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CANADA BANK NOTE CO. LIM.

T. Sterry Hunt

THE

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OF SCIENCE.

VOL. V. JULY, 1892. NO. 3.

THOMAS STERRY HUNT, LL.D., F.R.S.

Thomas Sterry Hunt was born in Norwich, Conn., on September 5, 1826, of an old New England family. His ancestor, William Hunt, was one of the founders of Concord, Mass., in 1635. His maternal grandfather, Consider Sterry, of Norwich, was a civil engineer and mathematician, and was the author of text books of arithmetic and algebra, published 100 years ago.

Mr. Hunt was destined for the profession of medicine; but after preliminary studies, his love for chemistry and mineralogy led him, early in 1845, to become a special student, and afterward assistant under Prof. Benjamin Silliman, sen., in Yale college. Two years later, after working for a short time in the Geological Survey of Vermont, he was selected, on Silliman's recommendation, by Mr., afterwards Sir William, Logan to be the chemist and mineralogist to the then recently organized Geological Survey of Canada. In this position he remained as the colleague and assistant of Sir William for more than twenty-five years, till his resignation in 1872. His work in this capacity is well known. He was employed in the earliest scientific investigations of the petroleum, the rock salt, the phosphates, and the iron and copper ores of Canada, and also in researches on the composition of a great number of rocks

and minerals, of mineral waters and of soils, while he devoted a large amount of attention to the structure and composition, at that time so little known, of the ancient crystalline rocks of the Ottawa Valley and the Great Lakes; in unravelling the stratigraphical intricacies of which Logan and his assistant Murray were at the same time actively and most successfully occupied. He thus had an important share in the great work of instituting the Laurentian and Huronian Systems of Geology, and in systematising our knowledge of the oldest rocks of Canada and of the world. This work he afterwards followed up independently, in the development of the Norian, Montalban, Taconian and Kewenian systems, in which he included various groups of ancient rocks between the Laurentian and the Cambrian; and though some of these groups may be regarded as still in dispute, there can be no question of the great scientific value of Hunt's studies of them and of the new facts which he contributed to their discussion.

While connected with the Geological Survey, Hunt willingly aided in the drudgery of literary work and administration, for many parts of which his early culture and extensive range of reading and knowledge well fitted him.

At this time also he conceived and published in a succession of papers those wide views on Chemical and general Geology, which were embodied in his greater works, and more especially in his Mineral Physiology and Physiography (1886), in which he discusses with a power and range of knowledge rarely equalled the original condition of our planet, and the genesis of its more ancient rocks, as well as the processes of decomposition, recomposition and metamorphosis to which they have been subjected. This great and eminently suggestive work deserves the careful study of all concerned in Petrography or Physical Geology, who whether or not they may agree with all its conclusions, will find very much to instruct and to stimulate and guide thought and investigation. This work alone, with the earlier Essays on Chemical Geology, would be sufficient to form the basis of a great reputation, and must retain its place as

a leading authority on the subjects of which it treats. As the author himself states, this work and more especially the "Crenitic" hypothesis developed in it, are "the result of nearly thirty years of studies, having for their object to reconstruct the theory of the earth on the basis of a solid nucleus, to reconcile the existence of a solid interior with the flexibility of the crust, to find an adequate explanation of the universally contorted attitude of the older crystalline strata, and at the same time to discover the laws which have governed the formation and the changing chemical composition of the stratiform crystalline rocks through successive geologic ages."

To Dr. Hunt we thus owe some of the earliest attempts to subdivide and classify in a scientific manner the stratiform crystalline rocks; a work to which he brought not only his studies throughout Canada and the United States, but also the results of enquiries conducted during repeated visits to the British Islands and to continental Europe. In pursuing these studies and while reviewing and controverting various hypotheses, including the igneous or plutonic, the metamorphic and the metasomatic, all of which he rejected as irreconcilable with observed facts, and as violating chemical theory, Dr. Hunt vindicated what he deemed the essential soundness of the still imperfect Wernerian aqueous view, and advanced, as its proper development and completion, his own crenitic hypothesis. According to this theory, the source of the various groups of crystalline rocks was "the superficial portion of a globe, once in a state of igneous fusion, but previously solidified from the centre. This portion, rendered porous by cooling, was permeated by circulating waters, which dissolved and brought to the surface during successive ages, after the manner of modern mineral springs, the elements of the various systems of crystalline rocks. These rocks thus mark progressive and necessary changes in the mineralogical evolution of the earth."

Dr. Hunt never abandoned the scientific pursuit of chemistry and mineralogy. In the former science he summed

up the general conclusions of his researches in 1887, in his work entitled "A New Basis of Chemistry," which has gone into a third edition and has been translated into French. His latest work, published in 1891, "Systematic Mineralogy," gives a new classification of the mineral kingdom based on an improvement of what used to be called the Natural History System, followed long ago by Möhs and Jameson. It would be premature to express any opinion as to the acceptance by chemists and mineralogists in general, of the new views propounded in these works; but they are unquestionably able and full of important generalizations and suggestions which must make their mark in the science of the future.

Dr. Hunt found time to do some work as an educator. He was professor of chemistry in Laval University, Quebec, from 1856 to 1862, during which time he delivered annual courses of lectures in French. He continued to be honorary professor until his death. He was also for several years lecturer in McGill University, Montreal, and was professor of geology at the Massachusetts Institute of Technology. 1872-1878. Among his academic titles were those of M.A., Harvard; Sc.D., Laval; LL.D., McGill, and finally LL.D., Cambridge, England. He was elected a fellow of the Royal Society of London in 1859. He was a member of a large number of other societies, both Canadian and foreign. A member of the National Academy of Science of the United States since 1873, he was president of the American Association for the Advancement of Science, and of the American Institute of Mining Engineers, and twice president of the American Chemical society. He was one of the original members and the third president of the Royal Society of Canada, which, uniting some features of the British Association with those of a Royal Society, elects a new president annually. One of the organizers of the International Geological congress, he was its first secretary, and was a vice-president at the congresses of Paris, 1878, Boulogne, 1881, and London, 1888. In connection with the great industrial exhibitions Dr. Hunt represented Canada as a

member of the international juries at Paris in 1855 and 1867 and at the Philadelphia Centennial Exhibition in 1876. He was an officer of the French order of the Legion of Honor and of the Italian order of St. Maurice and St. Lazarus.

In 1878, Dr. Hunt retired from public professional life and devoted himself mainly to the perfecting of his more important works in new editions and to the preparation of his "Systematic Mineralogy." His health and strength, however, gradually declined, and continuing to work almost to the last, he passed away peacefully on Friday, February 12th, 1892. His death at a comparatively early age must be deplored as a great loss to science; but he had the good fortune, not granted to all scientific workers, to have means and leisure in his closing years to bring together in a complete and elaborated form all the principal scientific results of the work of his life.

Dr. Hunt was at the time of his death one of the oldest members of the Natural History Society of Montreal. He had been its President, and for many years one of its vice-presidents, and a member of its council. He took a lively interest in the society and in its publications; and frequently contributed papers and lectures to its proceedings. The Society owes much to his long continued and active influence in its affairs.

In 1878, Dr. Hunt married the eldest daughter of the late Mr. Justice Gale, a lady of culture and literary taste, who survives him.

It is proper to state that the above notice is taken in part from biographical sketches published in the Montreal *Gazette* and elsewhere.

The Experimental Farms of Canada.

By Professor D. P. Penhallow.

The work now being conducted by the Central Experimental Farm at Ottawa and its several branches, had its origin in a resolution of the House of Commons of the 30th January, 1884, appointing a Committee "to inquire into

the best means of encouraging and developing the Agricultural Industries of Canada, and to report thereon to the House."[1] The testimony collected under this authority subsequently led to the appointment of Mr. Wm. Saunders, of London, as Special Commissioner to inquire into and report upon the system of experiment stations in operation in the United States. This duty he discharged in a very full and conscientious manner, the results being embodied in a report to the Minister of Agriculture. Acting upon the information thus obtained, and having in mind the most immediate needs of the country at large, a system of experimental farms was established, having the central farm at Ottawa, and Mr. Saunders as the Director.

In any attempt to pass in review the work of such an establishment as the one now under consideration, it should be clearly borne in mind that there are several points of view from which it may be regarded: first, as an institution which shall promote strictly scientific inquiry, leaving the practical application to others; second, as an institution designed to adapt the results of scientific inquiry to practical ends, to test and verify the work of others, and serve as a bureau of information. And again, viewing each of these objectives with reference to the particular conditions of agricultural progress, and therefore the special needs of the country at large. It would, therefore, be manifestly improper to lay down special limits within which such work must proceed according to the highest standard of value, regardless of surrounding conditions.

Experiment stations may be regarded as having attained to their best development in Germany—practically the land of their origin. There their work is specialized. All of it is based upon the fundamental idea that a fact once established may serve as a permanent basis for the exposition of natural laws. Their work is, therefore, scientific, and the results are of great value as scientific data. With few exceptions, they do not recognize the practical appli-

[1] Report of the Select Committee appointed by the House of Commons to obtain information as to the Agricultural Interests of Canada. 1884.

cation of the results obtained, which is wholly committed to the attention of others more directly interested.

In England, but little attention has been paid to such work on the part of Government, so that such as has been carried on has devolved upon private individuals. A most conspicuous case of this kind is to be found in Rothamsted, where since 1843 a most important series of investigations has been conducted by Sir James Lawes and Dr. J. H. Gilbert. But here again the aim is scientific, not practical, although in the extensive field experiments we find an admirable combination of the two. The results obtained contain an elucidation of some of the most important laws governing the growth and nutrition of plants, ranking high as scientific achievements.

But because in Germany and England the aim is scientific and not practical, it cannot be said that these *institutions fail to fulfil the objects for which they were* established—promotion of the agricultural interests—and that agriculture suffers in consequence. Far from it. For though the reduction of such results to practice may result in a slower rate of progress, yet is that progress of the most substantial character.

