gaspé, and his work was facilitated by the study of collections of fossil plants from Ohio, New York and Great Britain. Elaborate sections of the Gaspé Devonian had already been made by Sir William Logan[1] and the true position of the rocks in this area was ascertained beyond a doubt, since the lower portion of the section passes downward into the upper part of the Silurian. The thickness of the Devonian rocks as determined by the Gaspé section was found to be somewhat over 7,000 feet.

Fresh from the study of the Gaspé fossils, Sir William Dawson began his study of the plant remains from the

1 Rep. Geol. Sur. Can., 1844.

vicinity of St. John, New Brunswick. From these he evolved a long list of species which to his mind at least conclusively established their horizon as Devonian also.[1] It is unnecessary to go into the details of this study since they are fully stated in the several reports of the Geological Survey on the fossil plants of the Silurian and Devonian extending from 1871 to 1882.[2] The results of his work were also summed up in a report to that Department in 1870–71 by Messrs. Bailey and Matthew.

The remark by Mr. White, on page 6 of his pamphlet, that "the determinations of Sir William in regard to the St. John plant remains were forced upon him by the finding of the stratigraphers" can therefore be assumed to be without foundation and to be misleading. More especially since the details of the stratigraphical sequence of these rocks in Southern New Brunswick were worked out carefully some years subsequent to his determination of the plant remains; and it may be stated that the conclusions arrived at by the stratigraphers abundantly confirmed the decision which had been reached by him some years previously. The great series of beds known in the southern part of the province as Devonian, and divided into Mispec, Cordaite shales and Dadoxylon sandstone, were conclusively found to be beneath the lower Carboniferous limestones as also beneath a considerable thickness of shales, sandstones and conglomerates which also underlie these.

Not only so, but they are known to underlie in great part a series of sandstones and shales, known as the Perry sandstone group,[3] concerning the age of which, as representing the upper member of the Devonian, Sir William apparently never had any doubt to the last of his investigations in this field.

1 Acadian Geology, 1868, and Supplements 1878 and 1891.

2 Fossil plants of the Erian (Dev.) and Up. Sil. of Can., 1882.

3 Fossil plants, discovered at Perry, Me. Proc. Port. Soc. Nat. His., Vol. I., pt. 2, 1862.

It has been suggested in Mr. White's paper on page 9 that "possibly the limestones of New Brunswick and Nova Scotia which are regarded as Lower Carboniferous, should be assigned to a higher position." In this connection it may be stated that the stratigraphical sequence of the Carboniferous rocks proper has within the last twenty-five years been so thoroughly worked out that this assumption is scarcely tenable. Not only in the celebrated Joggins section in Nova Scotia, but in many other places both in that province and in New Brunswick is their true position beneath the rocks which are regarded as Millstone-grit well established. If we admit the proposition of Mr. White, therefore, that the limestones regarded as Lower Carboniferous may be assigned to a higher position, the curious anomaly will result that our Carboniferous rocks proper, representing many thousands of feet of strata, must occupy the place now assigned to the upper or Permo-Carboniferous or possibly to the horizon of the Cretaceous. This would open an entirely new field of investigation, and is a proposition not likely to be favorably entertained, at least in the present state of our knowledge on this subject.

The age of the Lower Carboniferous limestones is, however, held to be abundantly established from their contained fossils which are well defined at many points.

Much has been said in the several papers already published on this question, as to the correlation of the several formations known as Devonian and Carboniferous, and this correlation has recently been apparently based entirely upon a supposed similarity of plant remains found over a wide area. The first correlation on the subject, however, was that made by Sir William Dawson, in which he made the St. John Devonian the equivalent of much of the Gaspé Devonian series.[1] Until further evi-

1 Acad. Geol. Suppl., 1878, page 70; Suppl. 1891, page 19.

dence is, therefore, presented on this subject, this correlation will presumably stand in the opinion of those who have most closely studied the question. Certainly Sir William, to the date of his last work, found no occasion to change his views as to their originally assumed position, and every one familiar with the large amount of careful work which he accomplished on these rocks and on his Devonian flora, a work which may be truly regarded as among the most important which he accomplished in his several lines of geological investigation, will regard his determination in this field as neither hasty nor superficial.

The assumption made by Mr. White, on page 6 of his paper, that "possibly Dr. Ells and Mr. Fletcher were influenced in referring the Riversdale beds to the middle Devonian through first correlating them with the 'Fern ledges' of St. John, N.B.", is practically correct. As regards the writer's share in this work it may be briefly stated. For some years his work had lain, in connection with Messrs. Bailey and Matthew, in the study of the folded rocks of southern New Brunswick, and the principal geological formations there found had been carefully mapped out. Later several years were spent in the study of the Devonian of the Gaspé peninsula over a very considerable area. In 1884 he was assigned to the Cumberland and Colchester district. There the great similarity of certain groups of rock along the south side of the Cobequid mountains to those so recently studied in New Brunswick was so marked that the writer had but little hesitation in assigning them to a similar horizon. Not only were they alike in their physical aspects, but they presented the same stratigraphical unconformity beneath the marine Carboniferous limestones and associated strata, while the fossil contents were also largely identical. Under such circumstances the correlation of the two series was a simple matter, and this has been abundantly confirmed by later investigators, notably by Mr. White

himself from an examination of the plant remains from the two areas, and also by Mr. Kidston.

Mr. Fletcher, working independently in the eastern portion of Nova Scotia, had in the meantime encountered precisely similar rocks and reached a similar conclusion as to their age. While therefore the inference was plain that these formations in the two provinces were similar in age, Sir William Dawson, from an examination of a few plants found in the beds near Riversdale, some years previously, had found what he supposed to be a Millstone-grit horizon at that place. The collection on which this determination was based was, however, but small and lacked the completeness of material found in the St. John beds. Moreover, these strata, near Arichat, at the Strait of Canso, East River of St. Mary's, Middle River of Pictou, the mouth of Shubenacadie River, Brookfield and the Cobequid hills, were assigned to the Devonian and lower horizons by Sir William Dawson.

In his report on the Fossil Plants of the Devonian and Silurian, 1871, page 70, Sir William calls attention to the great similarity existing between the floras of the Devonian and Carboniferous systems in many particulars. The presence of some forms, therefore, poorly preserved and presenting a Millstone-grit facies, should not be taken as conclusively overturning the conclusions which he had arrived at from the systematic study of the great collections from the similar sediments in New Brunswick which he had previously assigned to the Devonian. Certain it is that the plants which he found at Riversdale did not in any way affect his own opinion as to the age of the latter.

The question of lithological resemblance between rocks of similar formations over wide areas is also entitled to some consideration in discussing such a problem. Thus the strata of the Carboniferous proper are distinctly much less altered both in New Brunswick and in Nova Scotia than those which we have regarded as of Devonian age.

Among these conditions may be mentioned the hard and quartzose character of many of the Devonian sandstones, a feature rarely found in those of the Carboniferous proper; as also the slaty character of much of the underlying or older series as opposed to the comparatively unaltered shales of the Lower Carboniferous formation. The rocks of the Devonian series are also frequently affected by intrusives which are rarely found in the overlying series, while there is also the further evidence of a marked break or unconformity between the Devonian rocks and those which are styled Lower Carboniferous.

In regard to the peculiar group of the Albert shales found in Albert and Westmoreland counties, New Brunswick, and supposed to be the equivalents of the Horton series of Nova Scotia, it is stated in the Geological Survey Report for 1876-77 by Professor Bailey and the writer, that these distinctly and unconformably underlie the lowest known Lower Carboniferous sediments of New Brunswick, and this feature is clearly indicated in the several sections that are given in the report alluded to. They were, however, at that time styled Lower Carboniferous from the presence of fish remains which were held to be of that age. Certain small areas of bituminous shales are, however, found in apparent association with strata of Lower Carboniferous age elsewhere in the southern part of the province, but these appear to be distinct from the "Albert shale" formation proper.

It is presumed that the present discussion will come to an end when those who now advocate the new theory as to the age of these rocks have made a careful study of their relations in the field. It is to be regretted that simply [1] upon the evidence of a few fossil plants of known wide range such a clash of opinion should have arisen, and that the credit due to Sir William Dawson for his long and careful work in this field should be so seriously

1 G. S. C. Summary Report for 1898, page 11A, line 6.

threatened. The writer firmly believes, from a somewhat long and careful study of the conditions affecting these rocks, both in Nova Scotia and in New Brunswick, that these conclusions will not be so easily set aside. While no one has greater respect for the work of the conscientious palæontologist than the write , and appreciation for the assistance which has thus been rendered in working out intricate stratigraphical details, it must be admitted that occasionally confusion has arisen from the attempt to work out geological problems in the office or the laboratory only. These difficult problems can be solved largely by careful field work, and instances are not wanting even in the history of Canadian geological investigation, where apparently conflicting testimony between the rocks and their contained fossils has been readily harmonized so soon as the true stratigraphic relations were understood.

In connection with this question, it may not be out of place to refer to some of Sir William Dawson's writings relating to this subject.

1856. Remarks on a Specimen of Fossil Wood from the Devonian Rocks of Gaspé. Amer. Assoc. Sci , 1856, Pt. 2, pp. 174-176.

1858. A Week in Gaspé. Can. Nat. and Geol., Vol. 3, pp. 320-331.

1859. Fossil Plants from the Devonian Rocks of Canada. Quar. Jour. Geol. Soc., Lon., Vol. 15, pp. 477-488.

1859. Recent Researches in the Devonian and Carboniferous Flora of British America. Can. Nat. and Geol., Vol. 4, pp. 297-298.

1860. The Fossil Plants of the Devonian Rocks of Canada. Can. Nat. and Geol., Vol. 5, pp. 1-14.

1861. The Pre-Carb. Flora of New Brunswick, Maine and Eastern Canada. Can. Nat. and Geol., Vol. 6, pp. 161-180.

1862. The Flora of the Devonian Period in North-Eastern America. Quar. Jour. Geol. Soc., Vol. 18, pp. 296-330.

1862. Fossil Plants discovered at Perry, Maine. Portland Soc. Nat. Hist., Vol. 1, Pt. 2, pp. 99-100.

1863. Further Observations on the Devonian Plants of Maine, Gaspé and New York. Quar. Jour. Geol. Soc., pp. 458-469.

1865. The Palæozoic Floras of North-Eastern America. Brit. Assoc. Rep., Vol. 35, pp. 50-51.

1868. Acadian Geology.

1869. Some new Fossil Plants from Gaspé. Can. Nat. and Geol., Vol. 4, pp. 464-465.

1870. Pre-Carb. Floras of North-Eastern America with special reference to the Erian Period. Trans. Roy. Soc., Vol. 18, pp. 333-335.

1871. The Fossil Plants of the Devonian and Upper Silurian Formations of Canada. Geol. Sur. Can., p. 92.

1873. Fossil Plants of Lower Carboniferous and Millstone Grit Formations of Canada. Geol. Sur. Can., p. 47.

1877. Notes on some Scottish Devonian Plants. Can. Nat., Vol. 18, pp. 379-389.

1878. Supplement to Second edition Acadian Geology, pp. 102.

1880. Notes on Fossil Insects from Devonian of New Brunswick. Bos. Soc. Nat. Hist. Ann. Memoirs, pp. 31-34.

1882. Recent Discoveries in the Erian (Dev.) Floras of the United States. Amer. Jour. Sci., Vol. 24, pp. 338-345.

1882. Comparative View of the Successive Floras of Canada. Pro. Amer. Ass. Adv. Sci., Vol. 31, pp. 415-416.

1882. Fossil Plants of the Erian (Dev.) and Upper Silurian Formations of Canada. Geol. Sur. Can., Pt. 2, pp. 91-142.

1883. The Successive Palæozoic Floras of Canada. Can. Nat., pp. 371-379. The more ancient floras of the old and the new world. Abst. Brit. Assoc. Report, Montreal, 1884.

1883. Rhizocarps of the Erian (Dev.) Period in America. Bull. Chicago Acad. Sci., Vol. 1, No. 9, pp. 105-118.

1888. The Geological History of Plants. Int. Sci. Series, pp. 294.

1889. A new Erian Plant allied to Cordaites. Amer. Jour. Sci., Vol. 38.

1890. Note on the Geological Relations of the Fossil Plants from the Devonian of New Brunswick.

1890. New Plants from the Erian and Carboniferous and on the Characters and Affinities of Palæozoic Gymnosperms. Can. Rec. Sci., pp. 28, Vol. 4, No. 1.

1891. Supplementary note to Fourth edition Acadian Geology, 1891.

1891. The Age of the Catskill Flora. Amer. Geologist, Vol. 7, p. 363.

A careful summing up of the work on the Devonian of Eastern Canada will also be found in the valuable correlation papers on the "Devonian and Carboniferous" by H. S. Williams, of the U. S. Geol. Survey, Washington, published in 1891.

Editor CANADIAN RECORD OF SCIENCE :

DEAR SIR,—I am quite aware that you disclaim responsibility for the utterances of authors who write for the RECORD, and this seems only reasonable, but as the antidote should go with the bane, I would ask you to publish the following remarks relative to the statement of Mr. David White, at page 227 of Vol. VIII. of the RECORD.

As to the "erroneous" reference of the flora of the fern ledges near St. John to the Devonian by Sir William Dawson, that is a matter of opinion, but to say that this was forced upon Sir William by the findings of the stratigraphers is distinctly wrong. The young geologist, who showed these rocks and their contents to Sir William, would not have presumed to express an opinion at that day contrary to the one which he held.

But Sir William's opinion was not based on the work of youthful "stratigraphers," for he traversed the sections around St. John carefully himself, about the time that these plants were discovered. Hence, the opinion Sir William held was "forced" upon him not only by the composition of the flora, but by the stratigraphy itself.

I mentioned this matter to Mr. White in a letter which I wrote to him some time ago, but he seems to have overlooked my statement, since he makes no reference to it in his paper in the RECORD.

Geology is not made up of Palæobotany alone, or the Laramie beds would still remain Tertiary; and if we can have modern genera of plants coming down to us from the Cretaceous, the lately elaborated Pottsville flora may have an earlier root than Mr. White suspects.

However, I have no intention to go into the discussion of these points further at present, but simply to assert what Mr. White seems not to have known, that Sir William Dawson went over the sections at St. John

containing the very ancient flora of the "fern ledges" himself, and did not trust to the "findings of the stratigraphers."

Thanking you, in anticipation for kindly inserting this note,

I remain yours sincerely,

G. F. MATTHEW.

LIFE HISTORY OF THE CAMBERWELL BEAUTY BUTTERFLY.

(*Vanessa Antiopa.*)

The subject of this paper is one of the commonest butterflies. Its geographic distribution comprises the whole of temperate North America, temperate Europe and England periodically. Dr. A. S. Packard says that it has probably been imported from Europe. In the streets of Montreal it may often be seen. The perfect insect hibernates, selecting for its long winter sleep an old hollow tree and sometimes a place under some loose stones.

On the advent of a warm sunny day, while the snow is on the ground, these lovely creatures may be seen disporting themselves in the birch woods. They are really looking for a good square meal. The sap of the maple or birch trees constitutes their entire food at this time of year; at other times they are fond of over-ripe pears and plums.

About the middle of May they have other business to attend to besides gorging themselves with sap. Their thoughts turn seriously to love. The males, carefully brushed up, playfully pursue their mates, the lady antiopa, as usual, seemingly doing her best to get away from them, a fact of which the reader will readily recall many similar cases in the higher studies of natural history.

The female generally selects a forked twig of willow or poplar and oviposits about 400 beautiful pale yellow eggs, resembling minute musk melons. These eggs hatch about June 6th into little dull orange caterpillars sparsely covered with brown hairs; in the later moults these hairs change into black branched spines.

These caterpillars are very irritable little creatures, throwing up their heads in a threatening manner when one approaches too near them. They spin a line of silk behind them as they walk in search of a fresh leaf, these strands probably serving as life lines in preserving them from injury from a fall, or it may be these form a system of telegraphic wires.

After feeding for four or five days the old skin gets too small and requires to be shed. One can easily tell the time of moulting by their sullen, dissatisfied attitude; this period continues for a day or two, when they manage by a lot of wriggling to get rid of the worn-out skin. After the first moult the caterpillars present a little improved appearance. The head is black, with two rows of interrupted brown lines down the back and several black hairs on each segment, each tipped with a white hair. The description of the four succeeding moults is so similar that it will only be necessary to describe the last one.

Fifth moult.—Length two inches, with four branched spines, innumerable white hairs in between, and a reddish irregular-shaped spot on each segment down the back. The six front legs are black, prolegs Indian red, and anal ones black. These caterpillars do considerable damage sometimes to elm and various other trees, including poplar, willow and hop.

The next stage requires unusual gymnastic accomplishments which would drive a modern acrobat green with envy. The first thing it does is to spin a button of silk (under a ledge of a fence or a branch), tuck its two anal

legs into it and hang head downward. Soon afterwards the first two or three segments next to the head swell, the skin splits, showing the newly forming chrysalis inside. The rent increases, and the chrysalis, acting as a wedge, succeeds in opening up the skin and pushing it down towards the anal legs.

By alternate contractions and expansions the head becomes wholly disengaged, and the caterpillar skin, now dry and shrivelled, is pressed together into a small bundle, which is its only means of support, and the difficult task which remains for the chrysalis to perform is to extricate itself from this skin and attach its cremaster to the silk above it. In order to accomplish this (which seems to require an effort beyond the power of a creature unprovided with arms or legs) the cremaster is pushed through the skin and held by it, while it searches for the button of silk. After several apparently futile attempts it finally jumps up a distance of about one-eighth of an inch and hooks its beak into it. All this time the reader will remember that the chrysalis is as soft and weak as a newly hatched bird. A comparison may here be made between a human being, which in its infancy is the most helpless of all creatures, and insects which perform such wonderful feats in their young state. The once soft chrysalis hardens and assumes the well-known grotesque shape. Perhaps these changes can be more plainly brought before the reader by supposing a fat boy, wearing a pair of sharp-pointed boots (so dear to some of our city exquisites), dressed in a worn-out but tightly-fitting sack, with his feet pushed through the sack into a loop of rope attached to the ceiling. He would require to burst the sack, wriggle it down towards his legs, having his whole weight supported by it, get his feet out of his boots and hook his toes into the same loop of rope. I do not think many athletes would care to go through a like series of

feats, but practically speaking this is what the weak chrysalis has to do.

After about twelve days in warm weather the butterfly is formed inside, the skin is rent, and the Camberwell Beauty crawls out with diminutive wings, only a quarter of an inch in length, but if you watch it half an hour you will see the wings grow to their natural size, about two or three inches from tip to tip.