In the United States, where the experiment stations are of recent origin, they have multiplied with great rapidity, until now every State of the Union possesses one or more. Because of their number, rapidity of development and extent of country, as well as the very diverse interests, agricultural, political and personal, to be satisfied, also owing to the want of properly trained officers to conduct the work, these institutions exhibit all grades of efficiency. In some, the scientific basis has been the leading idea from the outset. In others, the immediate reduction to practice of half-gathered facts, and thereby the cultivation of an unstable popularity with the farming community, has dominated all other considerations. In all these stations the scientific work is unduly hampered by the continual performance of mere routine work, such as is involved in the analysis of fertilizers, the identification of plants, testing

of seeds and other work of a similar nature. It is a class of work which, while important in its way, makes no demands upon original powers, and does not call for high scientific capacity. To saddle it upon those who are qualified for work of a high order, is to seriously limit their usefulness and mar such results of scientific value as they may obtain. To divert the appliances of well-equipped stations to such purposes, is to belittle the object of their foundation. It should rather be relegated to separate institutions of a special character, or placed in the hands of a distinct staff. It is probable, however, notwithstanding the short period within which their growth lies, a careful observer will note that, from the first, there has been a decided tendency towards the position first defined and assumed by the more conservative. Men of better capacity are constantly working to the direction of these institutions, as pebbles come to the surface of sand, and with this change there is necessarily less poorly directed effort, with more results which will bear scientific scrutiny, and thus the output is becoming of greater value with each year. Acting as a central bureau, the Department of Agriculture at Washington collects all the valuable material as issued, and publishes it monthly in such a digested form as renders it of direct value to the farmer, with whom rests the final reduction to practice. This may be regarded as the ideal method of bringing the results of scientific inquiry within reach of the farmer of average education and opportunity. It cannot be doubted, however, that the final solution of the difficulties now but too obvious will be satisfactory.

My object in thus bringing out the characteristic features of these institutions in other countries is that we may more clearly understand the particular field which is being cultivated in Canada.

Work on the Central Experimental Farm at Ottawa was commenced in 1887. The first report was issued in 1890, followed by a second—the last up to date—in 1891. The Director, Mr. Wm. Saunders, is assisted by a staff of nine chiefs of departments, including an Agriculturist, Horticul-

turist, Chemist, Entomologist and Botanist, and a Poultry Manager, together with four superintendents of branch farms.

The Branch Experimental Farms established at the date of the last report are four in number, and are located at Nappan, Nova Scotia, for the Maritime Provinces; Brandon, Manitoba; Indian Head, North-West Territories, and at Agassiz, British Columbia. The central farm serves as the centre of supply, the branches being designed more as local testing stations.

As a result of the first year's operations, the Director was able to observe that "Canadian farmers are making careful inquiries for more full and accurate information regarding the numerous and varied operations pertaining to their calling; they desire to have the mysteries which surround some of the operations of Nature explained as far as this is practicable, and it is our object to foster and stimulate such a spirit of inquiry which will, it is believed, result in the speedy advancement of agriculture, and thus in material and lasting benefit to the country."

The intelligent interest manifested by the farmers in the operations of an institution designed and supported in their behalf, as thus indicated, is in itself a most hopeful sign, but it will be well to see what efforts are made to carry out the promises thus held forth by the Director at the very beginning of his first report.

During the year 1889, there were received 6,864 letters. There were dispatched 5,428 letters; pamphlets, including reports and bulletins, 41,584, and 3,662 packages of seeds of various kinds. During the year 1890, there were received 17,539 letters, and 2,152 samples of grain for examination and report. There were despatched 19,806 letters; reports, bulletins and other circulars of information, 218,129, and of seeds, trees, etc., 24,332. The number of farmers on the regular mailing list for reports for the same year was 20,600, to which must be added 4,009 for the special reports on dairying. As this output represents information distributed, no better conception could be gained as to the general volume of work accomplished and

the thoroughness with which the results obtained are distributed throughout the farming community, These data also clearly show the keen interest which is taken in the work by the farmers throughout the country. In addition to their other duties, the various officers carry their work into different centres where special stimulus or information may be needed — where it will prove most useful — distributing through the medium of lectures the results obtained in the laboratory and the field.

At the time of the Indian and Colonial Exhibition, the Director performed an important work in the capacity of Special Commissioner, in making a collection of fruits from all parts of the Dominion, which attracted wide attention.

Among the earliest questions presented for solution was that of the grains best adapted to cultivation in Canada. The valuable results obtained with the Ladoga and Red Fyfe wheats, which secure to the Canadian farmers high grade spring grains of large yield and weight, and with the two-rowed barley, which has proved so superior for malting purposes over the ordinary six-rowed varieties, are in themselves of such importance to the farming community as to justify the establishment of these farms.

The work of the chemical department is almost wholly in the direction of fertilizer, soil and sample analyses, though a limited amount of time has been found for determinations of more pronounced value. Among these we note "The composition of apple tree leaves, being the first of a series of analyses on the apple, with a view to ascertain a rational mode of fertilizing orchards;" a report on "The effect of solutions of copper and iron sulphates, alone and together, on the vitality of the wheat germ."

With the advent of a well-qualified head, the horticultural department has rapidly taken the prominent position which it should hold. It is gratifying to note that the extensive and valuable work undertaken by the late Charles Gibb, relative to the introduction of hardy fruits, is here being continued and extended. The free distribution of fruit trees is a very important feature of the work. During the

year 1890, 100,000 seedling fruit trees were sent to various points, as widely separated as possible, in Manitoba and the North-West. That this work is appreciated, and that there seems to have been awakened an interest in the important question of forestation, is indicated by the fact that there were 1,600 more applications for trees than could be granted. A most commendable feature of the plant and seed distribution is to be found in the clear and concise directions accompanying each package. No more thorough way of distributing much needed information on the subject of tree planting and seed growing could be devised.

The application of fungicides to the treatment of the fungi which prey upon all classes of fruits, receives a large measure of attention. Important work has also been accomplished in the production of new and valuable varieties of small fruits as seedlings and hybrids. In the report of a special committee chosen from the Ontario Fruit Growers' Association and the Montreal Horticultural Society, the statement is made that "The chief attraction to your committee was a patch of two or three hundred seedlings and hybrids (raspberries) which were originated by the Director, some of which, in our estimation, bid fair to supersede the best of the standard varieties."

In the department of botany and entomology good work is also being accomplished. A botanic garden and arboretum has been planned, and a large amount of work has been done upon it. The testing of important forage plants, the study of insects injurious to plants, and the best methods of preventing their action, form the principal features of the work thus far accomplished.

From the outline thus presented, it appears that the Experimental Farm does not fulfil the scientific mission of the European stations, nor does it accomplish both the practical and scientific ends as in the United States. It fills a distinctly different field. As is evidently intended to be expressed by the name, its mission is to reduce to practice the results of scientific research; to perform for the

farming community at large, and within a reasonably short space of time, what would require many years to accomplish if dependent upon individual enterprise and resources; to prove the value of new varieties; to encourage forestry; to test the value of fertilizing ingredients and soils; to disseminate agricultural information of all kinds; to encourage and direct. To this work scientific methods are necessarily applied.

The institution is achieving, in its own way, results of the greatest value to the farming community, and through it to the country at large. The Director and his assistants are deserving liberal support at the hands of Government, and more particularly at the hands of the farmers themselves.

The Birds of Quebec.

Abstract of a Popular Lecture delivered before the Natural History Society of Montreal on the 12th of March, 1891, by J. M. LeMoine, Esq., F.R.S.C.

Part I

The earliest ornithological record in Canada—I might say, possibly in America—occurs in Jacques Cartier's Voyages up the Gulf of St. Lawrence. In chapters ii, iii, vi, vii and xii of the narrative of his first voyage, in 1534, and chapter 1 of his second voyage, in 1535, as well as an entry in the log of Roberval's first pilot, Jean Alphonse, in 1542, mention is made of the myriads of gannets, gulls, guillemots, puffins, eider ducks, cormorants and other sea fowl nesting on the Bird Rocks and on the desolate isles off the Labrador coast. Jacques Cartier goes so far as to say that "the whole French navy might be freighted with these noisy denizens of that wild region without any apparent diminution in their number." (Chap. i–ii, Voyages.) Reliable modern naturalists—Dr. Henry Bryant, of Boston, visiting the Bird Rocks, in 1860, and Charles A. Cory in 1878—confirm these statements of early discoverers as to the number and species of birds to be found in the lower St.

Lawrence. The Jesuit, Le Jeune, in the "Rélations des Jésuites" for 1632, dwells on the multitudes of aquatic birds infesting *Ile aux Oies* (county of Montmagny), and frequenting the shores of our noble river. Friar Gabriel Sagard Theodat that same year furnished in his "Grand Voyage au Pays des Hurons," a list of Canadian birds. In 1636, he notices, among other things, some of the leading species, such as jay, eagle, crane, etc., and has left us a lovely piece of word-painting in his glowing description of the Humming-bird. It was too quaint, too fascinating, not to be preserved. You will find it reproduced at page 217 of my "Album du Touriste." In 1663, Pierre Boucher, governor of Three-Rivers, in an agreeably written memoir, addressed the 8th October, 1663, to Minister Colbert, depicted the birds, mammals, fishes, etc., of New France. This memoir has been recently reprinted by a lineal descendant of the learned and venerable governor, the late Edward F. (Boucher) Montizambert, in his lifetime, law clerk to the Senate of Canada, and father of Col. Charles and Dr. Frederick Montizambert of Quebec. In volume I of Baron la Hontan's "Voyages to North America," published in France in 1703, there occurs an annotated "List of the Fowls or Birds that frequent the South Countries of Canada," and also, a second "List of the Birds of the North Countries of Canada." Father Charlevoix, in 1725, devotes a few pages of his voluminous history to the Canadian fauna. Peter Kalm, the Swedish savant, the friend of Governor La Galissonière and guest at his Chateau St. Louis at Quebec, in an edition of his travels republished in London, in 1770-71, gives plates of American birds and mammals. Thomas Jefferys, geographer to H. R. H. the Prince of Wales, in an elaborate folio volume, issued in London in 1760, devoted a few pages to the birds of Canada. The year 1831 gave us Swainson and Richardson's standard work on the birds of the fir countries, "Fauna Boreali-Americana." In 1853 Hon. G. W. Allan, of Toronto, furnished a list of the land birds wintering in the neighborhood of Toronto. In 1857, a committee of Canadian naturalists, Messrs. Billings, Barns-

ton, Hall, Vennor and D'Urban founded in Montreal a monthly magazine, the *Canadian Naturalist and Geologist*, now the *Canadian Record of Science.* This valuable storehouse of many good things is still of daily reference. Three years later, in 1860, I published at Quebec, under the title "Ornithologie du Canada," in two volumes, the first French work published in Canada on Canadian birds. Professor Wm. Hincks of Toronto furnished, in 1866, a list of Canadian birds observed by Mr. Thomas McIlwraith about Hamilton. In 1868, an industrious entomologist, the Rev. Abbé Louis Provancher, started at Quebec a monthly publication, *Le Naturaliste Canadien*, which he kept up, with a legislative subsidy, for fourteen years. Canadian birds often found a corner in it, though not a large one. In 1883, Mr. C. E. Dionne, the taxidermist of the Laval University, brought out a useful volume, "Les Oiseaux du Canada." Six years later, in 1889, he supplemented it with a "Catalogue des Oiseaux de la Province de Québec." We owe to Messrs. J. A. Morden of Hyde Park, London, Ont., and W. E. Saunders, also of London, Ont., carefully prepared notes on the feathered tribes of Western Canada, whilst a Fellow of the Royal Society of Canada, Dr. J. Bernard Gilpin of Nova Scotia, drew attention to the birds of prey of his native province. In 1881, William Couper published, in Montreal, a valuable little monthly journal, *The Canadian Sportsman and Naturalist*, to which for three years our leading field naturalists and amateurs generally contributed most useful notes and observations. Amongst other valuable records, it contains Mr. Ernest T. Wintle's list of birds observed round Montreal, with discussions and correspondence over the signature of Dr. J. H. Garnier, Mr. Lett and the Rev. Vincent Clementi. In 1886, that veteran field naturalist, Thomas McIlwraith of Hamilton. Ont., published his excellent treatise, "The Birds of Ontario." The book was favorably reviewed in the *Auk* by the eminent Dr. Elliott Coües, who unhesitatingly placed Mr. McIlwraith "in the first place in his own field." I have previously dwelt on the invaluable works on the Canadian fauna by

Mr. Chamberlain, one of the founders of the American Ornithological Union Club. I would be guilty of an injustice were I to fail noticing the numerous contributions to the daily press from a keen Quebec field naturalist, John T. Neilson, who has utilized the rare facilities his outdoor occupations as land surveyor afford him, to study the bird world. Canadian ornithology is also indebted to the late Dr. T. D. Cottle for a "List of Birds found in Upper Canada," in 1859; to H. Hadfield, "Birds of Canada observed near Kingston during the Spring of 1858;" to A. Murray, "Contributions to the Natural History of the Hudson Bay Company's Territories," 1858; to Professor J. R. Willis, "List of Birds of Nova Scotia," 1858; 1870, to J. F. Whiteaves, "Notes on Canadian Birds;" 1873, to A. L. Adams, "Field and Forest Rambles, with Notes and Observations on the Natural History of Eastern Canada;" to Dr. J. H. Garnier of Lucknow, to Prof. Macoun of Ottawa, and many others. The *Bulletin of the Natural History Society of New Brunswick*, the *Transactions of the Ottawa Field Naturalists' Club* have proved useful auxiliaries to the cause of the natural sciences.

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Part II.

It would be about as easy to depict a Canadian winter, without its snow-drifts, as it were to imagine the fleecy plains and solitary uplands of Canada in winter, without their annual visitors, the Snow-bunting—better known to our youth under the appropriate name of Snowbird (*Plectrophanes Nivalis.*)

In New England it is styled the Snowflake; "it comes and goes with these beautiful crystallisations, as if itself one of them, and comes at times only less thickly. The Snow-bird is the harbinger, and sometimes the follower, of the storm. It seems to revel, to live on snow, and rejoices in the northern blast, uttering, overhead, with expanded wing, its merry call, 'preete-preete,' reserving, as travellers tell us, a sweet, pleasant song for its summer haunts, in the far north, where it builds its warm, compact nest on the ground,

or in the fissures of rocks on the coast of Greenland, &c." The Snowbird is part and parcel of Canada. It typifies the country just as much as the traditional Beaver.

Thousands of these hardy migrants, borne aloft on the breath of the March storms, come each spring, whirling round the heights of Charlesbourg, or launch their serried squadrons over the breezy uplands of the lovely isle facing Quebec—the Isle of Orleans; one islander alone last spring, to my knowledge, having snared more than one hundred dozen for the Quebec, Montreal and United States markets.

The merry, robust "Oiseau Blanc" is indeed the national bird of French Canada; it successfully inspired the lays of more than one of its native poets. In his early and poetical youth the respected historian of Canada, F. X. Garneau, found in the Snowbird a congenial subject for an ode—one of his best pieces—and the Laureate Frechette is indebted to his pindaric effusion "L'Oiseau Blanc" for a large portion of the laurel crown awarded him by the Forty Immortals of the French Academy.

With the ornithologist Minot, I am quite prepared to recognize the Snowflake as "the most picturesque of our winter birds, which often enliven an otherwise dreary scene, especially when flying, for they then seem almost like an animated storm."

There exists a great variety of color in the plumage of these birds; some, the males perhaps, are more white than the rest, some nearly all white; in others, black and a warm brown is noticeable mixed with the white.

"The black dorsal area is mixed with brown and white, the feet are black, but the bill is mostly or entirely yellowish." Though they seldom perch on trees and are not fond of thickets, but prefer the open country, I have seen flocks light more than once on large trees, elms and others, in the midst of pasture lands at St. Thomas, County of Montmagny.

The eggs, five in number, vary in their coloration, markings and size. The Sn Bunting all disappear from the neighborhood of Quebec with the middle or end of April,

and retire probably to the Arctic regions to build, though we are told that Audubon found a Snowbird's nest in the White Mountains and Maynard certifies to the presence of a flock of these birds at Mount Katahdin, in Maine, early in August, 1869.

The Snow Bunting, common to the continents of America and Europe, occurs in vast flocks in Scotland, England, Russia, and even in Siberia.

Round Quebec it comes as a regular fall and spring migrant: like the passenger pigeon its numbers have sadly decreased of late years.

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That broad-mouthed, long-winged, short-legged, dark bird, with white badges on its wings, is the Night Hawk, or Goat Sucker, *Caprimulgus*. You, no doubt, are aware why he is so persistently called Goat Sucker by naturalists; it is because he never in his life sucked a goat—never dreamed of it. It is one of those outrageous fabrications invented by ignorance, to filch a poor bird of his good name, and which *took root* only because it was oft repeated. In the days of Olaüs Magnus, Bishop of Upsal, in Sweden, few dared to doubt but that Swallows, instead of going to Senegal and the Gold Coast to spend their Christmas and Easter holidays, dived before winter into the bosom of lakes and hybernated under the ice till spring, with no gayer companions than a few meditative trout or other fish. This was an absurd theory, but which had many great names to support and prop it up. The Rev. Gilbert White, in his *History of Selborne*, eloquently demonstrated how absurd, how impossible it was that such a thing could take place.

* * * * * * * *

I must not, however, forget to point out to you that richly-dressed individual, wearing black and orange badges; that is the Baltimore Oriole. He visits chiefly the Montreal district and Western Canada. Black and orange, did I say? Why that was the official livery of a great English landowner of Maryland, in the days when democracy

amongst our neighbors was not. We have it on the authority of Alexander Wilson, no mean authority, as you know, that this brilliant July visitor took its name from Lord Baltimore, on whose estates a great number of Orioles were to be seen. The *Baltimore Oriole* is a tolerably good musician. You can see how brilliant are the colors of these Canadian birds now exhibited to you!

I think you will agree with me in saying that few countries can furnish a group of brighter ones than those now exposed to view, and composed of Canadian birds only:—Hermit Thrush, Purple Finch, Canadian Gold Finch, Wood Duck, the Golden-winged Woodpecker, or Rain Fowl; Blue Jay; Field Officer; Maryland Yellow Throat: Wax Wing; Indigo Bird; Ruby-throated Humming Bird; Scarlet Tanager; Baltimore Oriole; Meadow Lark; Pine Grosbeak; Cardinal Grosbeak; Rose-breasted Grosbeak, and Towhe Bunting.

As for song, we may safely assert, with the same Alexander Wilson, that the fauna of America can compete with that of Europe; true, we have not the Skylark nor the Blackbird, and the Robin, although very similar to him in notes and habits, is still his inferior; but we have the Wood Thrush, with its double-tongued flute notes, the Hermit Thrush, the Brown Thrush, the gingling, roystering Bobolink, the Canadian Goldfinch, whose warble reminds you of the Canary. The far-famed European Nightingale has certainly met with a worthy rival in the American Mocking Bird, whose extraordinary musical powers have been so graphically delineated by the great Audubon.

* * * * * * * *

The lecturer commended the study of Ornithology to the young people of his audience in particular, as one of elevating tendency, and, in common with other branches of natural history, calculated to make men better. Lastly, eloquent reference was made to the expediency and need of establishing a chair of zoology in connection with McGill University. The following were his closing words: "We have to admit that the study of natural history in our country has

not been prosecuted with the same vigor as have other departments of science. The outlook might be brighter. The clouds of prejudice hover above, the upas of indifference still lingers below blighting and nipping in the bud, blossoms giving promise of fair fruit. In my humble opinion, what is wanted is a well equipped National Museum worthy of the Dominion, either at Ottawa or in your prosperous, ever expanding city, with some of our millionaires to breathe into the movement the breath of life by the endowment of a chair of Zoology. Your magnificent city has taught other cities that a race of progressive generous men have taken root in the soil, alive to noble duties which the stewardship of wealth imposes. Of such may you well feel proud, on such may I rest some sanguine hopes."

Sir William Dawson, in presenting the thanks of the audience to the lecturer, which had been moved by the Hon. Senator Murphy, seconded by Mr. J. S. Shearer, completely endorsed all that he had said respecting a chair of zoology and a national museum, and hoped the day would arrive when they would be realized. The remarks of Sir William were warmly to the point and as warmly received by the audience.

The European House Sparrow, or, as it is generally called, the English Sparrow (Passer Domesticus.)