It is not generally known that a butterfly attains its full size in the short space of about one hour. In about two hours it is ready to fly. After the courtship and marriage festivities are over another batch of eggs is laid and the butterflies resulting from these secure a snug retreat and hibernate until spring.

The enormous increase of these insects is prevented by ichneumons, tiny wasp-like creatures belonging to the Hymenoptera order.

The special ichneumon which attacks the Camberwell Beauty larva is called *Ptermalus Puparum*, a small metallic green fly; extreme length of body $\frac{3}{32}$ in., wings expanded $\frac{1}{4}$ in. It lays about 130 eggs in the mature larva. These hatch and feed inside, avoiding the vital organs; but the astonishing part is how the larva turns into a chrysalis with 130 ichneumon maggots inside of it, each $\frac{1}{16}$ in. long. I propounded this question to Mr. A. F. Winn, an entomologist of considerable note, and he explained the mystery by informing the writer that the eggs are probably laid while the larva is hung up just before it changes into the chrysalis state; thus it is only incommoded by the ichneumon eggs and not by the large maggots.

When the caterpillar has undergone all the hard work of changing into a pupa, the ichneumon eggs are probably just hatched, and then commence to eat up everything inside the antiopa chrysalis, leaving nothing except the skin. When full fed the maggots are nearly $\frac{1}{8}$ in. long

and stout in proportion. The length of the chrysalis (antiopa) is only $1\frac{1}{8}$ in. and diameter at thickest part $\frac{3}{8}$ in., so one can easily imagine how crowded 130 maggots would be in such a small space. A Montreal street car at 6 in the evening will give the reader an idea how tightly these grubs are packed together.

The maggots change into chrysalides and the flies soon emerge by piercing one or two holes, and are just in time to destroy the larvæ of the common white butterfly, while some hibernate.

A. E. NORRIS.

2753 St. Catherine Street,
Montreal, March 1, 1901.

THE FLORA OF MONTREAL ISLAND.[1]

(*Continued from Vol. VIII., Number 1, p. 24.*)

By REV. ROBERT CAMPBELL, M.A., D.D.

Now for the first time an attempt is made to collect and classify the mosses of the district. Doubtless the local species were noted by Mr. D. A. P. Watt and others who catalogued the Acrogens of Canada forty years ago, but no distinction was made between those found near the city and those collected elsewhere. The following mosses were obtained during the summer and autumn of 1900:

SPHAGNACEÆ—PEAT MOSSES.

SPHAGNUM DILL.

SPHAGNUM ACUTIFOLIUM EHRH.—*Peat Moss.*—Savanne, St. Michel. August.

1 Being the substance of two papers read before the Natural History Society of Montreal, session 1900-1901.

SPHAGNUM CYMBIFOLIUM HEDW.—*Peat Moss.*—Savanne, St. Michel. August.

SPHAGNUM RIGIDUM COMPACTUM SCHIMP.—*Peat Moss.*—Savanne, St. Michel. August.

BRYACEÆ—TRUE MOSSES.

TREMATODON MICHX.

TREMATODON AMBIGUUM HORNSCH.—Petite Cote woods. June.

DICRANELLA SCHIMP.

DICRANELLA VARIA SCHIMP.—Petite Cote woods. August.

DICRANELLA RUFESCENS SCHIMP.—Base of Mount Royal. June.

DICRANUM HEDW.

DICRANUM FUSCESCENS (TURN.) LONGIROSTRE SCHIMP.—On decayed tree, St. Michel. August.

DICRANUM DRUMMONDII MUELL.—Mount Royal. July.

DICRANUM UNDULATUM TURN.—Foot of Mount Royal.—September.

DICRANODONTIUM BRUCH AND SCHIMP.

DICRANODONTIUM LONGIROSTRE BRUCH AND SCHIMP.—Petite Cote. July.

CERATODON BRID.

CERATODON PURPUREUS BRID.—Common. May to November.

LEPTOTRICHUM HAMPE.

LEPTOTRICHUM TORTILE MUELL.—Westmount. August.

LEPTOTRICHUM VAGINANS SULLIV.—Westmount. September.

BARBULA HEDWIG.

BARBULA RECURVIFOLIA SCHIMP.—Mount Royal. July.

ORTHOTRICHUM Hedw.

ORTHOTRICHUM ANOMALUM Hedw.—Rocks, Westmount. May.

FUNARIA Schreb.

FUNARIA HYGROMETRICA Sibth.—Common all through the season.

BARTRAMIA Hedwig.

BARTRAMIA POMIFORMIS Hedw.—Mount Royal. July.

CONOSTOMUM Swartz.

CONOSTOMUM BOREALE Swartz.—Westmount. June.

BRYUM Dill.

BRYUM CÆSPITICIUM Linn.—Very common throughout season.

BRYUM CAPILLARE Linn.—St. Michel woods. June.

MNIUM Linn.

MNIUM SERRATUM Laich.—Westmount. June.

AULACOMNIUM Schwægr.

AULACOMNIUM PALUSTRE Schwægr.—Common throughout season.

AULACOMNIUM PALUSTRE IMBRICATUM Bruch and Schimp.—Savanne, St. Michel. August.

TIMMIA Hedw.

TIMMIA MEGAPOLITANA Hedw.—Mount Royal. September.

POGONATUM Beauv.

POGONATUM ALPINUM Roehl.—Mount Royal. August.

POLYTRICHUM Linn.

POLYTRICHUM GRACILE Menz.—Mount Royal. August.

POLYTRICHUM FORMOSUM HEDW.—Mount Royal. July.

POLYTRICHUM FORMOSUM PALLIDISETUM BRUCH AND SCHIMP.—Petite Cote woods. June.

POLYTRICHUM OHIOENSE REN. AND CARD.—Mount Royal. August.

POLYTRICHUM PILIFERUM SCHREB.—Westmount. September.

POLYTRICHUM JUNIPERINUM WILLD.—Mount Royal. June.

POLYTRICHUM JUNIPERINUM ALPINUM SCHIMP.—Westmount. July.

POLYTRICHUM STRICTUM BANKS.—Mount Royal. August.

POLYTRICHUM COMMUNE LINN.—Savanne. July.

POLYTRICHUM COMMUNE PERIGONIALE BRUCH AND SCHIMP.—Mount Royal. June.

POLYTRICHUM COMMUNE CANADENSE KINDB.—Mount Royal. August.

PTERIGONIUM SWARTZ.

PTERIGONIUM GRACILE SWARTZ.—Common on Mount Royal all the season.

HYPNEÆ.

BRACHYTHECIUM SCHIMP.

BRACHYTHECIUM ACUMINATUM SETOSUM C. M. AND KINDB.—Common throughout the season.

HYPNUM PROPER.

HYPNUM CURVIFOLIUM HEDW.—Petite Cote woods. June.

HYLOCHOMIUM SCHIMP.

HYLOCHOMIUM SPLENDENS LINN.—Mount Royal. August.

HYLOCHOMIUM TRIQUETRUM LINN.—Bagg's Woods. June.

OPHIOGLOSSACEÆ PRESL.

BOTRYCHIUM SW.

BOTRYCHIUM SIMPLEX E. HITCHCOCK.—*Little grape-fern.*—Found by Dr. H. B. Cushing at north base of Mount Royal. June.

POLYPODIACEÆ R. BR.

WOODSIA R. BR.

WOODSIA ILVENSIS (L.) R. BR.—*Rusty Woodsia.*—Below the steep crag, near the top of Mount Royal, above Ravenscrag. September.

CYSTOPTERIS BERN.

CYSTOPTERIS FRAGILIS (L.) BERN.—*Brittle fern.*—Crevices of rocks, north end of Mount Royal. August.

ASPLENIUM L.

ASPLENIUM TRICHOMANES L.—*Maiden-hair Spleenwort.*—Found by Dr. H. B. Cushing on rock at north-east end of Mount Royal. August.

ASPLENIUM ANGUSTIFOLIUM MICHX. — *Narrow-leaved Spleenwort.*—Abundant in Bagg's Woods. August.

ASPLENIUM ACROSTICHOIDES SW.—*Silvery Spleenwort.*—In Bagg's woods, and on Mount Royal above Ravenscrag. August.

PELLÆA LINK.

PELLÆA STELLERI (S.G. GMEL.) WATT.—*Slender Cliff Brake.*—On face of rocks, north-east end of Mount Royal. August.

GRAMINEÆ JUSS.

ALOPECURUS L.

ALOPECURUS PRATENSIS L.—*Meadow Foxtail.*—Fletcher's Field. June.

SIEGLINGIA Bern.

Sieglingia sesleroides (Michx.) Scribn.—*Tall Red-top.*—Bagg's Woods. August.

ELYMUS L.

Elymus robustus Scrib. and Sm.—*Stout Wild Rye.*—Back River. September.

CYPERACEÆ J. St. Hil.

CAREX L.

CarexRæana Boot.—*Rae's Sedge.*—Savanne, St. Michel. August.

Carex Hartii Dewey.—*Hart Wright's Sedge.*—Beaconsfield. June.

Carex viridula Michx.—*Green Sedge.*—Near Water Works, St. Henri. August.

JUNCACEÆ Vent.

JUNCUS L.

Juncus filiformis L.—*Thread Rush.*—Lachine. August.

ORCHIDACEÆ Lindl.

CYPRIPEDIUM L.

Cypripedium reginæ Watt.—*Showy Ladies' Slipper.*—Savanne, St. Michel. July. (Reported by Dr. Holmes from Mount Royal.)

LEPTORCHIS Thouars.

Leptorchis Loeselii (L.) MacM.—*Fen orchis.*—Abundant in Savanne, St. Michel. July.

CORALLORHIZA R. BR.

CORALLORHIZA MULTIFLORA NUTT.—*Large Coral Root.*—Petite Cote woods. August. (Reported by Dr. Holmes as *odontorhiza.*)

MYRICACEÆ DUMORT.

MYRICA L.

MYRICA GALE L.—*Sweet Gale.*—Banks Riviere des Prairies. September.

SALICACEÆ LINDL.

SALIX L.

SALIX FLUVIATILIS NUTT.—*Sandbar Willow.*—Longue Pointe and Pointe aux Trembles. June.

SALIX BEBBIANA SARG.—*Bebb's Willow.*—Savanne, St. Michel. May.

SALIX BROWNII BEBB.—*Robert Brown's Willow.*—Savanne, St. Michel. June.

SALIX CANDIDA FLUEGGE.—*Hoary Willow.*—Savanne, St. Michel. May.

FAGACEÆ DRUDE.

QUERCUS L.

QUERCUS VELUTINA LAM.—*Black Oak.*—Mount Royal Cemetery. June.

QUERCUS ALBA L.—*White Oak.*—St. Anne's. June.

URTICACEÆ REICHENB.

ADICEA RAF.

ADICEA PUMILA (L.) RAF.—*Clearweed.*—St. Michel woods. August.

CHENOPODIACEÆ DUMORT.

CHENOPODIUM L.

CHENOPODIUM GLAUCUM L.—*Oak-leaved Goosefoot.*—Common. August.

AMARANTHACEÆ J. ST. HIL.

AMARANTHUS L.

AMARANTHUS HYBRIDUS L.—*Slender Pigweed.*—Common. September.

AMARANTHUS BLITOIDES S. WATS.—*Prostrate amaranth.*—Railway grounds, Point St. Charles. August.

AMARANTHUS GRÆCIZANS L.—*Tumbleweed.*—Alongside railway tracks. September.

ACNIDA L.

ACNIDA TAMARISCINA TUBERCULATA (MOQ.) ULINE AND BRAY.—*Tall Western Water-hemp.*—On banks of St. Lawrence. Common. August.

CARYOPHYLLACEÆ REICHENB.

VACCARIA MEDIC.

VACCARIA VACCARIA (L.) BRITTON.—*Cow herb.*—Refuse heap, Cote St. Paul. July.

NYMPHÆACEÆ D.C.

BRASENIA SCHREB.

BRASENIA PURPUREA (MICHX.) CASP.—*Water-shield.*—Found by Dr. Girdwood at St. Anne's.—(Reported by Dr. Holmes in 1821 from Point St. Charles.)

BERBERIDACEÆ T. AND G.

BERBERIS L.

BERBERIS VULGARIS L.—*European Barberry.*—East of reservoir, spread from McGill College grounds. June.

CRUCIFERÆ B. JUSS.

ARABIS L.

ARABIS GLABRA (L.) BERNH.—*Tower Mustard.* Mount Royal Park. July.

BRASSICA L.

BRASSICA CAMPESTRIS L.—*Wild Navew.*—Lachine. August.

BARBAREA R. BR.

BARBAREA BARBAREA (L.) MACM.—*Yellow Rocket.*—Montreal.

SARRACENIACEÆ LA PYL.

SARRACENIA L.

SARRACENIA PURPUREA L.—*Pitcher Plant.*—Savanne, St. Michel. July. (Reported by Dr. Holmes.)

HAMAMELIDACEÆ LINDL.

HAMAMELIS L.

HAMAMELIS VIRGINIANA L.—*Witch-Hazel.*—Found by Dr. Girdwood at St. Anne's. September.

ROSACEÆ B. JUSS.

GEUM L.

GEUM MACROPHYLLUM WILLD.—*Large-leaved avens.*—Savanne, St. Michel. June.

ROSACEÆ L.

CRATÆGUS L.

CRATÆGUS MACRACANTHA LODD.—*Longspined Thorn.*—St. Michel. May.

CÆSALPINACEÆ KL. AND GARCKE.

GYMNOCLADUS LAM.

GYMNOCLADUS DIOICA (L.) KOCH.—*Kentucky Coffee-tree.*—On Parthenais Street, Dorchester Street, near Fort Street, and in Cemetery—introduced. June.

OXALIDACEÆ LINDL.

OXALIS L.

OXALIS CYMOSA SMALL.—*Tall Yellow Wood Sorrel.*—On trolley track, Longue Pointe. September.

POLYGALACEÆ REICHENB.

POLYGALA L.

POLYGALA SENEGA L.—*Seneca Snakeroot.*—St. Anne's. June.

EUPHORBIACEÆ J. ST. HIL.

EUPHORBIA PEPLUS L.—*Petty Spurge.*—Pine Avenue. August.

EUPHORBIA HIRSUTA (TORR.) WIEGAND.—*Hairy Spurge.*—Mount Royal Park. July.

CALLITRICHACEÆ LINDL.

CALLITRICHE L.

CALLITRICHE PALUSTRIS L.—*Vernal Water Starwort.*—Near Back River. August.

STAPHYLEACEÆ D.C.

STAPHYLEA L.

STAPHYLEA TRIFOLIA L.—*American Bladder-nut.*—Roadside, near Cartierville. June. (Reported by Dr. Holmes from St. Martin's, in 1821.)

ACERACEÆ ST. HIL.

ACER L.

ACER SACCHARUM MARSH.—*Rock Maple.*—Mount Royal Park. May.

ACER NEGUNDO L.—*Ash-leaved Maple.*—Common. May.

ACER PLATANOIDES L.—*Norway Maple.*—McGill College Grounds. April.

HYPERICACEÆ LINDL.

HYPERICUM L.

HYPERICUM BOREALE (BRITTON) BICKNELL.—*Northern St. John's Wort.*—Savanne, St. Michel. August.

TRIADENUM RAF.

TRIADENUM VIRGINICUM (L.) RAF.—*Marsh St. John's Wort.*—Lachine. September.

ELATINACEÆ LINDL.

ELATINE L.

ELATINE AMERICANA (PURSH.) ARN.—*Mud Purslane.*—Back River. August.

LYTHRACEÆ LINDL.

LYTHRUM L.

LYTHRUM ALATUM PURSH.—*Wing-angled Loosestrife.*—Riviere des Prairies. September.

LYTHRUM SALICARIA L.—*Purple Loosestrife.*—Longue Pointe and Pointe aux Trembles. July.

UMBELLIFERÆ B. JUSS.

ZIZIA KOCH.

ZIZIA AUREA (L.) KOCH.—*Early Golden Meadow Parsnip.*—Common. May.

DERINGA ADANS.

DERINGA CANADENSIS (L.) KUNTZE.—*Honewort.*—Bagg's Wood. July.

HYDROCOTYLE L.

HYDROCOTYLE AMERICANA L.—*American Marsh—Pennywort.*—Mountain Marsh, Mount Royal Park. August.

ERICACEÆ D.C.

LEDUM L.

LEDUM GRŒNLANDICUM OEDER. — *Labrador Tea.*—Savanne, St. Michel. June. (Reported by Dr. Holmes as *Ledum palustre.*)

GAULTHERIA L.

GAULTHERIA PROCUMBENS L.—*Creeping Wintergreen.*—Savanne, St. Michel. June. (Reported by Dr. Holmes in 1822.)

PRIMULACEÆ VENT.

ANAGALLIS L.

ANAGALLIS ARVENSIS L.—*Poor Man's Weather Glass.*—Found occasionally in gardens. July.

APOCYNACEÆ LINDL.

APOCYNUM L.

APOCYNUM HYPERICIFOLIUM AIT.—*Clasping-leaved dog-bane.*—St. Anne's. June.

CONVOLVULACEÆ VENT.

CONVOLVULUS L.

CONVOLVULUS ARVENSIS L.—*Small Bindweed.*—Westmount. July.

BORAGINACEÆ LINDL.

LAPPULA MOENCH.

LAPPULA VIRGINIANA (L.) GREENE.—*Virginia Stickseed.*—Bagg's Wood. August.

LABIATÆ B. JUSS.

HEDEOMA PERS.

HEDEOMA PULEGIOIDES (L.)—PERS.—*American Penny-royal.*—St. Anne's. June.

KOELLIA MOENCH.

KOELLIA VIRGINIANA (L.) MACM.—*Virginia Mountain Mint.*—Riviere des Prairies and Westmount. August.

SCROPHULARIACEÆ LINDL.

ILYSANTHES RAF.

ILYSANTHES ATTENUATA (MUHL.) SMALL.—*Shortstalked false pimpernel.*—Savanne, St. Michel. June.

GRATIOLA L.

GRATIOLA VIRGINIANA L.—*Clammy Hedge-Hyssop.*—Dixie. September.

VERONICA L.

VERONICA ARVENSIS L.—*Corn Speedwell.* — Roadside, Cote des Neiges. July.

LEPTANDRA NUTT.

LEPTANDRA VIRGINICA (L.) NUTT. — *Culver's-root.*—Roadside, St. Michel. August.

LENTIBULARIACEÆ LINDL.

UTRICULARIA L.

UTRICULARIA VULGARIS L.—*Greater Bladderwort.*—Pond, Lachine. June.