W. A. Oswald, Esq., Hill Farm, Belle Riviere, Que.

My object in presenting this paper and group of cliff swallows' nests to the Natural History Society is to show one of the many evils which the English sparrow is doing, by driving some of our most beautiful birds from the country.

The sparrow question is becoming a very serious one, when it is seen that this bird is increasing to an alarming extent throughout the whole country. Up to within the last few years it was chiefly confined to large cities, towns,

and their immediate vicinities; but now there is hardly a farm-yard or dwelling that is not visited by them during some part of the year in search of food or nesting places. Farmers and gardeners are suffering heavy losses annually from its ravages on grain, vegetables and fruit.

The English sparrow was first brought to Canada about twenty years ago. Some colonies were brought to cities in the United States a few years previous to that. These birds were carefully protected and fed for a few years, so that they multiplied rapidly.

Each pair rears two or three broods annually, and an average of four or five young in a brood. They invariably nest near the habitation of man, and, therefore, are free from such enemies as hawks, crows, shrikes, etc., that many of our native birds are exposed to in rearing their young.

Let us take for granted that there are 20,000 sparrows in the city of Montreal and its suburbs at the present time, of which half are males and half are females—which would make 10,000 pairs—and putting the progeny of a single pair at 8 or 10 young in a season, which I believe to be a low estimate, then there would be from 80,000 to 100,000 of an increase in a single season, to spread to the adjoining country, to multiply in the same way. This may serve to give a slight idea of its rapidly increasing numbers. It is hardy and seems to be able to endure the cold winters of Canada, as it does the tropical heat of Australia, and it is becoming a burdensome pest in both of these widely separated countries.

Although it has only been a short time here, yet in the vicinity of villages, flocks of several scores, and even hundreds, are sometimes seen in fields of wheat and oats, while the grain is still green and in the milk state. Besides the kernels actually eaten at this time, it does considerable damage by breaking down the stalks; but as the grain matures, however, far more damage is done by shelling and beating out the heads, so that much more is scattered on the ground and lost than is actually eaten.

Gardeners complain of its ravages on seeds and green peas, while the fruit growers suffer also from its plundering nearly all the different kinds of soft fruit,—but grapes seem to be its favorite fruit.

It has often been stated in favor of the sparrow that they destroy caterpillars, worms and the smaller insects that are injurious to trees and vegetables; but from frequent observations and dissections by experts, it has been proved that while they are young, they are fed partly on insects, but as they reach maturity, their food consists almost wholly of grain,—while it is a known fact that the food of blue-birds, white-bellied swallows, and the cliff swallows, consists entirely of caterpillars, worms, butterflies, moths, and small insects. Yet these are the first birds to be attacked and driven away from their nesting places by the English sparrow, as I stated once before in answer to a question of this kind in the Montreal *Witness*, a couple of years ago. The late Mr. F. B. Caulfield replied to this question, supporting these views.

At one time dozens, and sometimes scores, of cliff swallows' nests might be seen attached under the eaves of farm buildings, almost all joined together, as it were; yet these birds lived in perfect harmony with each other, sallying back and forth from their nests, gliding over the fields in search of food, catching butterflies, moths, and other insects; but since the English sparrow has made its appearance they have taken complete possession of their nests. Not content with one they enter into severe conflicts with adjoining swallows, breaking down their nests, and finally driving away a whole colony of swallows; and the farmer sees to his sorrow, instead of a colony of swallows living happily together with their agreeable and melodious notes, the noisy, quarrelsome sparrows, with their ceaseless, discordant, unmusical notes, making thieving excursions to his fields or barn to feast on his grain; but he never observes it attempt to make a repast on insects.

There are many others of our native birds which are valuable insect-eaters that are being driven away by the English sparrow.

We shoot all we see around the premises, but it is expensive, as there are always new arrivals, especially in the spring and summer time, during the nesting season.

As long as they are allowed to breed unmolested in villages, towns and cities, they will stock and pest the surrounding country, no matter how diligently the farmer may shoot them.

Their extermination ought to be encouraged by premiums being paid for their destruction; and in places where multitudes are congregated together, large numbers of them might be destroyed by shooting, poisoning, or trapping. Laws affording protection to the English sparrow should be repealed, and instead, parties appointed to pay a bounty on all sparrows killed, as well as on all nests and eggs destroyed, thereby helping to free the land from an evil as quickly as possible, before we lose too many of our most beautiful and useful insect-eating native birds, which are a blessing to the farmer, gardener and fruit-grower, and all who depend on them for a subsistence.

The Utica Terrane in Canada.

By Henry M. Ami, M.A., F.G.S., of the Geological Survey of Canada.

Introduction.

The following remarks on the Utica formation in Canada are put forth by the writer, not only in the hope of bringing together and recording a series of facts obtained regarding the history of this interesting formation, but also with the express purpose of arriving at some definite and decided conclusion as to the true horizon and age to which certain slates and associated strata belong, occurring in the highly disturbed and faulted regions of North-Eastern America, which have been referred to several horizons by various writers, and more recently placed in the "Quebec Group" of Sir William Logan—on palæontological, stratigraphical and lithological grounds.

To accompany this essay, or thesis, a table has been

prepared showing the distribution of species known to date from localities where the Utica occurs in Canada, together with comparative lists of species from the same formation in the United States.

H. M. A.

OTTAWA, March 28th, 1892.

THE UTICA TERRANE IN CANADA.

Historical Sketch.—Through the writings of Green, Orton, Rogers, Eaton, Mather, Conrad, Emmons, Hall, Whitfield, Walcott and others in the United States, together with those of Sir William Logan, Billings, Murray, Hunt, Dawson, Chapman, Laflamme, Nicholson and Smith in Canada, the Utica terrane has been fairly well established and defined as marking a distinct horizon or period in the series of strata constituting the Cambro-Silurian or Ordovician Epoch in North America.

Whether it is viewed from a palæontological, stratigraphical or lithological standpoint, the Utica characterizes an epoch in the evolution of this continent which may be readily recognized over wide areas.

First described by New York geologists from exposures of that formation near the town of Utica, N.Y., the *Utica* was defined as a "black and tender rock which reposes upon the Trenton limestone." By some of the early writers it was spoken of as consisting of shaly strata whose total thickness exceeded *nine hundred* feet, whilst by others the very humble, yet perhaps truer estimate, was given of "about seventy-five feet in thickness."

Stratigraphical characters and relations.—Inasmuch as the Trenton limestone is one of the most extensively developed and easily recognized terranes or horizons in America, and inasmuch as the Utica reposes directly upon it without any discordance of stratification whatever, the position of the Utica is therefore likewise easily known and ascertained. Wherever the sequence of Ordovician strata is unbroken, either by faults, foldings or denudation, from the Potsdam to the Hudson River, the presence of the Utica has been

observed,[1] its fossils recognized, its bituminous strata detected, and its position is everywhere the same between the Trenton (below) and the Hudson River (above).

The following table indicates the sequence of terranes in Canada during that portion of Palæozoic times when no break whatever occurred in the deposition of marine sediments, when life progressed and flourished in the quiet depths of the Ordovician seas or along their shores. The relative position of the Utica is herein also indicated. These Ordovician terranes are numbered from 1 to 7 in the natural order in which they were deposited :—

7. Hudson River (= Lorraine).
6. Utica.
5. Trenton.
4. Bird's Eye and Black River.
3. Chazy.
2. Calciferous.
1. Potsdam.

The remarkable continuity of the Trenton limestone, so abundant in fossil remains, and so uniform in its mode of occurrence and deposition throughout the Provinces of Quebec and Ontario in Canada, is admirably kept up in the succeeding Utica terrane, whilst the next higher terrane—the Hudson River—also presents similar characters of continuity, uniformity in sedimentation, life, and in lithological characteristics. Coming in between the Trenton and Hudson River terranes the Utica is essentially a transitional series of strata, a link in the chain of terranes above noted.

The following is a section of a portion of the lower Utica strata as they were observed on Crichton street, New Edinburgh, near Ottawa, during the excavation for waterworks purposes in 1887 :—

	Feet.	Inches.
1. Dark grey bituminous limestone band holding *Leptæna sericea*, Sowerby and other species....	0	9
2. Soft, friable, purplish black disintegrating and fossiliferous shales holding abundance of *Orthis testudinaria*, Dalman, bleached, and *Leptæna sericea*, Sowerby, and *Asaphus Canadensis*, Chapman	0	8

[1] This is true of Ontario, Quebec and New York State especially.

3. Unevenly bedded impure bituminous limestone band with *Asaphus Canadensis*, Chapman, *Orthis testudinaria*, &c.	0	7
4. Soft, friable and brittle shales, with abundance of fossil remains—*O. testudinaria, L. sericea*, &c.	0	2¾
5. Light grey band of impure limestone, bituminous, and holding *Conularia Trentonensis, Leptæna sericea, Asaphus Canadensis, O. testudinaria*, &c.	0	4
6. Thin, irregular and unevenly bedded soft friable shales which disintegrate readily, teeming with fossils which appear bleached or white on the brownish-yellow weathering grey shales holding *L. sericea* and *O. testudinaria* in abundance.	0	1½
7. Black bituminous impure limestone with *Leptæna sericea, Orthis emacerata, Asaphus Canadensis*, &c.	0	8
8 Black bituminous shales holding abundance of trilobitic remains, especially those of *Asaphus Canadensis*. Resembles that band which crops out along the Rideau River shore near the Rifle Range	1	2
9. Band of impure, highly bituminous limestone, black in colour, with irregular splintery and at times conchoidal fracture, holding remains of *Asaphus Canadensis, Endoceras proteiforme, Strophomena alternata*, Conrad	0	11
10. Black, bituminous and somewhat splintery brittle shales. Amongst the species of fossils observed there were: *Leptograptus flaccidus*, Hall, (?) *Sagenella ambigua*, Walcott, *Conularia Trentonensis, Leptæna sericea, Schizocrania filosa*, Hall, *Leptobolus insignis*, Hall, *Endoceras proteiforme*, var. *tenuistriatum, Asaphus Canadensis, Primitia Ulrichi*, Jones, &c.	0	7
	6	0¾

It would thus appear that we have shales and limestones interstratified with each other in this portion of the Utica, showing the intimate and close relationship to the underlying Trenton. A summary of the above section gives us :—

SUMMARY OF SECTION AT NEW EDINBURGH.

	FEET.	INCHES.
1. Limestone	0	9.
2. Shales	0	8.

3. Limestone	0	7
4. Shales	0	2¾
5. Limestone	0	4
6. Shales	0	1½
7. Limestone	0	8
8. Shales	1	2
9. Limestone	0	11
10. Shales	0	7
	6	0¼

Lithological characters.—The Utica terrane is essentially a *shale* formation, whence the designation "Utica shale" which numerous writers have applied to it. It is chiefly composed of shales and limestone, dark in colour and sometimes highly bituminous.

Whilst the uppermost measures of the Trenton formation are characterized by calcareous strata interstratified with shaly bands which increase in number and extent as we pass upward from the Trenton to the Utica, similarly, the lower measures of the Utica consist of shaly strata interstratified with calcareous or limestone bands, all of which are bituminous in character.

The accompanying sketch taken at New Edinburgh, Ottawa, along the right bank of the Ottawa River, shows the character of the strata at the summit of the Trenton and in the basal beds of the Utica:—

These characters of the upper Trenton and lower Utica point clearly to a subsidence which occurred towards the close of the Trenton and led to the deposition of finely divided muds and clays. The change in the nature of the sediments led to a change in the forms and characters of the fauna or life of this old Ordovician sea, so that new forms of animal life were ushered in, in these pelagic depths, which will be discussed later on.

The presence of many of these organic forms led to considerable change in the character of the strata as we find them at the present day. Graptolites and trilobites in great abundance characterize the Utica, and the shales are highly impregnated with bituminous materials from

which petroleum and oils can be extracted, but scarcely yet with sufficient readiness and cheapness to warrant the utilizing of these shales for economic purposes.

The shales of the Utica are for the most part soft dark-brown or black, brittle, earthy and bituminous. From the exposures of this formation as far east as Murray Bay, Que., along the north shore of the St. Lawrence in the vicinity and under the waters of Lake St. Peter; at Montreal, Lacolle, Clarenceville; and again between Lake Ontario (Whitby) and Collingwood Bay, near Collingwood, as also along the capes and bays of the great Manitoulin and other islands in the northern portion of Lake Huron, the shaly strata of the Utica are very similar throughout and the characters very closely related.

In certain areas they are more or less calcareous, at times they are highly argillaceous. The presence of volcanic and intrusive masses about Montreal, and in the Eastern Townships of Quebec, has considerably altered and hardened the Utica of that region, which is, as a rule, highly calcareous.

Chemical characters.—In the "Geology of Canada," 1863, Sir William Logan has given a number of interesting chemical analyses of the Utica shales or "pyroschists," as they are called, which were made by Messrs. Chandler and Kimball for Prof. Whitney, and were published in the "Geol. of Wisconsin," Vol. I, p. 184.

The five analyses there given are here inserted, as they serve to show clearly the chemical composition of these shales or pyroschists from various localities. They are as follows:—

"I. is a blackish-brown, very fine-grained rock, from Cape Smith, Lake Huron. It has a somewhat conchoidal fracture, is not schistose in its structure, and contains no traces of fossils. II. is from an Island north of Maple Cape, and is blackish-brown, fine-grained, and earthy in texture, with a laminated structure, and contains no fossils. III. is from Ste. Anne, Montmorenci, and is dark-brown, shaly, and contains graptolites. IV. is from Gloucester, and is a

black shale filled with fragments of trilobites and crinoids. In these analyses the carbonates of lime and magnesia, with the alumina and oxide of iron, were removed by solution in acids, and the elements of the organic matter determined in the insoluble portion.

	I.	II.	III.	IV.	V.
Clay and sand.....	38·45	34·60	37·26	48·27	73.57
Carbon.....	6·83	6·63	·61	6·99	15·08
Hydrogen.....	·74	·77	·83	1·13	1·65
Oxygen.....	3·20	2·96	1·71	3·39	5·39
Carbonate of lime.....	45·02	49·31	52 60	20 30	1·29
Carbonate of magnesia...	2·09	2·53	3·42	11·48	·76
Alumina and oxide of iron.	2·16	2·09	3·29	7·99	2·79
	98·49	98·89	99·72	99·55	100·48

"The analysis V in the above table is that of a pyroschist from this formation, in the lead region of Wisconsin."

The first *four* analyses are made from Canadian specimens, and give us a sufficiently typical series from remote outcrops of the Utica terrane, from which the lithological and chemical characters of the rock may be ascertained.

Mineralogical characters.—The minerals which characterize the Utica are not numerous, but it may be stated here that *iron pyrites* is tolerably abundant in the middle beds of the Utica, about Ottawa where it occurs in masses from the size of a man's fist to smaller dimensions, and often replacing entirely or simply coating organic remains, such as orthoceratites, trilobites, graptolites and sponges.

Strontianite has also been observed, determined and recorded by Dr. B. J. Harrington from the Utica shales of St. Helen's Island, opposite Montreal, Que.

Selenite.—A variety of gypsum occurs in fine scales or flakes either coating organic remains or between divisional planes of stratification as a secondary product of the decomposition of iron pyrites.

The Utica, except in its lowest measures, does not afford any building stone of any consequence.

A few of its calcareous strata, close to the base of the formation, might be utilized for building purposes, but they

are usually too thin or nodular and easily disintegrating to be of any commercial value.

Some bands, however, are magnesian and calcareous and break with a conchoidal fracture. These might very reasonably prove to be useful for cement or hydraulic purposes.

The bituminous character of the shales of this terrane induced a company to start operations at the village of Windsor, near Collingwood, Ont., for the purpose of extracting oil (petroleum) from these shales, but the process proved too costly and the work was abandoned. The shales used are reported to have contained an average of 8 per cent. of petroleum. The specimens collected by Mr. A. S. Cochrane, C.E., at the works, showed the shales to be highly fossiliferous.

The basal beds of the Utica have been described as consisting of interstratified bands of limestones and shales which gradually pass upward into shales exclusively as the middle portion of the terrane is reached. These middle beds consist for the most part of shales, dark-brown weathering and black along a fresh fracture, which become more or less compact in certain places, whilst many beds have a decided conchoidal fracture. They are rich in graptolites and trilobites, especially of the genera *Lepto graptus* and *Triarthrus* respectively. The uppermost beds of the Utica, so far as they are known to the writer, show a strong tendency to become argillaceous and magnesian, especially in the Ottawa Palæozoic Basin. They consist of very thin and fissile, soft argillaceous shales, evenly bedded and rather destitute of fossils. They pass upward into the Hudson shales and strata whose lower measures are highly magnesian, as can be seen from the bright buff weathering character of the Hudson River rocks along the line of the Canada Atlantic Railway, near Ottawa and elsewhere.

The total thickness of the three subdivisions of the Utica, thus differentiated on lithological as well as other grounds, has nowhere been seen by the writer to exceed one hundred feet, but is usually much less.

Palæontological characters.—The Utica formation along the whole line of its outcrop in Canada may be said to be for the most part highly fossiliferous. This is especially true of the lower and middle portions of this terrane, *i.e.*, of those portions which are more calcareous than the upper series of strata. In the "Palæontology of Ontario," 1874, by Prof. A. H. Nicholson, that writer describes and records *eleven* species of fossils as constituting the fauna of this period in Cambro-Silurian times. In 1882, when the writer joined the Geological Survey staff, there were then exhibited in the cases of the museum some twelve species of fossils representing the then known fauna of the Utica.

By dint of collecting and gathering together the material which was in the possession of the Geological Survey of Canada, determining the same, and of losing no opportunity of collecting himself wherever the Utica formation was known or seen, the writer has been able to bring together an assemblage of upwards of sixty forms which marks a special horizon in Ordovician times and differentiates itself from the Trenton and Hudson River terranes. The fossils which are found entombed in the shales and limestones of this formation are often exceedingly well preserved, and being very abundant afford an excellent opportunity of studying the fragments or separate portions of individuals which are usually seen along the divisional planes of stratification in such vast numbers.

Just as the lithological characters of the Utica show a decided resemblance and similarity to the underlying Trenton and overlying Hudson River, so also the fossil remains of the Utica towards the base of that terrane show a decided affinity and close relationship to the Trenton *facies*, and towards the summit to the newer Hudson River fossils. In fact, we find that just as there are passage beds, or transitional strata, between the Trenton and Utica, and also between the Utica and Hudson River, so also do we find a number of species of fossils which pass upwards or are common to the three formations.

The following table has been prepared to show the

different species which have, so far, been recognized in Canada by the writer as common to the Utica and Trenton and to the Utica and Hudson River, pointing out, besides, the forms common to the Trenton and Hudson River terranes:—

TABLE SHOWING THE SPECIES OF FOSSIL REMAINS COMMON TO THE TRENTON AND UTICA, TO THE UTICA AND HUDSON RIVER, &c.

	GENERA AND SPECIES.	Trenton.	Utica.	Hudson Riv.
1..	*Monotrypa undulata*, Nicholson	*	·	*
2..	*Discina Pelopea*, Billings	*	*	·
3..	*Lingula quadrata*, Eichwald	*	*	·
4..	*Leptæna sericea*, Sowerby	*	*	*
5..	*Strophomena alternata*, Conrad	*	*	*
6..	*Orthis testudinaria*, Dalman	*	*	*
7..	*Platystrophia biforata*, v. *lynx*, Eichwald	*	*	*
8..	*Orthis emacerata*, Hall	*	·	·
9..	*Zygospira Headi*, Billings	·	*	*
10..	" *modesta*, Say	·	*	*
11..	*Anazyga recurirrostra*, Hall	*	*	·
12..	*Rhynchonella increbescens*, Hall	*	*	·
13..	*Serpulites dissolutus*, Billings	*	*	·
14..	*Modiolopsis modiolaria*, Conrad	·	*	*
15..	*Orthodesma parallelum*, Hall	·	*	*
16..	*Pterinea insucta*, Conrad	·	*	*
17..	" *Trentonensis*, Conrad	*	*	·
18..	*Conularia Trentonensis*, Hall	*	*	·
19..	*Bellerophon bilobatus*, Sowerby	*	*	*
20..	*Plunotomaria subconica*, Hall	·	*	*
21..	*Murchisonia Milleri*, Hall	*	*	·
22..	*Endoceras proteiforme*, Hall	*	*	*
23..	*Asaphus platycephalus*, Stotts	*	*	*
24..	*Triarthrus Becki*, Green	·	*	*
		17	22	15
		In common.		
		15		13

The palæontological characters of the Utica are exceed-

ingly varied, the forms of life entombed in its strata belonging to almost all the classes of the Palæozoic fossils. No evidence of plant or fucoidal remains has been detected in the Utica of Canada.