ACANTHACEÆ J. ST. HIL.

DIANTHERA L.

DIANTHERA AMERICANA L. — *Dense-flowered Water-Willow.*—Shore of St. Lawrence, Point St. Charles. July.

RUBIACEÆ B. Juss.

Galium mollugo L.—*Wild Madder.* — Westmount. July.

Galium spurium L.—*Lesser-Goosegrass.*—St. Anne's. June.

Galium lanceolatum Torr.—*Torrey's Wild Liquorice.* —Westmount. July.

Galium tinctorium L.—*Stiff Marsh Bedstraw.*—Back River. July.

Galium palustre L.—*Marsh Bedstraw.*—St. Anne's. June.

CAMPANULACEÆ Juss.

Campanula rapunculoides L.—*Creeping Bellflower.*—Roadsides, escaped from cultivation (wrongly named *Americana* in former list.)

Campanula aparanoides Pursh.—*Marsh Bellflower.*—Back River. September.

CICHORIACEÆ Reichenb.

LEONTODON L.

Leontodon autumnale L.—*Fall Dandelion.*—Pointe aux Trembles. September.

LACTUCA L.

Lactuca Scariola L.—*Prickly Lettuce.*—Logan's Park. August.

Lactuca hirsuta Muhl.—*Hairy Wood Lettuce.*—Mount Royal Park. August.

Lactuca sagittifolia Ell.—*Arrow-leaved Lettuce.*—Westmount. August.

HIERACIUM L.

HIERACIUM AURANTIACUM L.—*Orange Hawkweed.*—Westmount. July.

AMBROSIACEÆ REICHENB.

AMBROSIA L.

AMBROSIA PSILOSTACHYA D.C.—*Western Ragweed.*—Common about Point St. Charles. August.

COMPOSITÆ ADANS.

EUPATORIUM L.

EUPATORIUM MACULATUM L.—*Spotted Joe-Pye-weed.*—Lachine and Savanne, St. Michel. August.

SOLIDAGO L.

SOLIDAGO HISPIDA MUHL.—*Hairy Golden-rod.*—Mount Royal Park. August.

SOLIDAGO PUBERULA NUTT.—*Downy Golden-rod.*—Petite Cote. August.

SOLIDAGO VIRGAUREA L. — *European Golden-rod.*—Mount Royal Park. September.

SOLIDAGO ULIGINOSA NUTT.—*Bog Golden-rod.*—Savanne, St. Michel. September.

SOLIDAGO CANADENSIS GLABRATA PORTER. — *Smooth Canada Golden-rod.*—Mount Royal Park, at base of mountain. August.

ASTER L.

ASTER MACROPHYLLUS BIFORMIS BURGESS.—*Large-leaved Aster.*—Lachine. September.

ASTER MACROPHYLLUS EXCELSIOR BURGESS.—*Fine large-leaved Aster.*—Park Road. September.

ASTER CORDIFOLIUS PEDICELLATUS BURGESS.—*Blue Wood Aster.*—Mount Royal Park. September.

ASTER LINDLEYANUS T. & G.—*Lindley's Aster.*—Savanne, St. Michel. September.

ASTER PUNICEUS FIRMUS (NEES) T. & G.—*Smooth Red-stalked Aster.*—St. Michel. August.

ASTER PUNICEUS LUCIDULUS A. GRAY.—*Shining Red-stalked Aster.*—St. Michel. August.

ASTER PANICULATUS BELLIDIFOLIUS (WILLD.) BURGESS.—*Fair White Aster.*—Common. August.

ERIGERON L.

ERIGERON ACRIS DROEBACHIANUS (O. F. MUELLER) BLYTT.—*Blue Fleabane.*—Cote St. Michel. August.

ERIGERON ACRIS DEBILIS A. GRAY.—*Slender Blue Fleabane.*—Lachine. September.

RUDBECKIA L.

RUDBECKIA LACINIATA L.—*Green-headed Cone-flower.*—August.

HELIANTHUS L.

HELIANTHUS DECAPETALUS L.—*Thin-leaved Wild Sunflower.*—Mount Royal Park. August.

HELENIUM L.

HELENIUM AUTUMNALE L.—*Swamp Sunflower.*—Shore Riviere des Prairies. September.

ARCTIUM L.

ARCTIUM MINUS SCHK.—*Common Burdock.*—Longue Pointe. September.

List of the Published Writings of Elkanah Billings, F.G.S., Palæontologist to the Geological Survey of Canada, 1856-1876.

Prepared by B. E. Walker, F.G.S., Toronto, Canada.

Previous to 1854, the date of his first serious contribution to science, Mr. Billings was the editor of one of the newspapers, the *Citizen*, in Ottawa (Bytown), Canada, and it is stated that he contributed to its columns articles on geology of a more or less popular character. No record of these articles is made here. In 1856 he published the first volume of the *Canadian Naturalist and Geologist.* The title page of this particular volume bears his name, and he is supposed to have written all the articles not specially indicated as from other contributors. Only one paper contains an original description of a fossil, and in the majority of cases they are articles about the wild animals and the geology of Canada, such as might have been contributed to a text book. The second volume was edited by a committee, and does not bear Mr. Billings' name. He apparently contributed at least twelve articles, some over his initials and some not, of which only eight appear in the index. Other articles, not indexed or bearing name or initials, may, of course, be by him. In any event, no article by him in the second volume contains an original description of a fossil or other natural object.

In 1856 he was appointed Palæontologist to the Geological Survey of Canada, and from 1857 to the end of his life his published works are almost entirely devoted to the description of the great number of new genera and species with which his name is associated.

In this list of his published writings the titles in almost every case are given literally as originally printed. In the series of articles devoted to natural history in Canada, the generic and specific name of the animal described is often part of the title. Sometimes this name is in brackets, sometimes not; the specific name may begin with a capital or not, without reference to any system of nomenclature. In the early volumes of the *Canadian Naturalist and Geologist* the entire title is always in italics. Words which in this list appear in brackets thus [ ] are part of the title. Words in brackets thus ( ) are not part of the title, but are notes by the compiler. Attention is particularly directed to this, because the notes of the compiler frequently intentionally contradict statements conveyed by the title. In the compiler's notes references are as a rule not made to illustrations unless they accompany descriptions of new fossils.

A biographical sketch of Mr. Billings by his successor, Mr. Whiteaves, will be found in Vol. VIII., new series, of the *Canadian Naturalist.*

LIST OF PUBLICATIONS IN WHICH WRITINGS BY MR. BILLINGS HAVE APPEARED, WITH THE ABBREVIATIONS USED IN THE BIBLIOGRAPHY.

Publications.	Abbreviations.
Geological Survey of Canada	G.S.C.
The Canadian Journal—Proceedings of Canadian Institute, Toronto, Canada	Can. Journ.
The Canadian Naturalist and Geologist—Proceedings of the Natural Historical Society, Montreal, Canada	Can. Nat.
The American Journal of Science and Arts, New Haven, U.S.	A.J.S.
Proceedings American Association for Advancement of Science	P.A.A.A.S.
Report of the Geology of Vermont	Geol. Verm.
Portland Society of Natural History, Portland, Maine, U.S.	P.S.N.H.
Annals and Magazine of Natural History, London, Eng	A.M.N.H.
Geological Magazine, London, Eng	Geol. Mag.
Quarterly Journal of the Geological Society, London, Eng	Q.J.G.S.

BIBLIOGRAPHY.

Year.	Month	Title.	Publication.	Volume.	Page.
1854	April and May	On some New Genera and Species of Cystidea from the Trenton Limestone. Read before the Canadian Institute, February 11th, 1854. (Describes and illustrates the new genera, *Glyptocystites* and *Pleurocystites*)	Can. Journ.	Ser. 1, V. 2	215-218
"	June	On some new Genera and Species of Cystidea from the Trenton Limestone. Second paper. Read before the Canadian Institute, April 8th, 1854. (Describes and illustrates the new genera, *Comarocystites* and *Amygdalocystites*)	"	"	250-253 268-274
1856	February	Elevation and subsidence of Land—Various Theories of the Earth—Origin of Stratified Rocks—European and American Formations—Geographical Distribution of the latter in Canada	Can. Nat.	1	1-25
"	"	On the Nomenclature and Classification of the Animal Kingdom	"	1	26-31
"	"	Fossils of the Potsdam Sandstone; Sea-weeds, Shells and footprints on the rock at Beauharnois	"	1	32-39
"	"	On some of the characteristic fossils of the Lower Silurian Rocks of Canada	"	1	39-47
"	"	On the Crinoidea or Stone Lilies of the Trenton Limestone, with a description of a new species. (Describes and illustrates *Glyptocrinus ramulosus*)	"	1	48-57
"	"	Fossils of the Upper Silurian Rocks, Niagara and Clinton Groups	"	1	57-60
"	"	Natural History of the Moose Deer, Alces Americana	"	1	60-70

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Year.	Month.	Title.	Publication.	Volume.	Page.
1856.	February	The Northern Reindeer, or Barren Ground Caribou [Tarandus arcticus]	Can. Nat.	1	71-76
"	"	The Woodland Caribou [Tarandus hastalis]	"	1	77-80
"	April	On the Wapite, or Canadian Stag [Elaphus Canadensis]	"	1	81-87
"	"	On the Common Deer [Cervus Virginianus]	"	1	87-92
"	"	On the Mule Deer [Cervus Macrotis]	"	1	92-100
"	"	On the American or Black Bear [Ursus Americanus]	"	1	100-104
"	"	On the Grizzly Bear [Ursus Ferox]	"	1	104-109
"	"	On the White or Polar Bear [Ursus maritimus]	"	1	109-113
"	"	On the Cinnamon Bear [Ursus cinnamomum]	"	1	114-115
"	"	On the Fossil Corals of the Lower Silurian Rocks of Canada	"	1	115-128
"	"	On some of the technical terms used in the description of Fossil Shells	"	1	128-131
"	"	On some of the Fossil Shells of the Niagara and Clinton Formations	"	1	131-139
"	"	Ornithology; Technical terms	"	1	139-142
"	"	On the Robin, or Migratory Thrush [Turdus migratorious]	"	1	142-146
"	"	On Black Duck [Anas obscura]	"	1	146-149
"	"	On the Wood Duck [Anas sponsa]	"	1	149-152
"	"	On the Green-winged Teal [Anas Carolinensis]	"	1	153-154
"	"	On the Blue-winged Teal [Anas discors]	"	1	154-156
"	"	On the Mallard [Anas boschas]	"	1	156-159
"	"	On a Sea-Gull shot at Ottawa	"	1	159-160
"	June	On the Pigeon [Ectopistes Migratoria]	"	1	168-176

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1856.	June	On the Species of Woodpeckers observed in the vicinity of the City of Ottawa	Can. Nat.	1	176-189
"	"	A Chapter on Earthquakes	"	1	189 195
"	"	On some of the Common Rocks of the British Provinces	"	1	196-202
"	"	On some of the Lower Silurian Fossils of Canada	"	1	203-208
"	"	Natural History of the Wolf [Canis Lupus] and its varieties	"	1	209-215
"	"	On the Foxes of British North America	"	1	216-228
"	"	On the Canadian Otter [Lutra Canadensis]	"	1	228 232
"	"	On the Bob-link or Rice-bird [Dolichonyx orzivora]	"	1	233-237
"	September	Natural History of the Wolverene or Carcajou [Gulo Luscus]	"	1	241-246
"	"	On the Loup Cervier, or Canadian Lynx [Lynx Canadensis] and the Bay Lynx or Wild Cat of the United States [Lynx Rufus]	"	1	247-252
"	"	Natural History of the Raccoon [Procyon Lotor]	"	1	253-260
"	"	On some of the Game Birds of Canada	"	1	284-305
"	"	On the Insects injurious to the Wheat crop	"	1	306-312
"	"	Description of Fossils occurring in the Silurian Rocks of Canada	"	1	312-320
"	December	On the Tertiary Rocks of Canada, with some account of their Fossils	"	1	321-346
"	"	On the American Buffalo [Bison Americanus]	"	1	346-353
"	"	On the Musk Ox [Ovibos moschatus]	"	1	353-357
"	"	The Rocky Mountain Sheep [Ovis montana]	"	1	357-360

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Year.	Month.	Title.	Publication.	Volume.	Page.
1856	December	On the Skunk [Mephitis chinga]	Can. Nat	1	360-364
"	"	On the Canada Porcupine [Hystrix dorsata]	"	1	364-369
"	"	On the Northern Hare [Lepus Americanus]	"	1	369-379
"	"	On the Mammoth and the Mastodon	"	1	379-390
1857	January	On the several species of Squirrels inhabiting the British Provinces	"	1	431-442
"	(The cover reads	On the great Horned Owl, Bubo Virginianus	"	1	443-447
"	February)	The Snowy Day Owl. Surnia Nyctea	"	1	447-450
"	"	The Enemies of the Wheat Fly	"	1	450-457
"	"	Lawrencian Formation	"	1	464-
"	"	Fossils of the Hamilton Group	"	1	473-479
"	March	On the iron ores of Canada and the cost at which they may be worked	"	2	20-28
"	"	On the Natural History of the Rosignol or Song Sparrow, Fringilla melodia	"	2	47-52
"	May	Notes on the Natural History of the Mountain of Montreal	"	2	92-101
"	"	The Muskrat [Fiber Zibethicus]	"	2	106-111
"	"	On the Wood-Chuck [Arctomys Monax]	"	2	112-116
"	"	On the "Fisher" or Pekan. "Pennant's Marten" [Mustela Canadensis]	"	2	116-119
"	"	On the Beaver.—Castor fiber	"	2	120-127
"	"	On the Genera of Fossil Cephalopoda occurring in Canada	"	2	135-138
"	December	On the Star-Nosed Mole of America	"	2	446-448

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Year.	Month.	Title.	Publication.	Volume.	Page.
1857	December	On the Mink [Putorius vison]	Can. Nat	2	448-455
"	"	The Common Weasel [Putorius erminea]	"	2	455-462
"	"	On the Pine Marten [Mustela martes]	"	2	463-464
		(The last four articles are neither signed nor indexed as by Billings, but they appear to be the concluding numbers of his series of papers on natural history.)			
1857	March	Report for the year 1856 (the first) as Palæontologist, containing the following sub-heading "New Species of Fossils from the Silurian Rocks of Canada." (The descriptions of new genera and species in earlier papers are here included together with many new species of Echinodermata, Brachiopoda, Gasteropoda, Cephalopoda and Crustacea, and the genera *Pasceolus* and *Batricea*. No illustrations accompany the descriptions)	G.S.C.	Report of Progress, 1853-56	247-345
1858	March	Report for the year 1857 as Palæontologist. (Contains descriptions of new genera and species of Cœlenterata, without illustrations, and of Lamellibranchiata and Brachiopoda, with illustrations. That part of the above report containing the descriptions of new fossils was published at Montreal, without date, as a separate pamphlet, 31 pp., with the title "Canadian Fossils, containing descriptions of New Genera and Species, from the Silurian and Devonian Formations of Canada, etc.)	"	Report of Progress, 1857	147-192
"	December	New Genera and Species of Fossils from the Silurian and Devonian formations of Canada. (This is merely a reprint of the descriptions and illustrations contained in the report for 1857, referred to immediately above.)	Can. Nat	3	419-444

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Year.	Month.	Title.	Publication.	Volume.	Page.
1858.	June	On the Cystideæ of the Lower Silurian Rocks of Canada. (7 plates and 26 figures with the text)	G.S.C.	Figures and descriptions, Can. Organic Remains, Decade 3.	9-74
"	"	On the Asteriadæ of the Lower Silurian Rocks of Canada. (3 plates and 2 figures with the text)	"	Figures and descriptions, Can Organic Remains, Decade 3.	75-85
"	"	On Cyclocystoides, a new genus of Echinodermata from the Lower and Middle Silurian Rocks, by J. W. Salter and E. Billings. (1 plate)	"	Figures and descriptions, Can. Organic Remains, Decade 3.	86-90
1859.	March.	On the Fossil Corals of the Devonian Rocks of Canada West. Read before the Canadian Institute, February 26th, 1859. (Describes 2 new genera and 30 species, some of which were described in Report for 1857, but not illustrated. 29 figures inserted with text. Published separately, pp. 44)	Can Journ.	Ser. 2, V. 4	97-140
"	April.	On some new Genera and Species of Brachiopoda, from the Silurian and Devonian Rocks of Canada. Read before the Natural History Society of Montreal, 28th March, 1859. From the Report of the Geological Survey for 1858. (Not printed in the Report for 1858. Describes 2 new genera and 4 species. 10 figures inserted with text)	Can. Nat.	4	131-135
"	May	On the Crinoideæ of the Lower Silurian Rocks of Canada. (9 plates and 26 figures with the text. Includes a memoir on the genus *Comatula* by John V. Thompson, F.L.S., etc	G.S.C.	Figures and descriptions, Can. Organic Remains, Decade 4.	pp. 72

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Year.	Month.	Title.	Publication.	Volume.	Page.
1859	August	Description of a new Genus of Brachiopoda, and on the genus Cyrtodonta. From Report of Geological Survey, 1858-59, unpublished. (No illustrations)	Can. Nat	4	301-303
"	October	Fossils of the Calciferous Sandrock, including those of a deposit of white limestone at Mingan, supposed to belong to the formation. Extracted from the Report of the Geological Survey of Canada for 1858-1859. (Not printed in Report. 41 species referred to, covering all Canadian forms from the Calciferous known at this time. 1 new genus and 27 new species described. 12 figures inserted with text)	"	4	345-367
"	"	Descriptions of some new species of Trilobites from the Lower and Middle Silurian rocks of Canada. Extracted from the Report of the Geological Survey of Canada for 1858-1859. (Not printed in Report 15 species referred to, of which 12 are new. 13 figures inserted with text)	"	4	367-383
"	December	Fossils of the Chazy Limestone, with descriptions of new species. Extracted from the Report of the Geological Survey of Canada for 1858-1859. (Not printed in Report. 129 species referred to, covering all Canadian forms from the Chazy known at this time. 37 new species described. 39 figures inserted with the text)	"	4	426-470