The mode of preservation of the fossil remains is similar to the manner in which most fossils are preserved in shales or finely divided clays and sands throughout palæozoic strata. The calcareous portions of the shells of brachiopoda, lamellibranchiata and cephalopoda, are preserved as such, but iron pyrites often replaces the lime, whilst the chitinous structure of crustaceans, graptolites, etc., is also replaced by iron pyrites in numerous instances.

Amongst the most characteristic species which distinguish this terrane from others, we find that *trilobites* play no unimportant part. In the lower half of the formation *Asaphus Canadensis*, Chapman—which may probably be identical with Hall's A. *latimarginatus* described in 1847—may be said to be very abundant indeed. Thousands of fragments of different sized individuals occur, which, when restored, would form individuals ranging from one inch to ten inches and more in length. The genus Triarthrus is also most characteristic of the Utica. In Canada the following forms occur: *T. Becki*, Green, *T. glaber*, Billings, *T. Canadensis*, Smith, and *T. spinosus*, Billings. Embryonic forms of this genus are very abundant in certain portions of the middle Utica about Ottawa, and a suite of specimens has been obtained, with few exceptions, similar to that obtained by Prof. Walcott, of the U. S. Geol. Survey, who has so admirably described the Utica of the United States and illustrated *Triarthrus Becki* in his "Utica and related formation" published in 1879.

Triarthrus glaber is characteristic of the Utica outlier in the Lake St. John region, Quebec, whilst *T. Canadensis*, with its peculiar genal angle produced into a prominent spine on each side of the head, is most abundant in the Utica shales of the islands in the northern portion of Lake Huron, such as the islands north of Maple Cape, &c.

Triarthrus spinosus occurs intimately associated with

T. Becki in the Utica of the Ottawa Palæozoic Basin, in the County of Carleton. It was armed with numerous spines both on its head and body, besides tubercles or blunted spines on the occipital segment and on the pygidium.

Besides these trilobites vast numbers of the remains of *Ceraurus pleurexanthemus* occur in the shaly strata which crop out south of Rochesterville, Ottawa, between that village and Carling Lake. This form occurs here associated with *Asaphus Canadensis* and *Triarthrus Becki*, Green. In the calcareous bands of Montmorenci, Pointe aux Trembles, Ottawa, Whitby and Collingwood *Calymene senaria* occurs in tolerable abundance, but usually in detached fragments, the cephalon and pygidium only, being usually preserved. Amongst the cephalopoda, may be mentioned shells of *Endoceras proteiforme* showing the large size and tapering character of the *endosiphon* as it is flanked all around and on each side of the septate or camerate portion of the shell. Individual specimens of this species have been found in the Utica of Gloucester and Ottawa whose probable length, when perfect, was not less than six feet. Thousands of small orthoceratites usually referred to the genus Endoceras :—E. *proteiforme*, *var tenuistriatum*, etc., etc., are also found throughout the Utica from Murray Bay and Lake St. John to Whitby and the islands north of the Great Manitoulin Island.

These individuals resemble closely the form described by Professor Hall as *O. lamellosum*, and as they are found appear to be true representatives of the genus Orthoceras. The shell in the younger examples must have been exceedingly delicate and thin from the mode of preservation.

These Orthoceratites are pre-eminently characteristic of the Utica.

The Glossophora or Gasteropoda are not numerous but interesting. As a rule they are crushed and preserved as casts. In a few instances the lines of growth and sculpture is shown with considerable precision.

Amongst the Lamellibranchiata we find such genera

as Pterinea and Modiolopsis represented. *Pterinea insueta*, Conrad, young individuals or a variety of the type species, also *Modiolopsis modiolaris*, Conrad, occur in tolerable abundance, but *Lyrodesma pulchellum*, Emmons, may be said to be the commonest and most characteristic of this class in the Utica terrane.

Of the brachiopoda—*Leptaena sericea*, Sowerby, *Orthis testudinaria*, Dalman, and *Strophomena alternata*, Conrad, are found in the lower Utica shales almost everywhere; but one of the most characteristic forms of this interesting class is the minute, though abundant, *Leptobolus insignis* of Hall.

Billings had observed its presence in the Montmorenci section and referred to it as a small *Discina*. On a small slab—the size of one's hand—there may be counted sometimes as many as twelve individuals—all in a tolerably good state of preservation—and presenting the characters of the genus remarkably well At Murray Bay, Lake St. John, Montmorency—around Quebec, at Montreal, Ottawa, Gloucester, Whitby, Collingwood, etc., this form occurs in almost every collection made and serves as a very good indicator of the presence of the Utica. Small individuals of *Zygospira modesta*, Say, are also very characteristic and intimately associated with the previously mentioned species. The Utica representatives of this species are rather diminutive, some individuals being scarcely more than one or two millimetres in length, and indicate or present the protegulum very markedly in such nepionic forms as we find especially about Ottawa.

Amongst the most interesting of the brachiopoda however, *Siphonotreta Scotica*, Davidson, marks a very interesting horizon. One single individual of this species, alone, was found by the writer amongst the numerous collections of brachiopoda gathered together by the late Mr. Billings. To Mr. J. W. H. Watts, of the Ottawa Field Naturalists' Club, and to Mr. Whiteaves is due the honour of discovering and making known this beautifully ornamented and setate tretenterate brachiopod. In a paper prepared by the writer and read in the winter of 1887, entitled: "*Notes on and the*

precise Geological horizon of Siphonotreta Scotica, Davidson." I had occasion to note the exact band from which this interesting fossil came and gave a list of sixteen other species which were found associated therewith. Since then I have had the good fortune to obtain additional forms, associated with which is the *Turrilepas Canadensis*, Woodward—described by Dr. Henry Woodward in the "Geol. Mag. No. 300, Dec. 3," vol. vi. p. 271 (1889.)

The following is a list of the species occurring in the 'Siphonotreta band" along the bank of the Rideau River, opposite the Rifle Range, Ottawa :—

1. *Batostomella erratica*, Ulrich.
2. *Lingula curta*, Hall.
3. " *elongata*, Hall.
4. " *quadrata*, Eichwald.
   (? = *L. Cincinnatiensis*, Hall and Whitfield.)
5. *Leptæna sericea*, Sowerby.
6. *Strophomena alternata*, Conrad.
7. *Orthis testudinaria*, Dalman.
8. *Zygospira Headi*, Billings.
9. " " var.
10. " *modesta*, Say.
11. *Conularia Trentonensis*, Hall.
12. *Leperditia cylindrica*, Hall.
13. *Beyrichia oculifera*, Hall.
14. *Asaphus Canadensis*, Hall.
15. " *platycephalus*, Stone.
    vel. *A. megistos*, Locke.
16. *Calymene senaria*, Conrad.

The above sixteen species all occur in the one band, from nine inches to one foot in thickness, associated with (17) *Siphonotreta Scotica*, Davidson, and (18) *Turrilepas Canadensis*, Woodward.

The Lingulæ are eminently characteristic, especially *Lingula Progne* and *L. curta*, the former of which is abundant almost everywhere the Utica shales holding *Asaphus Canadensis* occur.

The monticuliporidæ and Bryozoa generally have afforded but little material as yet. *Batostomella erratica*, Ulrich, has been recognized and identified by Prof. E. O.

Ulrich, of Newport, Ky., U.S.A., whilst an obscure form allied to Arthronema occurs in certain shaly strata of Rideau Ward, Ottawa. The GRAPTOLITES are eminently characteristic of the Utica. The most common species is the *Orthograptus quadrimucronatus*, Hall, which is found almost invariably in all collections of the Utica. Then *Leptograptus flaccidus* comes next. With the graceful and slender curving stipes of the polypary the surfaces of many slabs of Utica shale are literally covered. Another species of this genus, *Lept. annectans*, Walcott, has been found in one or two localities. The genus *Climacograptus* has also one representative at least, and *that* a form closely related to C. Scharenbergi, Lapworth, or *C. teretiusculus*, Hisinger. Considerable difficulty has been met in identifying this Climacograptus, and especially on account of the fact that the earlier types and descriptions in many instances included several forms quite separate and distinct in structure, whose affinities have yet to be discussed and characters ascertained. Several small specimens of a diprionidian graptolite occurs abundantly in the Utica shales of Collingwood, Whitby, Ottawa, Montreal, &c., and is usually referred to the ubiquitous *Diplograptus pristis*, Hisinger. *Reteograptus* (?) *Eucharis*, Hall, another curious and interesting form, whose relations and affinities are still obscure, has been met with at Montreal in the Utica of St. Helen's Island, and resembling closely the forms from the typical locality Lake St. John basin.

The obscure parasitic hydroid ? *Sagenella ambigua*, Walcott, has been detected on the shells of several orthoceratites, but the identification of this form is very dubious.

Referring to parasites, a small *Cornulites*, *C. immaturum*, Hall, has also been found in the Utica of Montreal by Mr. Thos. Curry amongst the *débris* hauled up from the bottom of the harbour whilst the excavations were going on for the 28-foot channel. The material there obtained has kindly been placed at my disposal by Sir William Dawson, and amongst the forms detected the last mentioned proved to be

an interesting addition to the fauna of the Utica. *Serpulites dissolutus*, Billings, has also been found in several localities.

A fossil sponge—*Stephanella sancta*, Hinde, has recently been described from the Utica shales of Ottawa in the Geol. Mag., new series, Dec. III, vol. viii, No. 1, for January, 1891, pp. 22-24, in a paper entitled : " *Notes on a new Fossil Sponge from the Utica shale formation* (*Ordovician*) *at Ottawa, Canada.*" This sponge proved to constitute a new and very simple type of a Lithistid sponge—whose spicules resemble closely those of the modern *Tethæa*—many specimens of which occur in the Post-Tertiary clays of the Ottawa and St. Lawrence river basins.

GEOGRAPHICAL DISTRIBUTION.—Having glanced at the stratigraphical relations of the Utica terrane and at its lithological as well as chemical constituents, then surveyed over in a general way the palæontological characters, let us look for a moment at the geographical distribution of the same in Canada.

In the Province of Quebec, the Utica is first met in the East in loose blocks and specimens brought up on the north shore of the Island of Anticosti by floating ice. There is scarcely any doubt that the Utica shales occur in their proper and natural position between the Trenton and Hudson River terranes—in the unbroken and fine sequence of Ordovician strata northwest of Anticosti—and that on account of their soft, brittle and easily denuded character they have been washed and carried away from that section now occupied by the north channel of the St. Lawrence River. But the most easterly outcrop of the Utica as yet recorded *in situ* occurs near the mouth of the Murray River, Murray Bay—where Mr. W. F. Ferrier made an interesting collection of fossils which were determined and described by the writer in the " Can. Record of Science " for 1887, pp. 101-107. The paper is entitled : " *Notes on Fossils from the Utica Formation at Point-à-Pic, Murray River, Murray Bay* (*Que.*), *Canada.*" In this paper twelve species of fossils were noted, as follows :—

1. *Diplograptus* sp. (resembling *D. pristis*, Hisinger.) . . .

2. *Pachydictya* sp.
3. *Leptobolus insignis*, Hall.
4. *Siphonotreta* sp.
5. *Leptæna sericea*, Sowerby.
6. *Orthis testudinaria*, Dalman.
7. *Trocholites ammonius*, Conrad.
8. *Endoceras proteiforme*, Hall.
9. *Triarthrus* sp.
10. *Calymene senaria*, Conrad.
11. *Leperditia* (*Primitia*) *cylindrica*, Hall.
12. " probably n. sp.

The Utica terrane occupies a more or less narrow and continuous belt along the north shore of the St. Lawrence from Cape Tourmente below Quebec, to Montreal, whence the belt trends to the south and is seen in the neighbourhood of Lacolle, Clarenceville, etc.—then crossing the boundary line—rounding the edge of or skirting the Adirondack range—to reappear north of Lake Ontario at and in the vicinity of Whitby—it crosses the Province to Collingwood where it again disappears beneath the waters of the Georgian Bay and continuing north and west strikes numerous points, capes and islands about the great Manitoulin Island dying out to the west and overlaid by newer and overlying formations.

In the vicinity of Quebec the Utica terrane is met at several localities. Characteristic species were collected by Rev. Prof. Laflamme, Mr. St. Cyr, Mr. T. C. Weston, Dr. Ells and the writer within recent years, at Montmorenci, Beauport, St. Charles River Flats, Charlesbourg, half-mile west of Charlesbourg, at Grondines, Pointe aux Trembles and Cape Santé, and also across the river at St. Antoine [de Tilly] interesting collections were made.

At Montmorenci Falls, near the bottom of the falls and ravine the following characteristic Utica fossils were collected and detected by the writer and Dr. Ells:—

1. *Orthograptus quadrimucronatus*, Hall.
2. *Diplograptus* sp.
3. *Climacograptus* sp.
4. *Reteograptus ? Eucharis*, Hall.

5. *Lingula curta*, Hall.
6. *Leptobolus insignis*, Hall.
7. *Leptæna sericea*, Sowerby.
8. *Triarthrus Becki ?* Green.

Near the mouth of the Montmorenci River—close to the Railway Bridge—the following species occur :—

1. *Diplograptus* sp. indt.
2. *Climacograptus* sp.
3. *Orthograptus quadrimucronatus*, Hall.
4. *Leptobolus insignis*, Hall.
5. *Endoceras proteiforme*, Hall.
6. *Triarthrus Becki*, Green.

Along the Beauport shore the following species were obtained by Mr. D. N. St. Cyr, a devoted and zealous naturalist at the Museum of the Department of Public Instruction, Quebec :

1. *Schizocrania filosa*, Hall.
2. *Leptæna sericea*, Sowerby.
3. *Lyrodesma pulchellum*, Emmons.
4. *Endoceras proteiforme*, Hall.
5. *Asaphus Canadensis*, Chapman.

At Charlesbourg village—along the road from Quebec to Charlesbourg and a few yards south of the church—the following forms were collected by Dr. W. Ells, Prof. Laflamme and the writer, in light coloured, calcareous shales :—

1. *Leptograptus flaccidus*, Hall.
2. *Strophomena or Rafinesquina* sp.
3. *Leperditia cylindrica*. Hall.
4. *Triarthrus Becki*, Green.

But along a brook—about one mile west of Charlesbourg village, on the road to Lorette, the black bituminous shales of the Utica are seen to crop out and afforded the following characteristic forms :—

1. *Orthograptus quadrimucronatus*, Hall.
2. *Climacograptus* sp.
3. *Leptobolus insignis*, Hall.

All these are typical Utica fossils.

(*To be continued.*)

Annual Presidential Address.

NATURAL HISTORY SOCIETY, 1892.

The duty of delivering what is called the Presidential Address falls this year on probably the most useless President that has ever had the honour conferred on him of sitting in the Presidential Chair of the Natural History Society of Montreal.

The fault however is not wholly mine, if indeed any real blame can be attached to my name in connection with the office.

No Natural History Society has as yet discovered a natural law, or even traces of a natural law whereby the grandest object of Nature, Man, can plead with sickness the positive urgency of Presidential position, and thereby obtain a six months lease of steady health.

For close on three months out of the six active months of this Society's work I was an "ailing man," barely able to fulfil the necessary duties of my profession, and wholly unable to fulfil any of the duties that fell to my lot as President of this or other Societies.

I also told the gentlemen who urged me strongly to accept the position that my professional duties were of that nature that no outside appointment could stand in the way of, clergymen as well as doctors being subject to sudden and pressing calls before which everything must give way.

Hence apart from ill health I have been forced to refrain from duties that in themselves would have proved a pleasure. Not because I loved the Natural History Society less, but because I loved my profession more.

With these words of apology, and direct warning as to future presidential elections; I would proceed with my address, carrying with me, I trust the good natured pardon or sympathy of the officers and members of this Society.

With regard to the working of the Society for the year I have but little to say, as the reports of the council about

to be read, taken with those of the curator, editing committee and librarian, furnish in a direct and forcible manner the facts connected with another year of this Society's progress.

There is no question that this Society has connected with it some singularly active members, that its aims are ever good; and that its influence is sufficient to arouse a prophetic spirit in its most faithful members as to the possibilities of its future.

If some of those large hearted and public spirited gentlemen, whose boundless munificence is fast making our city a magnificent educational centre, would only place the Natural History Society on their list of educational institutions worthy of being enquired into as a possible future field for their liberality, the higher educational influences of the city would unquestionably receive a much needed and admirable addition.

The true destiny of a society such as this should be that of centreing within its field of operation those *aids* to study which would illustrate to the eye and ear and mind of the hundreds of students who throng our colleges and schools, the direct instruction of their scientific and literary teachers, and which would also constantly create a desire in the minds of others who are not students, to seek to improve themselves through the impetus to study which a well equipped Natural History Society would hold out to them. Our aims as I said are admirable, namely "the study of Natural History, General Science and Literature" but none I fancy would claim that the work of the Society has ever permanently reached the aims set forth in our act of incorporation. The record made by the Society since its foundation has been in every way creditable and fully up to the limit of its financial opportunity; but whilst other educational institutions once weak and ineffective, have been developing with rapidity their original aims, and gathering about them the well earned lustre which ever comes from increasing success, our society can scarcely claim a proportionate advancement, as the "Sure yet Silent Years pass on."

We are a "Natural History Society," and up to the limit of our opportunity I hold a successful one, but we were created just as much a Society for the Study of General Science, as a Society for the Study of General Literature; and as far as my knowledge goes both these latter aims can scarcely be claimed as forming part of our corporate active life and existence.

And yet our city abounds with scattered societies many of them private, others semi-public and others public; which have started into existence to meet what their members considered positive, scientific and literary needs and that wholly apart from the Natural History Society incorporated for the very purpose of seeing those needs supplied.

One could easily understand this if our city were the size of London or New York, but with a population such as ours it does seem a pity that scattered societies should positively be doing the work that our act of incorporation has created us to do, and are doing it wholly apart from our society, and in some cases without the slightest knowledge that such work forms part of the work that our society was incorporated to perform.

Of course such a fulfilment of original aims, demands an expenditure far beyond our present income, and an expenditure that would not be just or business-like under the present conditions of our life. But there is no condition of life in this busy world of progress that cannot be improved, and it does seem to me that the time has come when this honored society should emerge from the almost "Classic Shades" of its existence, into that bustling life of educational competition which working out its destiny in the public arena "on which ten thousand eyes are fixed" has already in connection with other institutions caught the attention, rivetted the thought, and won the noble gifts of noble hearted and generous men, who regard the educational improvement of a country as all important, and have proved their regard by acts of princely munificence. But then these institutions were always "in evidence" before the

public, ever stating their needs, ever enlarging their needs, ever holding out hands to catch the drops that heaven might send them, until at last importunity, the reward of just demands prevailed, and the golden shower poured down to feed the thirsty ground. In this busy competitive age, next in value to existence itself is that of giving evidence —ceaseless, untiring evidence, of your existence.

No one standing to-day on the steps of the original McGill College remembering what it was 25 years ago and seeing what it is to-day can fail to realize the inestimable value of keeping the needs of an educational institution clearly and distinctly before the public. Admit as Montreal may gratefully and proudly do, the force and power that McGill has gathered to itself through its right to claim as its presiding genius such a brilliant world-known guide as Sir William Dawson, admit to the full the magnificent staff which in all the branches of the University group themselves around him; —all such admissions do not fully explain the phenomenal success of the institution for much of it must in fairness be explained by the fact that McGill *has aimed high*, and has ceaselessly and with dogged persistency kept its aims before the public.

Now the Natural History Society is an educational Society or it is nothing, and it ought to be righteously within the admitted field of "higher education," otherwise it has largely failed in reaching the object of its existence.