Year.	Month.	Title.	Publication.	Volume.	Page.
1860.	February ...	..Description of some new species of Fossils from the Lower and Middle Silurian Rocks of Canada. From the Report of the Geological Survey for 1860. (Report not published. 7 new species of Brachiopoda and 5 of Crustacea described. 12 figures inserted with the text)	Can. Nat....	5.....	49-69
"	"	.....Description of a new Palæozoic Starfish of the genus Palæaster, from Nova Scotia. (Describes and illustrates *Palæaster parviusculus*).....	"	....5.....	69-70
"	May.	.....On the Devonian Fossils of Canada West. Extracted from the Report of the Geological Survey of Canada for 1860—in preparation. (Report not published. 11 new species of Cœlenterata and 10 of Brachiopoda described. 47 figures inserted with the text and 1 plate)	Can. Journ..	Ser. 2, V. 5...	249-282
"	June . ..	....New Species of Fossils from the Lower Silurian Rocks of Canada. From the Report of the Geological Survey for 1860. (Report not published. 10 new species of Gasteropoda and 6 of Cephalopoda. 20 figures inserted with the text)	Can Nat....	5 (Printed "VI.")	161-177
"	August.....	.On some new species of Fossils from the Limestone near Point Levi, opposite Quebec. (25 new species of Crustacea. 30 figures inserted with the text. Page 301 printed *201* in error. Published separately pp. 24, same date)	"	....5.....	301-324

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1860.	September	Description of a new Trilobite from the Potsdam Sandstone, by Frank H. Bradley, with a note by E. Billings. (Republished P.A.A A.S., Vol. XIV., pp. 161-166, and Can. Nat., Vol. 5, pp. 420-425)	A.J.S.	Ser. 2, V. 30	241-243
"	November	Additional Note on the Potsdam Fossils. (Republished as indicated under previous paper)	"	"	337-338
"	December	On certain theories of the formation of mountains	Can. Nat	5	409-420
"	"	Acadian Geology and a Supplementary Chapter thereto. (Review)	"	5	450-455
1861.	March.	On the Devonian Fossils of Canada West. Continued from Vol. V., page 282. No. XXVII., May, 1860. (1 new species of Brachiopoda. 11 figures inserted with the text)	Can. Journ.	Ser. 2, V. 6	138-148
"	"	Note on a New Genus of Palæozoic Brachiopoda	"	"	148
"	April	Description of the new species of Lingula referred to in the foregoing paper. (Appended to "Notes on the Geology of Murray Bay—Lower St. Lawrence." J. W. Dawson. Describes and illustrates *Lingula eva*)	Can. Nat	6	150-151
"	May	On the Devonian Fossils of Canada West. Continued from Vol. VI., page 282. No. XXVIII., May, 1860. (Should read page 148 and March, 1861. 2 new species of Brachiopoda. 44 figures inserted with the text)	Can. Journ.	Ser. 2, V. 6	253-274

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1861	July	On the Devonian Fossils of Canada West. Continued from Vol. VI., page 282. No. XXVIII., May, 1860. (Should read page 274 and May, 1861. 1 new species of Lamellibranchiata 3 of Gasteropoda and 2 of Cephalopoda. 31 figures inserted with the text. The four entries under same title, at May, 1860, and March, May and July, 1861, constitute one paper.)	Can. Journ.	Ser. 2, V. 6	329-363
"	August	On some of the Rocks and Fossils occurring near Phillipsburg, Canada East. (1 new species of Brachiopoda, 3 of Gasteropoda and 1 of Crustacea. 6 figures inserted with text.)	Can. Nat	6	310-328
"	September	On the Age of the Red Sandstone formation of Vermont.	A.J.S.	Ser. 2, V. 32	232
"	October	On the occurrence of Graptolites in the base of the Lower Silurian. (No descriptions of fossils)	Can. Nat	6	344-348
"	November (Cover reads 21st Nov., 1861)	New Species of Lower Silurian Fossils. (The matter in this pamphlet forms the first 24 pages of the first volume of "Palæozoic Fossils," published Oct., 1865, *q.v.*)	G.S.C.	Pamphlet	pp. 24
"		On some new or little known species of Lower Silurian Fossils from the Potsdam Group—"Primordial Zone"	Geol. Verm.	2	942-945
"		On some new species of Fossils from the Calciferous, Chazy, Black River, and Trenton Formations. (The above two papers contain the matter covered by the pamphlet published by the G.S.C., November, 1861)	"	2	955-960

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1862.	January	New Species of Lower Silurian Fossils. (This constitutes the second part of "Palæozoic Fossils," published October, 1865, *q.v.*)	G.S.C.	Pamphlet	25-56
"	January	Further observations on the age of the Red sandrock formation (Potsdam Group) of Canada and Vermont	A.J.S.	Ser. 2, V. 33	100-105
"	April	On the date of the Report on the Geology of Wisconsin, noticed in this Journal, Vol. VI., p. 465	Can. Nat.	7	156-158
"	May	On Prof. J. Hall's claim of Priority in the determination of the Age of the Red Sandrock Series of Vermont	A.J.S.	Ser. 2, V. 33	370-376
"	"	Geology of Vermont, etc. (A Note on the publication of the "Report on the Geology of Vermont")	"	"	416-420
"	"	On the date of the recently published Report of the Superintendent of the Geological Survey of Wisconsin, exhibiting the Progress of the work, Jan. 1, 1861	"	"	420-421
"	"	Correction of the Article on the Red Sandrock in this vol., p 100.	"	"	421-422
"	June (Cover reads 6 June, 1862)	New Species of Lower Silurian Fossils. This constitutes the third part of "Palæozoic Fossils," published October, 1865, *q v.*)	G.S.C.	Pamphlet	57-168
"	October	Remarks upon Prof. Hall's recent publication, entitled "Contributions to Palæontology".	Can. Nat.	7	389-393
"	December	Notes on some of the habits of the pine-boring beetles of the genus Monohammus. Read before the Natural History Society of Montreal, 24th November, 1862.	"	7	430-438
"	"	Dana's Manual of Geology	"	7	474-476

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1863 (1869 ?)	January	Description of some new species of Fossils, with remarks on others already known, from the Silurian and Devonian rocks of Maine. (10 new species of Brachiopoda, 3 of Lamellibranchiata and 6 of Crustacea. 1 plate. This paper bears date the 12th and was read on the 19th January, 1863. It was published, however, in the second half, consisting of pp. 97-212, of the first volume of proceedings. P.S.N.H., and appeared without title page, the cover bearing date 1869. The building of the Society and the types of the fossils described were burned in 1866, and the second half of the volume did not appear either as a whole or in part until after that date)	P.S.N.H	1	104-126
1863	February	On the Parallelism of the Quebec Group with the Llandeilo of England and Australia, and with the Chazy and Calciferous formations. Read before the Natural History Society of Montreal, 3rd February, 1863.	Can. Nat	8	19-35
"	"	Description of a new species of Harpes from the Trenton Limestone, Ottawa	"	8	36-37
"	"	On the Internal Spiral Coils of the Genus Cyrtina	"	8	37-39
"	April	Description of a new Trilobite from the Quebec Group, by T. Devine (with a note by E. Billings)	"	8	95 98

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1863.	April	On the remains of the Fossil Elephant found in Canada. Read before the Natural History Society of Montreal, 23rd February, 1863. (The above five papers appeared in a separate pamphlet published by the Geological Survey of Canada at Montreal, 1863, pp. 36)	Can. Nat.	8	135-147
"	May	Geological Survey of Canada. Report of Progress from its Commencement to 1863	G.S.C.	——	pp. 983

(The following extract from Sir William Logan's preface, page VII., indicates partially Mr. Billings' share in the preparation of this volume: "In order to insure uniformity in the palæontological part of this work, all the palæozoic fossils mentioned in it have been submitted to the inspection of Mr. Billings, and the species are, therefore, all given on his authority. Of the described Lower Silurian species found in Canada, not including those of the Quebec group, he has prepared a catalogue, showing their vertical distribution, and referring to the publications in which the descriptions and figures will be found. This catalogue has been introduced into the appendix to this volume." The catalogue will be found at pp. 936-956. There is also at pp. 862-864 a "List of Fossils from the various bands at Point Levis" (Quebec). There are no descriptions of fossils in the volume, but 498 figures, almost all of fossils, are inserted with the text.)

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1863.	June	Description of a new species of Phillipsia from the lower Carboniferous rocks of Nova Scotia	Can. Nat	8	209-210
"	September	On the genus Centronella, with remarks on some other genera of Brachiopoda	A.J.S.	Ser. 2, V. 36	236-240
"	October	On the Genus Stricklandia; proposed alteration of the name	Can. Nat	8	370
1865.	February	New Species of Lower Silurian Fossils. (This constitutes the fourth part of "Palæozoic Fossils." In the case of every other title given in this bibliography except this, I have seen the actual publication. See preface to "Palæozoic Fossils," published October, 1865.)	G.S.C.	Pamphlet	169-344
"	June	Notes on Some of the More Remarkable Genera of Silurian and Devonian Fossils. (On *Receptaculites* and *Pasceolus*. 14 figures inserted with the text)	Can. Nat	N. Ser, V. 2	184-198
"	October	Palæozoic Fossils. Volume 1. (The several parts which here appear as one volume were published as follows: Pp. 1-24 November, 1861—text altered somewhat in 1865, see page 419. 25-56 January, 1862. 57-168 June, 1862—pp. 57-72 reprinted or altered in 1865, see page 419. 169-344 February, 1865. 345-426 with the complete work as above. The volume contains eleven sub-headings with a list of Levis fossils and an appendix. The index gives the names of 529 species, which are illustrated by 401 figures inserted with the text)	G.S.C.	1	pp. 426

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1865.	December	Notes on Some of the More Remarkable Genera of Silurian and Devonian Fossils. Continued from page 198. (On *Beatricea*, 3 figures. Continuation of paper dated June, 1865)	Can. Nat.	N. Ser., V. 2.	405-409
"	"	Notice of Some New Genera and Species of Palæozoic Fossils. (1 new genus, *Calapœcia*, and 18 new species of Cœlenterata, described but not illustrated)	"	"	425-432
1866.	November	Catalogues of the Silurian Fossils of the Island of Anticosti, with Descriptions of some New Genera and Species. (This report contains the following five papers :)	G.S.C.	Spl. Report	pp. 93
		1. Catalogue of the Lower Silurian Fossils of Anticosti, with Descriptions of some of the Species. (Describes 28 new species. Cœlenterata, 1 ; Polyzoa, 4 ; Echinodermata, 1 ; Brachiopoda, 2 ; Lamellibranchiata, 7 ; Gasteropoda, 6 ; Cephalopoda, 2 ; Pteropoda, 2 ; Crustacea, 3. 11 figures inserted with the text)			5-28
		2. Catalogue of the Fossils of the Anticosti Group with Descriptions of Some of the Species. (Describes 75 new species. Protozoa, 3 ; Polyzoa, 19; Brachiopoda, 15; Lamellibranchiata, 9 ; Gasteropoda, 10; Cephalopoda, 9 ; Crustacea, 10. 11 figures inserted with the text)			29-72
		3. Additional Species from the Hudson River Group. (Describes 3 species of *Licrophycus* and the new genus *Scrichnites* with one species			72-75

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
		4. General Observations on the Palæozoic Fossils of Anticosti. (No descriptions of fossils)			75-82
		5. New Species of Fossils from the Clinton and Niagara Formations. (Describes 23 new species and one new genus. Cœlenterata, 6; Polyzoa, 1; Cephalopoda, 13; Echinodermata, 3. 6 figures inserted with the text. This last paper is entered in the publication as a subtitle, but it has no relation to the main title)			82 93
1867	May	Geological Survey of Illinois, etc. (A note on the publication of Vol. II., Palæontology)	A.J.S.	Ser. 2, V. 43	395-398
"	July	On the Classification of the subdivisions of McCoy's Genus Athyris, as determined by the laws of Zoological Nomenclature. Read before the Nat. Hist. Soc., Montreal, March 25th, 1867. (Also published in A.M.N.H., Ser. 3, Vol. XX., pp. 233-247	"	Ser. 2, V. 44	48-61
"	——	Esquisse Géologique du Canada. Restes Organiques	Commission Géologique du Canada. ——		43-49
1868	February	Description of Two New Species of Stricklandinia (one plate)	Geol. Mag.	5	59-64
1868	December	On Leskia mirabilis (Gray) by Prof. S. Lovén. Communicated by Dr. Christian Lütken, Assistant Zoologist in the Museum of the University, Copenhagen. (With a note by Mr. Billings. The article treats of the morphology of *Cystidea*)	Can. Nat.	N. Ser., V. 3	437-445

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page
1869.	March	Note on the Blastoidea	Can. Nat	N. Ser., V. 4	89-90
"	May	Note on the structure of the Blastoidea. (Although dealing with the same genera, the two articles, published respectively in March and May, are not identical. The last article was reprinted in A.M.N.H., Ser. 4, Vol. 4, p. 76)	A.J.S.	Ser. 2, V. 47	353
"	September.	On Hyponome Sarsi, a recent Cystidean, by S. Loven. Reprinted from the Annals and Magazine of Natural History, September, 1869. (With a note by Mr. Billings)	Can. Nat	N. Ser., V. 4	265-270
"	July	Notes on the structure of the Crinoidea, Cystidea and Blastoidea	A.J S.	Ser. 2, V. 48	69-83
1870.	January	Notes on the structure of the Crinoidea, Cystidea and Blastoidea. Continued from this journal, II., Vol. XLVIII., p. 83	"	Ser. 2, V. 49	51-58
"	September.	Notes on the structure of the Crinoidea, Cystidea and Blastoidea. Concluded from this journal, II , Vol. XLIX , p. 58. (The three articles above were reprinted as follows: Can. Journ. N. Ser., V. 4, pp. 277-293, September, 1869 ; pp. 426-433, December, 1869 ; V. 5, pp. 180-198, June, 1870. A.M.N.H., Ser. 4, V. 5, pp. 251-266 ; pp. 409-416 ; V. 7, pp 142-158)	"	Ser. 2, V. 50	225-240

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1870.	November	Corrections of errata in the "Notes on the structure of the Crinoidea, etc."	A.J.S.	Ser. 2, V. 50	436
"	"	Notes on Some Specimens of Lower Silurian Trilobites. (On the walking-appendages, Panderian organs, eggs and tracks of trilobites. Abstract of above, Can. Nat., N. Ser., V. 5, p 93)	Q J.G.S.	26	479-486
1871.	May	Notes and Observations on the Gold Fields of Quebec and Nova Scotia, by Alfred R C Selwyn. (With a note by Mr. Billings on the geological horizon of *Eophyton* at p. 269)	G.S.C.	Report of Progress 1870-71	252-282
"	June	Note on Trimerella acuminata. (Reprinted in A.M.N.H., Ser. 4, Vol. VIII., pp. 140-141)	A.J.S.	Ser. 3, V. 1	471
"	December	On Some New Species of Palæozoic Fossils. (Describes 9 new species as follows: Pteropoda, 4; Gasteropoda, 1; Brachiopoda, 4, with 2 new genera or subgenera, *Monomerella* and *Obolellina*. Reprinted in A.J.S., Ser. 3, Vol. 3, pp. 352-360)	Can. Nat.	N. Ser., V. 6	213-222
"	"	Proposed new genus of Pteropoda. (*Hyolithellus* proposed	"	"	240
1872.	February	Note on the discovery of fossils in the "Winooski marble" at Swanton, Vt. (Reprinted in Can. Nat., N. Ser., Vol. 6, p. 351)	A.J.S.	Ser. 3, V. 3	145
"	March	Fossils from the so-called Huronian of Newfoundland	"	"	223-224

BIBLIOGRAPHY—*Continued.*

Year.	Month.	Title.	Publication.	Volume.	Page.
1872	April	Remarks on the Taconic Controversy. (Reprinted in A.J.S., Ser. 3, Vol. 3, pp. 466-471)	Can. Nat	N. Ser., V. 6	313-325
"	"	On the Genus Obolellina. (Describes genus *Obolellina* and one new species. 7 figures)	"	"	326-330
"	"	A Question of Priority. (Published under a sub-title to previous article)	"	"	330-333
"	"	Note on a Question of Priority. (Same subject but not identical with previous article)	A.J.S.	Ser. 3, V. 3	270-273
"	"	Additional Note on Obolellina, etc. (Neither signed nor in index)	Can. Nat	N. Ser., V. 6	365-367
"	August	Additional Notes on the Taconic Controversy	"	"	460-465
"	"	On Some Fossils from the Primordial Rocks of Newfoundland. (Describes 4 new genera, *Arthraria*, *Iphidea*, *Aspidella*, *Scenella*, and 20 new species as follows: Plantæ, 3; Pteropoda, 4; Gasteropoda, 1; Brachiopoda, 5; Crustacea, 7. 14 figures inserted with the text. Was to have been continued)	"	"	465-479
"	"	Fossils probably of the Chazy era in the Eolian Limestone of West Rutland	A.J.S.	Ser. 3, V. 4	133
"	November	Rejoinder to Prof. Hall's Reply to a "Note on a Question of Priority"	"	"	399-400
1873	May	On the Mesozoic Fossils from British Columbia, collected by Mr. James Richardson in 1872. (No descriptions of fossils)	G.S.C.	Report of Progress, 1872-73	71-75

BIBLIOGRAPHY—*Continued.*

Year	Month.	Title.	Publication.	Volume.	Page.
1874	March	On Some New or Little Known Fossils from the Silurian and Devonian Rocks of Ontario. (Describes 2 new genera, *Aulocopina* and *Heterophrentis*, and 16 new species as follows: Protozoa, 1; Cœlenterata, 12; Cephalopoda, 2; Crustacea, 1. 2 figures of *Aulocopina*)	Can. Nat	N. Ser., V. 7	230-240
"	May	On Mr. Meek's Note, p. 373 of this vol	A.J.S	Ser. 3, V. 7	530
"	July	On Some New Genera and Species of Palæozoic Mollusca. (Describes 2 new genera, *Ilionia* and *Pteronitella*, and one new species. 2 figures)	Can. Nat	N. Ser., V. 7	301-302
"	August	Palæozoic Fossils. Vol. II.. Part I. (Contains the following articles): 1. On some of the Fossils of the Gaspé series of Rocks. 2. On some new species of Fossils from the Primordial rocks of Newfoundland. 3. On the Genus Stricklandinia, with descriptions of the Canadian species. 4. Notes on the Structure of the Crinoidea, Cystidea and Blastoidea. 5. On some of the Fossils of the Arisaig series of rocks, Upper Silurian, Nova Scotia. (10 plates and 85 figures inserted with the text)	G.S.C	Vol. II., Pt. 1	pp. 144
1876	March	On the structure of Obolella chromatica. (4 figures)	A.J.S	Ser. 3, Vol. 11	176-178

NOTE.—This bibliography was completed in 1898, and met with the approval of the late Director and other officers of the Geological Survey of Canada, but was, at the suggestion of one of these officers, withheld from publication in the hope that the compiler might find time to extend the notes sufficiently to give the names of all new genera and species described by Mr. Billings. The recent publication of a partial and very inaccurate description of the writings of Mr. Billings has, however, made it necessary to publish this bibliography without further delay.

PROCEEDINGS OF THE NATURAL HISTORY SOCIETY.

MONTREAL, October 29th, 1900.

The first meeting of the Society for the season was held this evening at 8 o'clock.

PRESENT—Rev. Dr. Campbell in the chair; Prof. E. W. MacBride, Edgar Judge, H. McLaren, J. Harper, A. E. Leroy, A. E. Norris, J. B. Williams, E. T. Chambers, Jos. Fortier, Alfred Griffin and a number of visitors.

In the absence of the Recording Secretary, Mr. E. T. Chambers was requested to act in his place.

The minutes of last meeting were read and confirmed.

MEMBERS ELECTED.—On motion, the rule was suspended and the following were elected members of the Society:—Mr. H. Markland Molson, life, proposed by Mr. J. H. Joseph, seconded by Judge Würtele; Rev. J. Edgar Hill, D.D., ordinary, proposed by Rev. R. Campbell, seconded by Judge Würtele; R. Meighen, ordinary, proposed by Rev. R. Campbell, D.D., seconded by Judge Würtele; Mr. E. Goff Penny, ordinary, proposed by Rev. R. Campbell, D.D., seconded by Judge Würtele; Dr. W. S. Morrow, ordinary, proposed by Dr. Wesley Mills, seconded by Judge Würtele; Dr. F. S. Jackson, proposed by Mr. Alfred Griffin, seconded by Mr. E. T. Chambers; Mr. J. G. McKergow, ordinary, proposed by Mr. Alfred Griffin,

seconded by Mr. C. S. J. Phillips; Mr. Irving Smith, ordinary, proposed by Mr. F. W. Richards, seconded by Mr. Edgar Judge; Mrs. Barfoot, associate, proposed by Mr. Alfred Griffin, seconded by Mr. F. W. Richards.

The Librarian, Mr. E. T. Chambers, reported the receipt of a number of valuable reports, including those of the U. S. Geological Survey, Royal Society of Canada and the New York State Museum.

Mr. A. E. Norris, Chairman of the Museum Committee, reported, on behalf of the Curator, the following donations to the Museum:—Mr. A. B. Dumouchel, old Spinning Wheel; Mr. J. J. Austin, Sponges from Western Australia; Mr. R. M. Shaw, Cannon Ball, dug out of old building in Quebec 30 years ago), Barnacles taken off ship's bottom in Montreal Harbor three or four years ago; Mr. Lachlan Gibb, two English Vipers (New Forest); Mr. E. D. Wintle, Skin Solitary Snipe, 5 Eggs, Common Snipe; Mr. D. McCulloch, Gospel St. John (Cree language); Mr. Alex. Robertson, Cocoa Nut (Island S. Pacific), Boomerang, S. Australia; Rev. R. Campbell, D.D., 40 specimens of Plants; Mr. H. H. Newcomb, 4 Moths from Dorchester, Mass.

It was proposed by Mr. J. B. Williams, seconded by Mr. E. T. Chambers, that the thanks of the Society be given to the donors. Carried.

The House Committee reported that the Hall had been re-tinted and also entrance to the building painted, and the damage sustained by the recent fire made good, the insurance companies agreeing to pay cost of same.

It was proposed by E. T. Chambers, seconded by Mr. Edgar Judge, that the report be received.

Rev. G. C. Heine reported, on behalf of the Lecture Committee, that the Somerville Lectures would begin on February 7th, and would be seven in number, and the Saturday Afternoon Course would commence on February 9th.

Dr. H. M. Ami having sent word that he would be unable to attend, his paper on "The Utica Formation Around Ottawa," was taken as read, and will be published in the CANADIAN RECORD OF SCIENCE.

Prof. E. W. MacBride being called to the chair, Rev. R. Campbell, D.D., then gave his paper on the "Newly Reported Plants on the Island of Montreal," and in the course of his remarks mentioned many plants not found for many years in Montreal.

A cordial vote of thanks having been given to the author for his valuable and interesting paper, the meeting then adjourned.

MONTREAL, November 26th, 1900.

The second monthly meeting was held this evening at 8 o'clock.

PRESENT—Rev. Dr. Campbell in the chair; Messrs. J. A. U. Beaudry, Edgar Judge, J. S. Buchan, J. Harper, A. E. Norris, E. T. Chambers, Jos. Fortier, Mrs. Duckett, Oswald Duckett, A. B. Dumouchel, Prof. E. W. MacBride, Dr. F. D. Adams, Rev. G. C. Heine, C. S. J. Phillips, A. Griffin and a large number of visitors.

The minutes of last meeting were read and confirmed.

MEMBER ELECTED.—On motion, the rule was suspended, and Mr. Percy Woodcock elected an ordinary member of the Society.

The Curator then reported the following donations:—A case of Stick Insects (showing Life History), donor, Mr. J. B. Williams, Toronto; a number of Shells from the Sandwich Islands, donor, Mr. P. M. Wickham (St. Lambert's); a number of Curios collected during a visit to China, India, etc., etc., by the donor, Mr. Alex. Robertson.

A cordial vote of thanks, proposed by Mr. J. A. U. Beaudry, seconded by Mr. Jos. Fortier, was unanimously carried and tendered to the donors.

After routine business the following papers were read :— "Life History of the Camberwell Beauty Butterfly," by Mr. A. E. Norris; "Was Mount Royal an Active Volcano ?" by J. S. Buchan, Q.C.

These papers created considerable discussion (especially the latter), Prof. MacBride, Dr. F. D. Adams and others taking part.

It was then moved by Prof. MacBride, seconded by Dr. F. D. Adams, that the best thanks of the Society be tendered to Messrs. Buchan and Norris for their very interesting and enjoyable communications. Carried unanimously.

The meeting then adjourned.

MONTREAL, January 28th, 1901,

The third monthly meeting was held in the Library at 8.15.

PRESENT—Rev. R. Campbell, D.D., in the chair; Messrs. E. T. Chambers, J. A. U. Beaudry, P. S. Ross, Edgar Judge, Jos. Fortier, Dr. F. S. Jackson, Percy Woodcock, Alex. Robertson, H. McLaren, C. T. Williams, F. W. Richards, Miss Howard O'Keefe, Mr. and Mrs. Duckett, Capt. R. C. Adams, A. Griffin, Hy. E. Vennor and a number of visitors.

The minutes of last meeting were read and confirmed.

Mr. E. T. Chambers reported a number of exchanges to the Library since last meeting.

The Curator, Mr. A. Griffin, reported the following donations to the Museum :—Tibia of Dinosaur, donor, Mr. E. C. Felch; Garter Snake (3 feet 4 inches long), donor, Dr. J. A. Hutchinson; two specimens of Conglomerate, Mr. Carey J. Joseph.

On motion, a hearty vote of thanks was accorded to the above donors for their valuable contributions. Carried.

The President, Rev. R. Campbell, D.D., then referred in

feeling terms to the sad loss we had sustained by the death of our beloved Queen Victoria, and also extended his sympathy to Hon. J. K. Ward on the loss of his wife. On motion of Mr. J. A. U. Beaudry, seconded by Mr. Jos. Fortier, the President and the two Secretaries were appointed a Committee a draw up resolutions of condolence and forward at once. Carried.

Dr. F. Sclater Jackson then read his paper, "The Human Organism," which was listened to with great interest. A spirited discussion followed, in which Mr. Edgar Judge, Capt. R. C. Adams, Rev. R. Campbell, D.D., and others took part.

It was then moved by Mr. Edgar Judge, seconded by Capt. R. C. Adams, that the cordial thanks of the meeting be tendered to the learned Doctor for his valuable and interesting communication. Carried.

The meeting then adjourned.

MONTREAL, February 25th, 1901.

The fourth monthly meeting of the Society was held this evening.

PRESENT—Rev. R. Campbell, D.D., in the chair; Messrs. J. A. U. Beaudry, H. McLaren, F. W. Richards, Dr. Wesley Mills, P. S. Ross, Rev. G. C. Heine, Dr. A. Fisher, Prof. O. E. Leroy, Miss O'Keefe, A. C. Lyman, Jos. Fortier, F. W. Carter, J. Bruce, Mr. and Mrs. Samuel Finley and a number of visitors—over forty in all.

The minutes of last meeting were read and confirmed.

The President, Rev. R. Campbell, D.D., then referred in feeling terms to the sad loss the Society had sustained in the death of Mr. E. T. Chambers, who had filled the post of Librarian so acceptably for a period extending over 17 years. It was then moved by Prof. E. W. MacBride, seconded by Mr. J. A. U. Beaudry, that a Committee, consisting of the President and the two Secretaries, be

requested to draw up a letter of condolence and forward same to the family of the late Mr. E. T. Chambers. Carried.

MEMBER ELECTED.—On motion of Mr. H. McLaren, seconded by Prof. E. W. MacBride, the rules were suspended, and Mr. Harry Swift was duly elected an ordinary member of the Society.

Prof. F. D. Adams was called upon to give his paper, entitled, "The Extinct Volcanoes of Central France."

This proved most interesting and invoked a spirited discussion, in which the following took part:—Rev. Dr. Campbell, Prof. E. W. MacBride, Messrs. P. S. Ross and C. S. J. Phillips.

It was then moved by Mr. P. S. Ross, seconded by Mr. Jos. Fortier, that a cordial vote of thanks be tendered to Dr. Adams for his able exposition of so interesting a subject. Carried.

The meeting then adjourned.

MONTREAL, March 25th, 1901.

The fifth monthly meeting of the Society for session 1900–1901 was held this evening in the Library at 8 o'clock.

PRESENT—Rev. R. Campbell, D.D., in the chair; Messrs. Edgar Judge, J. A. U. Beaudry, C.E.; F. W. Richards, H. McLaren, A. E. Norris, Prof. O. E. Leroy, P. S. Ross, Miss H. O'Keefe, Prof. E. W. MacBride, Messrs. Jos. Fortier, R. W. McLachlan, Alex. Robertson, Mr. and Miss Duckett, C. S. J. Phillips and about 22 others.

The minutes of last meeting were read and confirmed.

Prof. O. E. Leroy then gave a very interesting communication on "Some Characteristic Land Forms of Glacial Origin," which was listened to with great attention, Prof. MacBride, Messrs. Robertson, Duckett and others participating in the discussion.

Then the Rev. R. Campbell, D.D., gave an exhibit of "New Zealand Ferns," comparing them with our Canadian species. At the close a very hearty vote of thanks was given to the two gentlemen for their papers. Carried.

The meeting then adjourned.

MONTREAL, April 29th, 1901.

The sixth monthly meeting of the Society was held in the Library, commencing at 8 o'clock.

PRESENT—Rev. R. Campbell, M.A., D.D., the President, occupied the chair; Messrs. Albert Holden, J. S. Buchan, K.C.; J. A. U. Beaudry, C.E.; C. T. Williams, H. McLaren, J. Harper, A. E. Norris, Alex. Robertson, Mrs. Duckett, Miss H. O'Keefe, Dr. Wesley Mills, P. S. Ross, Dr. A. Fisher and the Recording Secretary.

The minutes of last meeting were read and confirmed.

The Museum Committee reported, through Mr. A. E. Norris, that the Museum was in good order and the following donations had been added to it:—An Excise Officer's Stick, England, 1790, from R. Davidson, Esq.; two Skins Duck-billed Platypus from Mr. Alex. Robertson, B.A.; eight sets of Cariboo Antlers (showing life history from young to adult stage) from the Hamilton Powder Co., per Mr. T. Dwight Brainerd.

Dr. Campbell vacated the chair, which was taken by Dr. Wesley Mills. Dr. Campbell then exhibited "Some Montreal Mosses," collected by himself on this island, and gave a very interesting description of them.

Mr. Alex. Robertson then gave an account of "A Visit to New Zealand in 1885," with some lantern slide illustrations of same, after which Dr. Wesley Mills gave a paper on "Some Recent Methods for the Investigation of the Nervous System and their Results."

This paper was listened to with more than ordinary interest, owing to the marvellous advances made in this branch of science.

Thanks were tendered to the three gentlemen for their communications and for the marvellous revelations contained especially in Dr. Mills's paper.

This was moved by Mr. P. S. Ross, seconded by Mr. J. S. Buchan, and carried after questions and discussion.

There being no other business the meeting adjourned.

MONTREAL, June 3rd, 1901.

ADJOURNED ANNUAL MEETING.

The adjourned annual meeting was held this evening in the lecture hall. The President, Rev. Robert Campbell, D.D., occupied the chair. The minutes of last annual meeting were held as read and sustained.

ANNUAL REPORTS.—The following reports were then read:—Council, A. Holden; Treasurer, F. W. Richards; Curator, A. Griffin; Librarian, A. Griffin, *pro tem;* Lecture Committee, Rev. G. Colborne Heine; Editing Committee, Dr. R. Campbell; Field Day Committee, C. T. Williams.

On motion of Justice Würtele, seconded by Mr. J. S. Buchan, the reports were received and adopted.

Thereupon the President delivered his retiring address:

"In quitting the office of President of the Natural History Society, to which you did me the honor of electing me a third time, I beg to tender you my warm acknowledgment of the uniform courtesy and support which you have extended me during my occupation of the chair.

"I have to congratulate the Society on a good year's work done. The monthly meetings have been particularly well attended, and the liveliest interest has been manifested in the communications laid before the Society.

These were varied in character, touching natural history on many sides, those dealing with local phènomena evoking specially deep interest, and awakening discussion. Thus one very important aim of the Society has been secured. It has brought together those ladies and gentlemen who are students of nature in one or other of its numerous departments, giving them an opportunity of affording mutual help and encouragement. And the increase of the attendance at the ordinary meetings of the Society is a sign that the number of scientific workers in and near the city is growing. There must, however, be many in Montreal who are quietly prosecuting the study of nature, of whom this Society has no knowledge, and I would venture, in your name, to invite their co-operation, and would respectfully suggest that we could help them, as their uniting of their efforts with ours would help us.

"INTEREST IN LECTURES.

"The lectures provided for the public in the Somerville course were of a practical character, mainly dealing with matters in which science is applied for the amelioration of human life, and promotion of civilization, and that the people of the city appreciated them was shown by the large attendance that greeted the lecturers.

"The Saturday afternoon talks, too, were on topics of varied general interest, well calculated to awaken in the minds of the youth of our city an observant turn, which, it may be hoped, will lead to many of them becoming hereafter ardent and successful students of nature.

"The annual field day to Orford afforded not only a pleasant outing to the members of the Society and their friends, but yielded valuable scientific results, especially in the determining of the height of the mountain by Messrs. Leroy and Evans.

"The Saturday afternoon excursions to points of interest in the neighborhood of the city were not largely taken

advantage of by the teachers and others for whose benefit they were especially got up; but those who did take part in them have very pleasant memories connected with them.

"The RECORD OF SCIENCE holds on its way, worthily representing the natural history of the Dominion. The two numbers issued during the year contained many original articles of a valuable character.

"The museum has continued to attract the public in increasing numbers since the entrance fee was abolished. It has been visited by a large number of boys and girls, just at the age when their eyes are wide open, and when their minds are impressionable, and excellent seed has thus been sown, which may be expected hereafter to yield good fruit in the way of a crop of students of natural science.

"In these several ways, the Society has prosecuted its work during another year; but it could have done still better work, in every department, had it larger means at its disposal. Application was made to the Government of the province for a renewal of the grant made by the Government of Canada for many years prior to Confederation, and continued for many years afterwards by the provincial treasury, but dropped when the finances became embarrassed. The Society has good reason to feel disappointed that the application was not entertained, as it has very strong claims to consideration, being the only society in the province doing the same class of work, especially as it was understood at the time of Confederation that the province would continue to foster the educational agencies which had previously been recognized by the Government of Canada.

"Failing to receive aid from this quarter, there is nothing left to the Society but to appeal to the generous public of Montreal for support. Were it not for the peculiar situation of our city, it might not be out of place

to ask the municipal authorities to come to the Society's rescue. The educational work done by the Society merits such recognition. There is not a city or town in the United States of any importance that has not its museum, and the municipalities, as well as the state governments, make liberal grants for the support of such institutions as ours. Except the $4,000 left by Mr. Somerville to found the lectures bearing his name, the Society has not received any considerable legacy.

"CHANCE FOR BENEFACTOR.

"Here, then, is an opportunity for some large-minded benefactor to do a good turn to Montreal. Let him settle on the Natural History Society an annual income that will enable it, not only to continue, but enlarge its operations. We would not even breathe a proposal to ask help from the Pittsburg millionnaire; it would be a dishonor done to our wealthy and public-spirited citizens to even hint at such a thing. But we hope they will come to our help. The workers in this Society give their time gratuitously, from their love of science, and their desire to see the scientific spirit and scientific attainments more general, and give also liberally of their limited means, believing that they are doing as valuable work for the masses as the great McGill University is doing for the superior intellectual few. Now things have come to such a pass that we cannot, with the means at our disposal, do what is required to keep abreast with the needs of the time. We are straitened for room for our valuable library, and we have nowhere to exhibit the additions constantly making to our museum. Our very efficient superintendent is overwhelmed with work, and needs assistance in the museum. The fact is he is seriously ill at present, and probably this illness is traceable to over-exertion, and what are we to do? Well, I believe we have only to let it be known that the continuance of the important work

done by the Society is endangered, to rally to its support our enlightened citizens. Why may we not look to a great many more of them, ladies as well as gentlemen, enrolling themselves in the list of membership of the Society? If we had an addition of even a hundred more members, these, with the modest annual fee attached to membership, would enable us to carry on our work better than we are able to do at present. Shall we make this appeal in vain? I do not believe it.

"I cannot conclude my remarks without referring to the great loss the Society has recently sustained, in the death of Mr. John S. Shearer, who had been for so long a period a prominent member and office-bearer of the Society, and who had in so many ways exerted himself on its behalf; although for a few years back, owing to ill-health, he was unable to continue to take so active a share in our work as formerly.

"The death of Mr. E. T. Chambers, the invaluable chairman of the library committee, has been recorded in the minutes. His loss is irreparable, as it is most unlikely that the Society can replace him by anyone with his special fitness for the position, and, at the same time, as willing as he to devote time to the work required."

OFFICE-BEARERS FOR YEAR.

Two ordinary members were admitted to the Society, and the election of officers for the ensuing year was proceeded with, and resulted as follows, Messrs. A. E. Norris and Alex. Robertson being the scrutineers:—

HON. PRESIDENT.—Lord Strathcona and Mount Royal.

PRESIDENT.—Prof. E. W. MacBride, M.A., D.Sc.

VICE-PRESIDENTS.—Prof. F. D. Adams, Prof. B. J. Harrington, A. Holden, J. H. Joseph, Rev. Dr. Robert Campbell, Prof. Wesley Mills, Hon. J. K. Ward, C. T. Williams and Mr. Justice Würtele.

HON. RECORDING SECRETARY.—Chas. S. J. Phillips.

HON. CORRESPONDING SECRETARY.—J. S. Buchan, K.C.

HON. TREASURER.—J. G. McKergow.

HON. CURATOR.—A. E. Norris.

MEMBERS OF COUNCIL.—F. W. Richards, J. A. U. Beaudry, N. N. Evans, Joseph Fortier, Dr. Girdwood, John Harper, Edgar Judge, H. McLaren, J. Bemrose.

SUPERINTENDENT.—Alfred Griffin.

EDITING AND EXCHANGE COMMITTEE.—Rev. Dr. Robert Campbell, chairman; Prof. F. D. Adams, J. S. Buchan, Prof. J. T. Donald, Dr. A. T. Drummond (Kingston), Prof. E. W. MacBride, G. F. Matthew (St. John, N.B.); T. Wesley Mills, J. F. Whiteaves (Ottawa).

The newly elected council subsequently met, appointed Mr. F. W. Richards its chairman, and elected the following committees:—

LIBRARY COMMITTEE.—H. McLaren, chairman; J. A. U. Beaudry, Joseph Fortier, Alfred Griffin, A. E. Norris, G. M. Tod, C. T. Williams.

MUSEUM COMMITTEE.—A. E. Norris, chairman; Rev. Dr. Robert Campbell, A. B. Dumouchel, G. A. Dunlop, O. E. Leroy, Prof. E. W. MacBride, Prof. Leymarie, H. E. Vennor.

FIELD WORK COMMITTEE.—C. T. Williams, chairman; Prof. F. D. Adams, J. S. Buchan, Rev. Dr. Robert Campbell, Rev. G. C. Heine, Alex. Robertson, O. E. Leroy, Prof. E. W. MacBride, J. Bemrose, F. W. Richards.

LECTURE COMMITTEE.—Prof. Wesley Mills, chairman; J. S. Buchan, Rev. Dr. Robert Campbell, Prof. John Cox, N. N. Evans, Prof. Harrington, Edgar Judge, Rev. G. C. Heine, C. S. J. Phillips, Mr. Justice Würtele.

HOUSE COMMITTEE.—Albert Holden, chairman; F. W. Richards, C. T. Williams.

MEMBERSHIP COMMITTEE.—Alex. Robertson, chairman; J. A. U. Beaudry, Rev. Dr. Robert Campbell, Edgar Judge, H. McLaren, C. S. J. Phillips, J. Bemrose, Hon. J. K. Ward, C. T. Williams.

Session 1900–1901.

Report of Council.

The Chairman of Council begs to submit the following report for the year ending May 31st, 1901 :

Seven meetings of Council have been held during the year, at which reports of the different Committees were received, and all other business of the Society discussed before being submitted to the regular monthly meetings of the Society.

The regular monthly meetings have been held as usual. The following papers, arranged for by the Lecture Committee, were read at these meetings :

October 29th, 1900.—"The Utica Formation Around Ottawa," Dr. H. M. Ami. "Newly Reported Plants of the Island of Montreal," Rev. R. Campbell, D.D.

November 26th, 1900.—"Life History of the Camberwell Beauty Butterfly," A. E. Norris. "Was Mount Royal an Active Volcano?" J. S. Buchan, Q.C.

January 28th, 1901.—"The Human Organisms," Dr. F. Sclater Jackson.

February 25th, 1901.—"The Extinct Volcanoes of Central France," Prof. Frank D. Adams.

March 25th, 1901.—"Some Characteristic Land Forms of Glacier Origin," Prof. O. E. Leroy, B.A. "New Zealand Ferns," Rev. R. Campbell, D.D.

April 25th, 1901.—"Some of the Recent Methods for the Investigation of the Nervous System, with their Results," Prof. Wesley Mills, M.A., M.D. "A Visit to New Zealand in 1885," Alexander Robertson, B.A. "Some Montreal Mosses," Rev. R. Campbell, D.D.

New members elected during the year : 1 life, 9 ordinary and 2 associates.

We regret to have to record the removal by death of the following members:

E. T. Chambers and Carey J. Joseph.

The "Somerville Course" of Free Lectures and the "Half Hour Talks to Young People," most of which were illustrated by the electric lantern, were highly successful, and the Lecture Committee who arranged for these lectures are to be congratulated on the great success of the same.

The Annual Field Day to Mount Orford was held on the second Saturday in June. The attendance was not as large as usual, and, we regret to say, was a financial loss to the Society, otherwise it was a success.

The Excursion this year is to be held on the Lake Bonnalie on the Orford Mountain, and it is to be hoped the members of the Society will take more interest in this than they did last year.

A. HOLDEN,
Chairman of Council.

REPORT OF EDITING AND EXCHANGE COMMITTEE.

Your Editing and Exchange Committee beg leave to report that during the year just closed they issued two numbers of the RECORD OF SCIENCE, Numbers 4 and 5 of Volume VIII., and have received in exchange a very large number of valuable scientific journals, magazines and reports. These await binding, and will, when bound, form an important addition to our Library. The numbers of the RECORD OF SCIENCE issued contained mainly the papers submitted to the Society at its monthly meetings, along with a few articles bearing on the Natural History of Canada by men of science living at a distance. The Committee believe that the contents of the last two

numbers were quite up to the usual high standard at which the RECORD has uniformly aimed, and have helped to maintain the reputation of the Natural History Society among men of science at home and abroad.

Respectfully submitted, by instruction of the Committee,

ROBERT CAMPBELL,
Chairman.

MONTREAL, June 3rd, 1901.

MUSEUM REPORT, SESSION 1900–1901.

GENTLEMEN,—I regret to say that owing to my many duties, but more particularly to want of space and the expenditure of a little money, the work on the Museum has not progressed as I could have desired.

I may say that the Museum has arrived at a stage where a thorough overhauling is necessary. Mr. J. Stevenson Brown carried this out very successfully some years ago, but such an undertaking requires a vast amount of labor, also a little financial aid.

The birds require dusting and cleaning with benzine and all the cases thoroughly cleaned.

The Mammals also require overhauling and treating with benzine, and the cases need to be cleaned.

The shells are, I am glad to say, in good order, but the want of more cases prevents us displaying many hundreds more.

The minerals require re-arranging, as the present classification is out of date.

The general collection of antiquities is in good order, and requires but little attention, except a new label here and there.

The donations were numerous and of a valuable character, of which special mention was made at the time they were received.

The visitors to the Museum were approximately about 10,000, considerably in excess of any previous year, due to the fact that the building is open free to the public daily, and also that the colleges and schools have visited us more frequently.

I would call the attention of the House Committee to the necessity of painting the windows in the skylight to prevent the glare of the sun bleaching the birds.

The lighting of the Museum also requires attention, as the present system is altogether out of date and totally inadequate.

In conclusion, I can only urge upon you the necessity of more space and a little financial assistance to make our collection one of the best in Canada.

Respectfully submitted,

ALFRED GRIFFIN,
Curator.

REPORT OF LIBRARIAN, SESSION 1900–1901.

GENTLEMEN,—On behalf of our late Librarian, Mr. E. T. Chambers, whose death is much to be deplored, I beg to submit the following report:

The exchanges received during the closing session have been of a more numerous and valuable character than for some years past. Special mention must be made of donations received from the Smithsonian Institute, U. S. Geological Survey, Geological Society of America, Canadian Geological Survey, Geological Survey of Minnesota, and Dr. H. M. Ami, of the Geological Survey, Ottawa.

The catalogue is still unfinished, but I trust that the new Librarian will take this matter up and carry it to completion.

I would also remind you that we shall have by the end of this month about 500 volumes ready for the binder, so

that as soon as funds will permit a grant should be made for this purpose. This is a matter that should be attended to so as to make references to these volumes more accessible.

I would also reiterate what our late Librarian has so many times brought to your notice, viz., the want of space. This is a matter that must be taken up seriously by the incoming House Committee, as at present the shelves and closets are full to overflowing and books have to be packed up on the floor of the Library.

It has been suggested that in view of the financial condition of the Society, the RECORD OF SCIENCE be suspended for a time. This is much to be regretted, as the publication of the RECORD is the only means we have of permanently recording the work done by the Society, much of which is original, and would be entirely lost not only to ourselves but to the world at large. As our journal is sent to scientific and kindred societies all over the world, from which we in return receive many valuable publications, some of which I have mentioned in the beginning of this report, I trust that some means will be taken to provide a fund for the publication of the RECORD so as not to encroach on the general funds of the Society. This was suggested by our Treasurer, Mr. F. W. Richards, last year, but up to now nothing has been done in this direction.

In conclusion, I would again urge upon the Society the necessity of providing more accommodation in the Library, as the work is greatly hampered at present.

To the incoming Librarian, I would say that I will give him every assistance in my power, and endeavor to earn the thanks and appreciation so generously accorded me by his predecessor.

Respectfully submitted,

ALFRED GRIFFIN,
Librarian pro tem.

REPORT OF THE LECTURE COMMITTEE OF THE NATURAL HISTORY SOCIETY OF MONTREAL FOR THE WINTER OF 1901.

Your Committee have pleasure in reporting that the usual Course of Lectures was given, both to the public and the young people, during the months of February and March.

The following gentlemen lectured in the Somerville Course:

Thursday, 7th February, 8 p.m., 1901.—"The Gold Fields of Canada," by John E. Hardman, Esq., S.B., M.E.

Thursday, 14th February, 8 p.m., 1901.—"The Water Works of Montreal," by John Kennedy, Esq., Chief Engineer of the Harbor Commissioners.

Thursday, 21st February, 8 p.m., 1901.—"Bridges and their Development," by Prof. E. G. Coker, B.A. (Cantab.), M.Sc. A.M. Inst., C.E.

Thursday, 28th February, 8 p.m., 1901.—"The History of the Cluck," by Prof. E. W. MacBride, M.A. (Cantab.), D.Sc. (Lond.), late Fellow of St. John's College, Cambridge.

Thursday, 7th March, 8 p.m., 1901.—"Cereal Products and their Transportation," by Edgar Judge, Esq., Merchant, Montreal.

It was a matter of deep regret that only five Somerville Lectures were given. The cause of this was that Mr. Percival St. George, C.E., who had agreed to deliver the sixth lecture of the Course, was suddenly called to England, owing to the serious illness of a relative, before the date of his lecture arrived. Your Committee strove hard to find a substitute, but were unsuccessful. Those that were given were of a high order and full of interest. The best thanks of the Society are due to these gentlemen, and should be conveyed through the proper channel.

The Talks on Natural History subjects were delivered on Saturday afternoons by the following gentlemen:

Saturday, 9th February, 3.30 p.m.—"Fruit and Seed Tramps," by Miss C. M. Derick, M.A.

Saturday, 16th February, 3.30 p.m.—"Instincts," by Prof. T. Wesley Mills, M.A., M.D., F.R.S.C.

Saturday, 23rd February, 3.30 p.m.—"Physiology," by Dr. W. S. Morrow.

Saturday, 2nd March, 3.30 p.m.—"Some Curious Natural Contrivances," by C. T. Williams, Esq.

Saturday, 9th March, 3.30 p.m.—"Hygiene," by Dr. D. J. Evans.

Saturday, 16th March, 3.30 p.m.—"The White Butterfly," by A. F. Winn, Esq.

Saturday, 23rd March, 3.30 p.m.—"How Paper is Made," by Chas. S. J. Phillips, Esq.

Saturday, 30th March, 3.30 p.m.—"Ferns," by Rev. Robert Campbell, M.A., D.D.

The little people were out in full force on every occasion, and manifested, both by their conduct and attention, the greatest interest. The special thanks of the Society are due to the President, who very kindly filled the place of one gentleman, who, at the last moment, was unable to appear. The Convener of your Committee arranged for chairmen at each meeting of the Somerville Course.

Altogether, your Committee is of opinion that the character of the work done was quite up to the average.

Respectfully submitted,

G. COLBORNE HEINE,
Convener.

REPORT OF THE FIELD WORK COMMITTEE.

The Field Work Committee are not able to make as satisfactory a report of their work for the season as they could wish.

Several attempts have been made to have Saturday afternoon rambles, but with only indifferent success as regards the matter of attendance. Early this spring letters were written to the various teachers in the leading public schools, asking their advice and suggestions in regard to the matter. As may be seen from their replies, all were in favor of such excursions, but found the teachers and older scholars too busy in the spring season to take advantage of them. It is evident that we have not arrived at the best solution of the question as yet, but your Committee is satisfied that patience and perseverance will yet find a way to carry out the wishes of the Society in this direction.

Respectfully submitted,

C. T. WILLIAMS,
Chairman Field Committee.

Natural History Society of Montreal

IN ACCOUNT WITH

F. W. Richards, *Hon. Treasurer.*

Cash Statement.

To Cash on hand June 1st, 1900			$15 68	
" Rents	$838 00			
" Members' Subscriptions	579 00			
" W. Kearney	425 81			
" Insurance, Fire Loss	73 36			
" Record of Science	29 25			
" Interest	3 20			
" A. Griffin, Account Repairs	10 00			
			1958 62	
" Bank Loans			751 25	
" Balance due Treasurer			2 80	
By Superintendent's Salary and Commission				$656 54
" Record of Science				285 72
" Repairs and Renovations				284 06
" Sundry Expenses				163 28
" Lighting Account				140 39
" Fuel "				108 55
" Printing "				95 17
" Lecture "				72 15
" Taxes				34 92
" Field Day Deficit				23 14
" Museum Account				15 70
" Deposits, Credit of Loans				841 10
" Interest on Loans				7 53
			$2728 35	$2728 35

Cash Account.

To Balance on hand June 1st, 1901	$	15 68	
" Receipts as per Cash Book		1958 62	
" Loans as per Bank Book		751 25	
" Balance due Treasurer		2 80	
By Deposits as per Bank Book			841 10
" Interest " "			7 63
" Disbursements as per Cash Book			1879 62
		$2728 35	$2728 35

BANK ACCOUNT.

Due Bank June 1st, 1900	$ 551 50		
" " New Loans	751 25		
Paid " on account Loans		841 10	
Due " May 31st, 1901		461 65	
	$1302 75	$1302 75	

Audited and found correct this 3rd day of June, 1901.

F. W. RICHARDS,
Hon. Treasurer.

H. MCLAREN,
C. T. WILLIAMS.

Book Notices.

Essai d'une Monographie des dépot marin et continentaux du Quaternaire Moséen, le plus ancien de la Belgique, par Michel Mourlon (Extrait des annales de la Société Géologique de Belgique), Tome XXV., bis, p. 121, 1900.

Director Mourlon in this essay describes an ancient surface deposit of Belgium, with full details of the localities where it has been recognized.

Northern Belgium is covered with a marine deposit subjacent to the "Campinien," which carries the remains of *Elephas primigenius*, *Rhinoceros tichorhinus*, etc., with flint flakes and other remains of human industry. M. Mourlon traces this marine deposit to central and southern Belgium, where it is represented by terrestrial and fluviatile deposits. In these, down to the very base, he finds flint chips and implements of palæolithic type. This formation he terms the Continental Moséen, and considers it equal in age to the ancient gravels, antedating the present river valleys, which Prestwich has described.

Director Mourlon draws the following conclusion: "I think I may assume from all that precedes, that, in the present state of our knowledge, the presence of flint flakes in the deposit referred to the Landenian of the vicinity of Mons, as well as the mammiferous bone beds in the Bruxillian sands of Ixelles, appear to authorize us to consider these deposits as constituting a new geological horizon, whose age remains to be determined, but which is anterior to the pebble deposits with *Elephas primigenius* at the base of our Quaternary Diluvium—the Campinien.

At the end of the memoir is a map of Belgium showing the area over which the Marine Moséen is spread.

G. F. M.

A New Physical Geography.—Probably in no other scientific branch has there been such a change of method in the matter of presentation as in the study of the topography and physiography of the earth's crust. In the old days it was all included under geography which it was *in toto* with the exception of a brief prefatory explanation of planetary relations and the phenomena of changing seasons and temperatures. Geography in the old days dealt with the rivers and mountain ranges, the valleys and bodies of water, but chiefly with the arbitrary divisions of the earth's surface made by man, the political centres and commercial marts. All this has been changed in recent years. The natural has been separated from the artificial, and the former has been given its right place in school curricula. An import-

ant addition to the text-books on physiographical geography is that by Jacques W. Redway, published by Charles Scribner's Sons, New York. This volume, as the author states in his preface, "is designed to show that the distribution of life is governed very largely by the conditions of geographic environment, and that human history and industries are always closely connected with geographic laws—in many instances the direct resultants of them." The book is planned for use in high schools and in normal schools. Some of the more important chapters are: The wasting of the land; by rivers; by underground waters; by avalanches and glaciers, and by imperfect drainage. The dispersal of life; distribution of plants and animals and the industrial regions of the United States are also treated. The matter is excellently arranged. The author's style is succinct and clear. The volume is well printed and freely illustrated with a good grade of half-tones. It is a book to be commended.

JOHN CRAIG.

Cornell University,
Ithaca, N.Y.

SPONGES FROM THE COASTS OF NORTH-EASTERN CANADA AND GREENLAND, by LAWRENCE M. LAMBE, F.G.S.

The paper bearing the above title was read before the Royal Society of Canada at the last annual meeting, and was subsequently published in the Transactions of the Society, appearing in second series, 1900-1901, Volume VI., Section IV. It consists of "identifications or descriptions of species found off the coast of Labrador in Davis Strait and Baffin's Bay," and is an extension of a former paper, entitled, "Sponges from the Atlantic Coast of Canada."

The paper is excellently illustrated by six plates, showing different sponge structures. As the descriptions are purely technical, it is only possible here to refer those interested in sponges to the paper itself, where full information may be had. The painstaking methods employed by the author have yielded gratifying results, and the paper marks a distinct advance in our knowledge of a branch of marine fauna, which, though of lowly organism, is of great scientific and general interest.

O. E. L.

ABSTRACT FOR THE MONTH OF JANUARY, 1901,

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY	THERMOMETER. † Mean.	Max.	Min.	Range.	*BAROMETER. † Mean.	Max.	Min.	Range.	‡Mean relative humidity.	*a* WIND. General direction.	Mean velocity in miles per hour	Per cent. possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	7.46	30.0	0.5	29.5	30.26	30.45	29.84	.61	84	W.	23.9	89	....	0.0	0.00	1
2	9.26	15.6	—2.6	18.2	30.37	30.60	30.23	.37	84	W.	23.0	00	....	0.2	0.02	2
3	— 3.97	1.2	—10.1	11.3	30.70	30.78	30.59	.19	74	W.	18.8	69	....	....	....	3
4	14.87	22.2	1.2	21.0	30.20	30.59	30.01	.53	87	W.	18.5	00	....	0.9	0.09	4
5	3.13	11.8	— 4.5	16.3	30.31	30.36	30.22	.14	85	W.	30.1	88	....	....	....	5
SUNDAY.... 6	20.11	24.9	11.8	13.1	30.22	30.30	30.11	.19	85	W.	22.2		....	....	....	6.....SUNDAY
7	23.77	26.9	21.0	5.9	29.99	30.15	29.85	.30	93	S.	11.8	31	....	2.7	0.27	7
8	19.87	31.8	10.0	21.8	30.14	30.23	29.79	.44	89	S.	14.6	00	0.08	0.0	0.08	8
9	26.27	36.9	12.0	24.9	30.13	30.48	29.77	.71	82	W.	18.4	99	0.04	....	0.04	9
10	12.54	18.0	8.1	9.9	30.27	30.48	30.03	.45	92	N.	16.4	71	....	4.3	0.43	10
11	15.84	18.4	12.7	5.7	30.03	30.11	29.92	.19	96	N.	16.3	00	....	0.4	0.04	11
12	21.07	25.1	18.4	6.7	29.68	29.92	29.55	.37	91	N.W.	8.8	00	....	9.9	0.99	12
SUNDAY.....13	15.42	18.5	12.1	6.4	30.01	30.09	29.74	.35	92	W.	11.6		....	0.0	0.00	13.....SUNDAY
14	13.02	18.2	4.3	13.9	29.95	30.08	29.81	.27	84	E.	2.5	46	....	.. .	....	14
15	22.03	33.0	13.4	19 6	29.78	29.81	29.76	.05	88	N.	6.3	00	....	3.0	0.30	15
16	34.08	37.7	29.0	8.7	29 51	29.76	29.34	.42	84	S.	18.6	00	0.10	0.2	0.12	16
17	29.12	34.7	23.0	11.7	29.53	29.57	29.43	.14	86	W.	22.8	00	....	0.2	0.02	17
18	— 0.28	23.0	— 9.3	32.3	29.75	29.95	29.56	.39	88	W.	12.7	09	....	....	....	18
19	—13.77	— 8.3	—16.7	8.4	30.31	30.63	29.95	.68	71	W.	24.0	84	....	....	....	19
SUNDAY.....20	— 2.78	9.9	—14.1	24.0	30.31	30.63	29.91	.72	89	S.E.	16.4	91	....	0.1	0.01	20.....SUNDAY
21	23.60	39.6	1.0	38.6	29.76	30.00	29.60	40	86	S.W.	27.9	00	0.05	....	0.05	21
22	0 06	16.5	— 4.9	21.4	30.43	30.52	30.00	.52	79	N.E.	11.7	00	....	....	....	22
23	2.57	8.6	— 5.7	14.3	30.32	30.47	30.10	37	86	E.	11.7	85	....	....	....	23
24	16.62	23.6	6.5	17.1	29.80	30.10	29.60	.50	91	N.E.	11.3	85	....	....	....	24
25	24.88	30.0	17.9	12.1	29.77	30.00	29.60	.40	89	N.	14.3	01	....	....	....	25
26	14.27	17.4	10.9	6.5	29.98	30.09	29.82	27	93	N.	11.2	79	....	....	....	26
SUNDAY.....27	11.23	16.2	2.3	13.9	29.34	29.82	29.07	75	92	W.	16.5	90	....	0.5	0.05	27.....SUNDAY
28	17 06	20.2	13.1	7.1	29.11	29.27	29.03	.24	87	W.	20.4	11	....	3.8	0.38	28
29	6.27	13.1	2.9	10.2	29.61	29.88	29.27	6	82	W.	28.4	00	....	0.0	0.00	29
30	4.99	8.9	— 1.4	10.3	29.97	30.03	29.88	.15	81	N.W.	8.6	33	....	....	....	30
31	6.78	12.9	0.2	12.7	29.77	29.95	29.70	.25	91	N.	14.2	86	....	0.9	0.09	31
Means.....	12.75	20.53	5.26	15.27	29.978	30.165	29.777	.387	86.5	W 6°38′ N	16.58	00				.....Sums.
27 Years means for and including this month	12.32	20.71	4.42	16.28	30.051	.....	.....	.333	82.4	....	§ 16.57	¶34.93	34.1	0.27	27.1	2.98	27 Years means for and including this month.
													0.856	30.03	3.727	

a. ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	CALM.
Miles	1850	626	420	338	728	1389	6284	707	
Duration in hrs..	136	55	49	22	53	54	306	60	9
Mean velocity....	13.6	11.4	8.6	15.4	13.7	25.72	20.5	11.8	

Greatest mileage in one hour was 42 on the 21st.

Greatest velocity in gusts was 45 miles per hour on the 21st.

Resultant mileage, 6717.

Resultant direction, W. 6° 38′ N.

Total mileage, 12,312.

a—Wind velocity on the 13th, 14th and 15th from City Hall Anemometer.

* Barometer readings reduced to sea-level and temperature 32° Fahrenheit.

† Mean of bi-hourly readings taken from self-recording instruments.

‡ Humidity relative, saturation being 100. Mean of observations at 8, 15 and 20 hours.

¶ 20 years only. § 15 years only.

The greatest heat was 39.6 on the 21st; the greatest cold was 16.7 below zero on the 19th, giving a range of temperature of 56.3 degrees.

Warmest day was the 16th. Coldest day was the 19th. Highest barometer reading was 30.78 on the 3rd. Lowest barometer was 29.03 on the 28th, giving a range of 1.75 inches.

Minimum relative humidity observed was 65 on the 19th.

Rain fell on 4 days.

Snow fell on 17 days.

Rain or snow fell on 19 days.

Hoar frost on the 14th.

Lunar Halos on the 30th and 31st.

Lunar Corona on the 9th.

Fog on the 8th, 14th and 21st.

ABSTRACT FOR THE MONTH OF FEBRUARY, 1901.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY	THERMOMETER. † Mean.	Max.	Min.	Range.	*BAROMETER. † Mean.	Max.	Min.	Range.	‡Mean relative humidity.	*a* WIND. General direction.	Mean velocity in miles per hour	Per cent. possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	11.76	20.0	2.1	17.9	29.78	29.93	29.73	.20	87	S.W.	14.4	24	....	0.0	0.00	1
2	10.44	14.8	3.3	11.5	30.19	30.33	29.93	.40	68	W.	18.9	91	....	....	....	2
3	7.79	14.1	— 1.0	15.1	30.31	30.39	30.18	.21	85	S.	6.5	71	....	....	....	3.....SUNDAY
4	12.05	20.4	8.0	12.4	29.85	30.18	29.73	.45	86	N.	21.1	00	....	3.2	0.32	4
5	15.08	21.0	7.9	13.1	29.80	29.89	29.74	.15	80	N.W.	23.7	00	....	3.0	0.30	5
6	4.11	7.9	0.3	7.6	29.91	29.96	29.87	.09	83	W.	30.9	57	....	....	....	6
7	1.38	6.1	— 4.0	10.1	29.99	30.04	29.92	.12	83	W.	35.7	95	....	....	....	7
8	4.13	10.4	— 2.6	13.0	30.01	30.04	29.97	.07	87	W.	31.9	99	....	....	....	8
9	8.06	13.7	1.2	12.5	29.86	30.03	29.75	.28	85	W.	10.9	36	....	....	....	9
10	9.63	14.8	4.2	10.6	30.05	30.21	29.76	.45	85	W.	25.1	41	....	.. .	....	10..... .....SUNDAY
11	11.50	16.6	4.2	12.4	30.17	30.28	30.02	.26	77	W.	19.4	99	....	....	....	11
12	15.85	21.1	10.4	10.7	29.89	30.02	29.80	.22	77	N.W.	15.8	00	....	....	....	12
13	6.02	10.4	— 0.7	11.1	29.74	29.89	29.64	.25	87	N.W.	32.4	34	....	2.4	0.24	13
14	4.29	9.1	— 1.1	10.2	29.60	29.65	29.54	.11	81	W.	23.8	00	....	0.3	0.03	14
15	12.69	19.9	5.8	14.1	29.53	29.60	29.47	.13	81	W.	31.2	00	....	1.1	0.11	15
16	19.72	23.1	15.2	7.9	29.60	29.64	29.56	.08	89	W.	11.1	00	....	1.7	0.17	16
17	22.72	25.8	18.9	6.9	29.63	29.67	29.57	.10	89	S.W.	11.7	00	....	0.7	0.07	17.....SUNDAY
18	25.51	28.4	23.0	5.4	29.65	29.68	29.62	.06	79	W.	12.4	00	....	....	....	18
19	24.71	29.5	20.8	8.7	29.50	29.63	29.41	.22	86	S.W.	13.4	03	....	0.0	0.00	19
20	16.35	22.9	9.9	13.0	29.50	29.58	29.43	.15	79	N.W.	15.8	00	....	0.4	0.04	20
21	8.17	10.7	5.5	5.2	29.69	29.75	29.58	.17	80	W.	17.2	53	....	0.3	0.03	21
22	12.67	21.0	3.2	17.8	29.77	29.85	29.74	.11	79	W.	13.3	63	....	....	....	22
23	13.54	18.3	8.1	10.2	29.92	29.96	29.85	.11	75	S.W.	16.6	74	....	....	....	23
24	10.83	15.3	2.5	12.8	29.73	29.90	29.64	.26	79	W.	12.3	91	....	....	....	24.....SUNDAY
25	19.43	25.8	9.3	16.5	29.75	29.77	29.71	.06	75	S.W.	17.3	56	....	1.8	0.18	25
26	22.01	27.9	13.9	14.0	29.64	29.76	29.63	.13	75	W.	15.3	34	....	7.5	0.48	26
27	8.75	14.9	1.3	13.6	29.88	30.05	29.73	.32	77	W.	26.0	99	....	....	....	27
28	8.66	14.5	2.0	12.5	30.15	30.21	30.05	.16	78	W.	23.3	97	....	....	....	28
Means.....	12.46	17.80	6.13	11.67	29.825	29.925	29.735	.190	81.1	W 3°43′ N	19.58	43.5	....	22.4	1.97	.....Sums.
27 Years means for and including this month	15.55	23.40	7.43	15.97	30.017	.....	.....	.307	80.5	....	§ 18.27	¶42.08	0.792	23.10	3.070	27 Years means for and including this month.

a. ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	CALM.
Miles	501	....	20	25	307	1233	9055	2019	
Duration in hrs..	27	....	1	4	34	85	425	96	
Mean velocity....	18.6	....	20.0	6.2	8.8	14.5	21.3	21.0	

Greatest mileage in one hour was 55 from the West on the 15th.

Greatest velocity in gusts was 60 miles per hour on the 15th.

Resultant mileage, 11346.
Resultant direction, W. 3° 43′ N.
Total mileage, 13,153.

* Barometer readings reduced to sea-level and temperature 32° Fahrenheit.

† Mean of bi-hourly readings taken from self-recording instruments.

‡ Humidity relative, saturation being 100. Mean of observations at 8, 15 and 20 hours.

¶ 20 years only. § 15 years only.

The greatest heat was 29.5 on the 19th; the greatest cold was —4.0 on the 7th, giving a range of temperature of 33.5 degrees.

Warmest day was the 18th. Coldest day was the 7th. Highest barometer reading was 30.39 on the 3rd. Lowest barometer was 29.41 on the 19th, giving a range of .98 inches.

Minimum relative humidity observed was 57 on the 25th.

Snow fell on 13 days.

Lunar Halo observed on the 3rd.

Lunar Corona on the 9th.

Fog on the 3rd.

ABSTRACT FOR THE MONTH OF MARCH, 1901

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER. † Mean.	Max.	Min.	Range.	*BAROMETER. † Mean.	Max.	Min.	Range.	‡Mean relative humidity.	WIND. General direction.	Mean velocity in miles per hour	Per cent. possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	24.89	33.5	11.0	22.5	29.74	30.13	29.46	.67	83	W.	25.2	64	....	1.4	0.14	1
2	18.47	33.5	7.3	26.2	29.86	30.17	29.48	.69	71	N.W.	13.3	69	....	0.3	0.03	2
SUNDAY.... ... 3	13.66	30.2	0.0	30.2	29.94	30.22	29.46	.76	76	S.E.	20.8	61	0.00	....	0.00	3.....SUNDAY
4	35.35	38.6	30.2	8.4	29.70	29.81	29.47	.34	65	S.W.	29.2	68	....	....	....	4
5	22.57	35.1	8.4	26.7	29.66	29.78	29.56	.22	71	W.	20.3	44	....	1.1	0.11	5
6	7.26	11.3	2.3	9.0	29.93	30.08	29.78	.30	76	W.	18.0	66	....	0.0	0.00	6
7	11.40	17.9	1.3	16.6	30.11	30.15	30.07	.08	87	S.	14.1	37	....	0.6	0.05	7
8	24.95	33.5	18.4	15.1	30.02	30.09	29.88	.21	90	S.	8.3	00	....	4.0	0.34	8
9	28.27	31.7	24.0	7.7	29.92	30.19	29.78	.41	85	N.E.	14.5	11	....	3.3	0.38	9
SUNDAY.....10	18.52	27.0	8.1	18.9	30.34	30.47	30.13	.34	70	N.E.	20.2	66	0.20	.. .	0.20	10..... .....SUNDAY
11	30.73	33.2	25.5	7.7	29.68	30.13	29.45	.68	94	E.	9.1	00	0.02	4.4	2.24	11
12	27.94	34.0	21.9	12.1	29.60	29.81	29.45	.36	90	S.W.	16.2	00	....	1.6	0.18	12
13	24.38	28.0	19.2	8.8	29.99	30.10	29.81	.29	84	N.W.	11.2	47	....	....	....	13
14	22.56	24.7	18.9	5.8	29.83	29.95	29.79	.16	81	N.E.	19.3	00	....	2.4	0.24	14
15	22.84	28.0	20.4	7.6	29.84	29.89	29.82	.07	70	N E.	21.0	89	....	....	....	15
16	21.61	26.0	14.7	11.3	29.96	29.99	29.89	.10	70	S.W.	19.9	91	....	....	....	16
SUNDAY 17	21.71	28.1	9.9	18.2	29.94	29.99	29.89	.10	86	S.W.	15.7	04	....	0.7	0.07	17..... .....SUNDAY
18	27.98	36.0	18.3	17.7	29.96	30.12	29.94	.18	84	S.W.	15.7	17	....	0.5	0.05	18
19	11.07	13.7	8.0	5.7	30.44	30.51	30.12	.39	66	N.E.	14.7	58	....	....	....	19
20	26.17	36.0	12.0	24.0	30.16	30.49	29.93	.56	71	S.E.	19.9	83	0.36	1.0	0.46	20
21	35.03	38.9	31.7	7.2	29.74	29 93	29.67	.26	87	W.	19.9	00	0.67	0.0	0.67	21
22	28.47	32.0	24.9	7.1	29.83	29.99	29.74	.25	74	S.W.	21.0	30	....	0.2	0.02	22
23	29.55	35.9	22.7	13.2	30.10	30.14	29.99	.15	73	S.W.	14.9	63	....	....	....	23
SUNDAY.....24	33.40	39.0	23.5	15.5	30.08	30.11	30.03	.08	69	N.E.	8.8	09	....	....	....	24.....SUNDAY
25	34.67	37.1	29.0	8.1	30.04	30.17	29.86	.31	75	N.E.	17.9	43	....	....	....	25
26	37.85	40.0	35.0	5.0	29.60	29.86	29.36	.50	96	S.E.	21.2	00	1.49	....	1.49	26
27	34.12	37.7	27.9	9.8	29.36	29.46	29.29	.17	91	W.	16.4	00	0.16	0.6	0.22	27
28	22.77	27.9	19.4	8.5	29.54	29.64	29.45	.19	87	W.	27.4	00	....	0.3	0.03	28
29	19.25	24.7	12.2	12.5	29.77	29.90	29.64	.26	87	N.W.	22.4	00	....	1.4	0.14	29
30	25.78	33.8	17.0	16.8	29.86	29.94	29.78	.16	71	N.W.	17.8	38	....	0.4	0.04	30
SUNDAY.....31	27.69	30.6	23.1	7.5	29.68	29.78	29.62	.16	89	N.W.	20.5	00	....	1.8	0.22	31.....SUNDAY
Means.....	24.87	30.89	17.62	13.27	29.878	30.032	29.729	.303	79.6	W.9°42'N.	17.91	30.4	2.90	26.0	7.32	.....Sums.
27 Years means for and including this month	24.33	30.70	16.91	14.55	29.972	.....	.....	.273	77.1	....	§ 17.89	¶46.53	1.170	24.43	3.787	27 Years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	CALM.
Miles	489	2998	784	1076	414	2536	3842	1188	
Duration in hrs..	53	171	71	51	38	122	174	63	1
Mean velocity....	9.2	17.5	11.0	21.1	10.9	20.8	22.1	18.8	

Greatest mileage in one hour was 51 on the 4th.

Greatest velocity in gusts was 58 miles per hour on the 4th.

Resultant mileage, 2850.

Resultant direction, W.9°42'N.

Total mileage, 13,327.

Direction and velocity on 11th and 12th from City Hall anemometer.

* Barometer readings reduced to sea-level and temperature 32° Fahrenheit.

† Mean of bi-hourly readings taken from self-recording instruments.

‡ Humidity relative, saturation being 100. Mean of observations at 8, 15 and 20 hours.

¶ 20 years only. § 15 years only.

The greatest heat was 40.0 on the 26th; the greatest cold was 0.0 on the 3rd, giving a range of temperature of 40.0 degrees.

Warmest day was the 26th. Coldest day was the 6th. Highest barometer reading was 30.51 on the 19th. Lowest barometer was 29.29 on the 27th, giving a range of 1.22 inches.

Minimum relative humidity observed was 57 on the 16th and 19th.

Rain or sleet fell on 7 days.

Snow fell on 20 days.

Rain, sleet, or snow fell on 23 days.

Fog on the 21st.

ABSTRACT FOR THE MONTH OF APRIL, 1901

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY	THERMOMETER. † Mean.	Max.	Min.	Range.	*BAROMETER. † Mean.	Max.	Min.	Range.	‡Mean relative humidity.	WIND. General direction.	Mean velocity in miles per hour	Per cent. possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	34.97	38.2	31.2	7.0	29.88	30.06	29.66	.40	88	N.W.	17.0	00	0.04	1.3	0.22	1
2	37.18	40.8	34.0	6.8	30.07	30.13	29.99	.14	83	N.	6.9	44	0.01	....	0.01	2
3	36.01	38.5	34.1	4.4	29.83	29.99	29.69	.30	93	N.E.	19.6	00	0.63	....	0.63	3
4	36.21	40.8	34.0	6.8	29.69	29.74	29.62	.12	89	N.E.	29.4	18	0.16	....	0.16	4
5	34.79	38.5	33.0	5.5	29.78	29.81	29.72	.09	94	N.E.	15.7	00	0.02	....	0.02	5
6	34.54	36.8	32.3	4.5	29.73	29.79	29.71	.08	97	N.E.	10.8	00	0.02	0.0	0.02	6
SUNDAY.... ... 7	34.53	25 8	32.3	3.5	29.67	29.73	29.61	.12	96	N.E.	25.7	00	1.00	....	1.00	7.....SUNDAY
8	35.33	36.7	33.4	3.3	29.67	29.72	29.61	.11	95	N.E.	19.4	00	0.43	....	0.43	8
9	38.80	41.7	37.0	4.7	29.80	29.91	29.72	.19	92	N.	19.4	00	0.24	....	0.24	9
10	38.40	44.0	35.0	9.0	30.08	30.19	29.91	.28	63	N.E.	23.2	09	....	....	....	10
11	37.88	46.0	30.7	15.3	30.23	30.29	30.18	.11	51	N.E.	18.0	93	....	....	....	11
12	40 09	50.0	29.0	21.0	30.27	30 34	30.19	.15	47	N.E.	10.0	95	....	....	....	12
13	45.22	56.0	32.1	23.9	30.15	30.21	30.09	.12	50	N.E.	7.6	95	....	....	....	13
SUNDAY.....14	48.42	60.4	35.4	25.0	30 09	30.13	30.03	.10	53	E.	8.7	81	....	....	....	14..... .....SUNDAY
15	50.80	63.0	39.9	20.1	30.08	30.13	30.04	.09	57	N.E.	10.8	48	....	....	....	15
16	48.22	60.2	38.2	22.0	30.14	30.19	30.04	.15	70	N.E.	11.6	70	....	....	....	16
17	49.99	62.1	35.4	26.7	30.13	30.22	30.05	.17	57	S.E.	11.2	94	....	....	....	17
18	49 76	58.0	41.1	16.9	29.98	30 08	29.88	.20	57	S.	24.2	42	0.00	....	0.00	18
19	42.15	49.6	36 0	13.6	30.14	30.27	29.95	.32	94	W.	16.7	00	0.44	....	0.44	19
20	36.18	37.9	34 0	3.9	30.18	30.26	30.11	.15	88	N.E.	28.7	00	....	....	....	20
SUNDAY.....21	43.74	54.7	35.9	18.8	30.06	30.11	30.00	.11	87	N.E.	25.4	01	0.08	....	0.08	21.....SUNDAY
22	40.35	53.5	42.0	11.5	30.06	30.12	30.01	.11	93	N.E.	22.6	01	0 11	....	0.11	22
23	45.40	54.0	42.1	11.9	30.17	30.21	30.12	.09	88	N.E.	23.0	41	0.23	....	0.23	23
24	47.87	57.6	40.0	17.6	30.05	30.15	29.99	.16	81	N.E.	21.0	00	0.18	....	0.18	24
25	53.62	65.0	45.8	19.2	30.02	30.13	29.96	.17	46	N.E.	27.8	78	....	....	....	25
26	47.95	58.6	36.7	21.9	30.28	30 34	30.13	.21	47	N.E.	19.9	96	....	....	....	26
27	51.83	66.0	36.4	29.6	30.42	30.48	30.34	.14	54	N.E.	7.4	96	....	....	....	27
SUNDAY.....28	62 61	75.2	43.7	31.5	30.41	30.47	30.34	.13	38	S.W.	14.8	98	....	....	....	28.....SUNDAY
29	55.25	65.0	46 5	18.5	30.35	30.42	30.29	.13	75	N.E.	16.9	70	....	....	....	29
30	44.27	47.7	41.5	6.2	30.07	30.29	29.93	.36	93	N.E.	10.5	00	0.42	....	0.42	30
Means.....	43.61	50.98	36.62	14.35	30 049	30.130	29.964	.167	73.9	N.14° 3'E	17.47	33.3	4.01	1.3	4.19	.....Sums.
27 Years means for and including this month	40.59	49.02	32.82	16.21	29.967	.....	.....	.200	66.7	....	§ 16.34	¶51.45	1.712	5.14	2.236	27 Years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S E.	S.	S.W.	W.	N.W.	CALM.
Miles	718	9057	449	308	804	316	539	385	
Duration in hrs..	36	473	47	29	47	24	31	33	
Mean velocity....	19.9	19.1	9.5	10.1	17.1	13.2	17.4	11.7	

Greatest mileage in one hour was 43 on the 4th

Greatest velocity in gusts was 45 miles per hour on the 4th.

Resultant mileage, 12,242.

Resultant direction, N.44°3'E.

Total mileage, 12,576.

* Barometer readings reduced to sea-level and temperature 32° Fahrenheit.

† Mean of bi-hourly readings taken from self-recording instruments.

‡ Humidity relative, saturation being 100. Mean of observations at 8, 15 and 20 hours.

¶ 20 years only. § 15 years only.

The greatest heat was 75.2 on the 28th: the greatest cold was 30.7 on the 11th, giving a range of temperature of 44.5 degrees.

Warmest day was the 28th. Coldest day was the 7th. Highest barometer reading was 30.48 on the 27th. Lowest barometer was 29.61 on the 7th, giving a range of .87 inches.

Minimum relative humidity observed was 26 on the 28th.

Rain fell on 16 days.
Snow fell on 2 days.
Rain or snow fell on 16 days.
Lunar corona on the 27th.
Fog on the 6th and 7th.

ABSTRACT FOR THE MONTH OF MAY, 1901

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY	THERMOMETER. † Mean.	Max.	Min.	Range.	*BAROMETER. † Mean.	Max.	Min.	Range.	‡Mean relative humidity.	α WIND. General direction.	Mean velocity in miles per hour	Per cent. possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	52.68	60.9	44.7	16.2	29.94	30.01	29.85	.16	52	W.	5.4	96	....	....	....	1
2	49.79	55.0	45.1	9.9	29.54	29.85	29.40	.45	88	N.W.	8.0	00	0.27	....	0.27	2
3	46.42	54.1	40.1	14.0	29.78	29.98	29.50	.48	38	N.W.	19.4	87	....	....	...	3
4	52.97	63.4	42.1	21.3	29.96	30.07	29.84	.23	39	N.W.	10.3	93	....	....	....	4
SUNDAY.... .. 5	52.22	60.9	45.1	15.8	29.83	29.91	29.80	.11	49	E.	12.7	99	....	....	....	5.....SUNDAY
6	54.14	65.8	40.3	25.5	29.88	29.96	29.76	.20	58	S.W.	6.6	74	....	....	....	6
7	63.35	74.0	53.5	20.5	29.76	29.79	29.73	.06	50	W.	3.2	97	....	....	....	7
8	63.57	77.9	50.1	27.8	29.80	29.84	29.75	.09	63	N.E.	5.7	67	....	....	....	8
9	65.44	74.1	55.6	18.5	29.95	30.00	29.82	.18	64	E.	5.1	60	....	....	....	9
10	63.75	79.1	57.3	13.8	29.96	30.02	29.87	.15	65	S.E.	2.9	17	0.03	....	0.03	10
11	59.73	66.0	56.0	10.0	29.60	29.87	29.49	.38	88	S.E.	9.0	00	0.26	....	0.26	11
SUNDAY.....12	56.11	64.2	51.1	13.1	29.59	29.67	29.51	.16	69	W.	16.4	60	0.34	....	0.34	12..... .....SUNDAY
13	48.22	53.5	44.3	9.2	29.69	29.77	29.65	.12	74	W.	13.6	20	0.11	....	0.11	13
14	48.64	55.2	44.5	10.7	29.94	30.05	29.77	.28	68	W.	20.0	48	0.06	....	0.06	14
15	54.08	63.8	44.0	19.8	30.08	30.10	30.05	.05	58	W.	12.3	98	....	....	....	15
16	58.89	69.6	47.0	22.6	30.09	30.16	30.03	.13	51	S.W.	9.0	100	....	....	....	16
17	57.07	53.2	50.5	2.7	29.93	30.03	29.82	.21	71	N.E.	6.6	02	0.10	....	0.10	17
18	51.11	53.5	48.0	5.5	29.79	29.90	29.75	.15	86	S.E.	9.1	00	0.36	....	0.36	18
SUNDAY.....19	50.30	54.5	46.9	7.6	30.03	30.07	29.90	.17	86	E.	14.4	00	0.25	....	0.25	19..... .....SUNDAY
20	55.68	64.0	49.7	14.3	30.06	30.09	30.03	.06	74	S.E.	9.5	05	0.03	....	0.03	20
21	60.05	67.2	53.9	13.3	30.05	30.11	29.99	.12	80	S.W.	1.3	13	....	....	....	21
22	66.98	79.4	53.9	25.5	29.86	29.99	29.71	.28	76	S.W.	3.8	30	0.07	....	0.07	22
23	65.94	73.8	58.0	15.8	29.68	29.79	29.63	.16	75	S.W.	17.2	65	0.13	....	0.13	23
24	49.34	58.0	46.0	12.0	30.03	30.16	29.79	.37	76	S.E.	17.8	00	0.15	....	0.15	24
25	53.34	61.8	45.1	16.7	30.20	30.24	30.16	.08	54	S.E.	8.3	87	....	....	....	25
SUNDAY..... 26	57.42	66.2	44.7	21.5	30.05	30 18	29.88	.30	58	S.	1.9	87	0.00	....	0.00	26.....SUNDAY
27	58.19	65.7	53.7	12.0	29.75	29.88	29.62	.26	83	S.	5.0	37	0.11	....	0.11	27
28	56.21	63.0	46.1	16.9	29.66	29.73	29.62	.11	69	E.	15.2	16	0.01	....	0.01	28
29	57.48	64.0	53.1	10.9	29.81	29.84	29.73	.11	73	S.E.	13.8	00	0.03	....	0.03	29
30	55.49	59.6	53.0	6.6	29.77	29.84	29.70	.14	87	E.	5.9	00	0.00	....	0.00	30
31	56.63	61.9	52.4	9.5	29.68	29.71	29.66	.05	88	S.	4.5	06	0.19	....	0.19	31
Means.....	56.17	63.69	48.86	14.82	29.863	29.955	29.768	.187	68.0	S 23° 43′ W	9.69	43.8	2.50	....	2.50	.....Sums.
27 Years means for and including this month	54.72	64.00	45.85	18.15	29.928	.....	.....	.170	66.5	....	§ 14.32	¶50.67	2.901	....	2.950	27 Years means for and including this month.

α ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	CALM.
Miles	198	475	1255	1352	375	1114	1463	975	
Duration in hrs..	14	45	135	134	112	108	91	62	43
Mean velocity....	14.1	10.6	9.3	10.1	3.3	10.3	16.1	15.7	

Greatest mileage in one hour was 32 on the 23rd.
Resultant mileage, 976.
Resultant direction, S. 23° 43′ W.
Total mileage, 7,207.

α. Wind for the month is from the Anemograph in the Fire Alarm Office, City Hall.

* Barometer readings reduced to sea-level and temperature 32° Fahrenheit.

† Mean of bi-hourly readings taken from self-recording instruments.

‡ Humidity relative, saturation being 100. Mean of observations at 8, 15 and 20 hours.

¶ 20 years only. § 15 years only.

The greatest heat was 79.4 on the 22nd; the greatest cold was 40.1 on the 3rd, giving a range of temperature of 39.3 degrees.

Warmest day was the 22nd. Coldest day was the 3rd. Highest barometer reading was 30.24 on the 25th. Lowest barometer was 29.40 on the 2nd, giving a range of .84 inches.

Minimum relative humidity observed was 24 on the 3rd.

Rain fell on 19 days.

Fog on the 22nd.

Rainbow on the 31st.

ABSTRACT FOR THE MONTH OF JUNE, 1901

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY	THERMOMETER. † Mean.	Max.	Min.	Range.	*BAROMETER. † Mean.	Max.	Min.	Range.	‡Mean relative humidity.	*a* WIND. General direction.	Mean velocity in miles per hour	Per cent. possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	60.39	69.9	52.9	17.0	29.76	29.80	29.71	.09	74	S.	4.6	44	....	....	....	1
SUNDAY.... ... 2	59.92	68.0	53.6	14.4	29.80	29.85	29.72	.13	77	S.E.	4.6	45	0.08	....	0.08	2.....SUNDAY
3	54.53	59.0	49.9	9.1	29.71	29.72	29.69	.03	76	S.W.	8.8	07	0.32	....	0.32	3
4	64.34	75.8	53.4	22.4	29.80	29.86	29.72	.14	69	S.W.	14.9	86	0.01	....	0.01	4
5	66.99	76.9	58.0	18.9	29.86	29.91	29.81	.10	68	S.W.	14.2	74	....	....	....	5
6	73.00	84.9	61.0	23.9	29.81	29.87	29.75	.12	66	S.W.	9.6	90	....	....	....	6
7	63.94	69.4	58.0	11.4	29.69	29.77	29.59	.18	91	S.W.	11.8	00	0.31	....	0.31	7
8	54.27	59.7	47.5	12.2	29.70	29.72	29.68	.04	79	S.W.	19.2	40	0.03	....	0.03	8
SUNDAY..... 9	48.77	54.7	43.7	11.0	29.80	29.90	29.72	.18	77	S.W.	21.6	00	0.19	....	0.19	9.....SUNDAY
10	61.51	72.2	49.4	22.8	30.00	30.06	29.90	.16	54	S.W.	19.9	95	....	....	....	10
11	66.55	76.7	56.0	20.7	30.07	30.10	30.02	.08	53	S.W.	18.8	71	0.00	....	0.00	11
12	69 04	78.5	62.3	16.2	30.12	30.19	30.05	.14	71	N.W.	4.8	66	0.09	....	0.09	12
13	67.02	76.7	54.1	22.6	30.14	30.23	29.99	.24	62	N.E.	6.1	86	....	....	....	13
14	73.17	85.7	65.2	20.5	29.92	30.09	29.82	.27	59	S.W.	19.4	85	....	....	....	14
15	60.61	69.0	50.7	18.3	30.12	30.18	30.08	.10	54	S.W.	10.2	93	....	....	....	15
SUNDAY.....16	60.23	69.2	49.3	19.9	30.12	30.19	30.04	.15	67	N.E.	10.3	99	....	....	....	16.....SUNDAY
17	62.97	72.9	52.9	20.0	30.01	30.07	29.94	.13	69	E.	5.3	99	....	....	....	17
18	60.41	66.0	52.1	13.9	29.84	29.98	29.90	.08	64	E.	1.5	09	0.00	....	0.00	18
19	64.13	75.0	60.0	15.0	29.95	29.98	29.90	.08	86	W.	3.5	23	0.39	....	0.39	19
20	64.35	73.9	57.3	16.6	29.99	30.03	29.94	.09	85	S.W.	3.3	19	0.08	....	0.08	20
21	69.01	78.8	60.1	18.7	29.95	29.98	29.91	.07	72	W.	11.2	78	....	....	....	21
22	72.08	81.0	62.0	19.0	29.85	29.94	29.69	.25	60	E.	3.5	41	....	....	....	22
SUNDAY..... 23	67.97	74.5	65.0	9.5	29.63	29.69	29.60	.09	84	S.W.	10.0	23	0.47	....	0.47	23 .....SUNDAY
24	68.84	75.1	63.9	11.2	29.87	29.94	29.69	.25	80	W.	6.1	23	....	....	....	24
25	74.21	85.7	61.6	24.1	30.03	30.06	29.94	.12	73	W.	4.5	85	....	....	....	25
26	79.36	87.6	72.0	15.6	30.06	30.11	30.03	.08	66	S.W.	9.0	95	....	....	....	26
27	80.56	89.1	72.0	17.1	29.90	30.03	29.78	.25	73	W.	21.1	95	....	....	....	27
28	82.22	91.4	74.5	16.9	29.80	29.83	29.75	.08	77	S.W.	15.6	91	....	....	....	28
29	81.15	92.0	72.8	19.2	29.66	29.77	29.55	.22	76	S.W.	17.7	83	....	....	....	29
SUNDAY.....30	73.34	83.1	65.3	17.8	29.74	29.79	29.62	.17	60	S.W.	23.2	98	....	....	....	30.....SUNDAY
Means.....	66.83	75.75	58.55	17.20	29.890	29.955	29 818	.137	70.8	W 40° 44′ S	11.15	61.5	1.97	....	1.97	.....Sums.
27 Years means for and including this month	64.97	73.73	56.42	17.31	29.905	.....	.....	.154	70.2	....	§ 13.20	¶54.97	3.527	....	3.527	27 Years means for and including this month.

a ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	CALM.
Miles	64	445	317	170	214	5587	1037	197	
Duration in hrs..	12	32	69	41	62	364	80	20	40
Mean velocity....	5.3	13.5	4.6	4.1	3.5	15.3	13.0	9.8	

Greatest mileage in one hour was 31 on the 27th.

Greatest velocity in gusts 38 miles per hour on the 27th.

Resultant mileage, 5,760.

Resultant direction, W. 40° 44′ S.

Total mileage, 8,031.

a. Wind from the 1st to 25th is from Anemograph in the Fire Alarm Office, City Hall.

* Barometer readings reduced to sea-level and temperature 32° Fahrenheit.

† Mean of bi-hourly readings taken from self-recording instruments.

‡ Humidity relative, saturation being 100. Mean of observations at 8, 15 and 20 hours.

¶ 20 years only. § 15 years only.

The greatest heat was 92.0 on the 29th; the greatest cold was 43.7 on the 9th, giving a range of temperature of 48.3 degrees.

Warmest day was the 28th. Coldest day was the 9th. Highest barometer reading was 30.23 on the 13th. Lowest barometer was 29.55 on the 29th, giving a range of 0.68 inches.

Minimum relative humidity observed was 40 on the 15th.

Rain fell on 12 days.

Lunar corona on the 26th.

Thunderstorms on the 3rd, 19th, 23rd and 28th