If one in this prosaic age might indulge in "day dreams" my dream as to the future of this Society would be something like this. A building worthy of Montreal as the Great Educational Centre of Quebec, and the Provinces, suited to the educational spirit of the times in which we live, and sufficiently large to gather under its roof in generous affiliation all the leading literary and scientific societies of our city which now are leading independent lives. A free library for study and reference, in connection with the three fold objects of our existenee—Natural History, General Science and Literature,—ample room for private study—every inducement held out to the students of our Colleges.

and the young life of our city to avail themselves of the privileges open to them. A museum that for teacher, student and enquirer alike would prove its worth as years roll on. Courses of free class lectures on Natural History, General Science and Literature by competent lecturers and Certificates of honorable proficiency for those who attending them earn by examination the just reward of their labors. Free popular lectures that might act as incentives to lure the young to higher and closer studies, and last though by no means least—a governing body, large, comprehensive and broad minded in its views; full of zeal and energy in grasping new ideas and fresh born thoughts, and realizing to the full that they have a great public educational work to do, and that the leading recipe for obtaining their aims is that of ceaselessly and with dogged persistency keeping the Natural History Society of Montreal before the public.

I know that such a scheme may fairly be regarded as visionary—but the world owes not a little to visionaries, and in this case the original visionaries were the honored founders of the Natural History Society itself. They founded a Society for the cultivation of Natural History, General Science, and Literature, and we to-day are the representatives of these high original aims. We can hold them in safe keeping and pass them on like the "whispered traditions of the hoary past" to those that will come after us, or we can grasp them with that touch of daring enterprise, which is largely characteristic of the age in which we live, and facing the public with claims as loudly lettered as those of less useful institutions, seek to gain our share of that munificent liberality for which our city is fast becoming renowned.

I am sure that you will pardon one for thus speaking on the aims and possibilities of a Society for which he has been enabled to do so little, and in whose work he has taken so small a part. But the fault has been yours, gentlemen, for it was you who placed me in the position to quote these words with which as the "Shadow of a Shade" of a Ghost

like President, I close this address,—and the words are these :

" Aim high
" For most aim low and fail.
" Aim as thy Fathers aimed
" Who won the vantage ground thou standest on."

Proceedings of the Natural History Society.

Montreal, March 28th, 1892.

The fifth monthly meeting was held this evening, the Very Rev. Dean Carmichael, President, in the chair.

The minutes of meeting of Feby 29th were read and approved.

Minutes of council meeting of March 21st were read.

The Librarian reported the following donations to the Library :—From Sir Wm Dawson, " Notes on Parka decipens ;" from American Book Company, " Laboratory Manual of Chemistry ;" and usual exchanges.

Moved by the Rev. Dr. Campbell, and seconded by J. S. Shearer; that the thanks of the Society be accorded the donors of the above books.

Moved by E. T. Chambers, seconded by F. D. Adams, and resolved, that the members of the Natural History Society desire to express their sorrow at the death of Mr. F. B. Caulfield, and their sincere sympathy with his widow and family in their bereavement. They also wish to put on record their sense of the valuable services he has in so many ways rendered to the Society, especially by the valuable papers he has contributed to their publications, and the great interest taken by him in the zoological collection.

It was moved by James Gardner, seconded by F. D. Adams that the rule requiring balloting be suspended, and M. Monongahela de Beaujeu be elected an ordinary member.

Mr. F. D. Adams read an obituary notice with notes of the scientific work of Dr. T. Sterry Hunt.

Moved by Sir W. Dawson, seconded by J. S. Shearer, That the obituary of the late Dr. T. Sterry Hunt, LL.D., F.R.S., read at this meeting be published in the RECORD OF SCIENCE, as a memorial of its distinguished subject and as a testimony of their regard for him as one of the most eminent of the members and officers of this Society, and one whose labours shed so much lustre on Canadian Science.

Moved by Sir W. Dawson, seconded by the Rev. Dr. Campbell, that J. S. Shearer, J. S. Brown, James Gardner and A. F. Winn be appointed a committee to arrange for providing some help for Mr. Caulfield's family.

A paper on the European house sparrow by W. A. Oswald of Belle Riviere, Que., was read.

Proposed by Sir W. Dawson, seconded by the Rev. Dr. Campbell the thanks of the Society be given to Mr. Oswald for his paper. Carried.

MONTREAL, April 25th, 1892.

The sixth monthly meeting was held this evening, John S. Shearer, Vice-President, in the chair.

Minutes of last meeting (March 28th) were read and approved.

The Librarian reported the usual exchanges, with the Smithsonian reports and Illustrations of Grasses of North America, from the Department of Agriculture, Washington.

To the Museum, from H. J. Tiffin, a lead from a corner stone of a building bearing date 1751.

Moved by J. S. Brown, seconded by Mr. Joseph that the thanks of the Society be sent Mr. Tiffin for his valuable donation. Carried.

Moved by Mr. E. Judge, seconded by Mr. G. Sumner that the Very Rev. Dean Carmichael be appointed delegate to the meeting of the Royal Society at Ottawa May 31st. Carried.

J. S. Shearer, Dr. Stirling, and R. W. McLachlan were appointed auditors.

It was moved by J. Gardner, seconded by J. S. Brown

that the rules be suspended and the following be elected members by acclamation. Carried.

L. Huot proposed by J. S. Shearer seconded by J. Gardner and E. D. Wintle proposed by A. Inglis seconded by J. Gardner.

Moved by J. S. Brown, seconded by G. Sumner that the invitation of the Hon. J. K. Ward to hold the next field day at the Riviere Rouge be accepted. Carried.

Capt. R. C. Adams gave a paper on the "Mineral resources of the Kootenay District" Moved by E. Judge, seconded by J. S. Brown that the thanks of the Society be accorded Capt. Adams for his valuable lecture.

MONTREAL, May 30th, 1892.

The Annual Meeting was held this evening, the Very Revd. Dean Carmichael, President, in the Chair.

The Minutes of last Annual Meeting were read and approved.

Mr. Shearer on behalf of the Field Day Committee reported that all had been arranged with the Hon. J. K. Ward and the C. P. R. for the excursion to Rivière Rouge.

Mr. Brown, Hon. Curator, reported that two cases of Birds had been donated to the Museum by Mr. H. J. Tiffin.

Proposed by Mr. Brown, seconded by Hon. Senator Murphy, that the thanks of the Society be sent to the donor.

On the suggestion of Sir W. Dawson, the delegates to the Convention of the Dominion Educational Association to be held in Montreal in July were invited to visit the Museum of the Society.

Mr. J. S. Brown suggested that the title of the Record be altered so as to read, The Canadian Record of Science, the Journal of the Natural History Society of Montreal.

Referred to the Editing Committee.

The President then delivered his annual address in which he referred to the various objects for which the Society was established.

Mr. J. S. Shearer, Chairman of Council read the report of Council.

Mr. James Gardner, Hon. Treasurer reported the total disbursements of $2248.95, and the receipts $2489.93, leaving a balance on hand of $240.98.

Mr. J. S. Brown, Hon. Curator, reported on the state of the Museum, noting a large increase in the number of visitors during the last year.

Mr. E. T. Chambers, Hon. Librarian, gave the report of Library Committee, showing a number of standard works added by purchase to the library during the year.

In the absence of Dr. T. Wesley Mills, the report of the Editing Committee was read by the Revd. Dr. Campbell.

Proposed by J. S. Shearer, seconded by the Revd. Dr. Smyth, that the reports just read be received, adopted and printed in the "Record."

Mr. Gardner and Mr. Winn were appointed scrutiners, and the election of officers was proceeded with.

Sir William Dawson was elected Hon. President on motion of Hon. Senator Murphy, seconded by Judge Wurtele.

Moved by Revd. Dr. Smyth and seconded by J. H. Joseph, that the Very Revd. Dean Carmichael be elected President.

Moved by J. H. Joseph, seconded by Hon. Senator Murphy, that Dr. T. Wesley Mills, be 1st Vice-President.

The following were on motion elected Vice-Presidents:

Vice-Presidents:—Hon. Senator Murphy, J. H. R. Molson, John S. Shearer, Sir Donald A. Smith, Rev. R. Campbell, D.D., Geo. Sumner, Rev. W. J. Smyth, B.A., B.Sc., Ph. D., J. H. Joseph, B. J. Harrington, Ph. D., F. R. S. C.

Hon. Recording Secretary:—R. W. McLachlan.

Hon. Corresponding Secretary:—John W. Stirling, M. B.

Hon. Curator:—A. F. Winn.

Hon. Treasurer:—James Gardner.

The scrutineers reported the following as elected members of Council.

Members of Council:—John S. Shearer, Chairman, Edgar Judge, Frank D. Adams, M. A. Sc., Albert Holden, Major L. A. H. Latour, M. A., Judge Wurtele, J. A. U. Beaudry, C. E., Prof. D. P. Penhallow, B. Sc, Prof. J. Cox, M. A., C. S. J. Phillips.

The following were elected on the Library Committee.

Library Committee:—E. T. Chambers, Chairman, J. A. U. Beaudry, C. E., R. W. McLachlan, Joseph Fortier, A. F. Winn, J. F. Hausen.

Editing and Exchange Committee:—Frank D. Adams, M. A. Sc., Chairman, G. F. Matthews, St. John, N. B., J. F. Whiteaves, Ottawa, Dr. B. J. Harrington, B.A., Ph. D., F. G.S., Rev. R. Campbell, D. D., Dr. T. Wesley Mills, Prof. D. P. Penhallow.

MONTREAL, May 30th, 1892.

The Meeting of the Council was held after the Annual Meeting. Present, John S. Shearer, in the Chair, Dean Carmichael, Senator Murphy, Revd. Dr. Campbell, J. H. Joseph, James Gardner, A. F. Winn, Edgar Judge, Judge Wurtele, C. S. J. Phillips and E. T. Chambers.

Mr. J. S. Shearer was elected Chairman.

The following committees were appointed:

Lecture Committee:—Dr. B. J. Harrington, Chairman, Rev. R. Campbell, D. D., Prof. John Cox. Dr. J. W. Stirling, Rev. W. J. Smyth.

House Committee:—John S. Shearer, Chairman, Edgar Judge, Jas. Gardner.

Membership Committee:—Edgar Judge, Chairman, S. Finley, G. Sumner, Rev. W. J. Smyth, P. S. Ross, J. A. U. Beaudry, R. W. McLachlan, J. S. Shearer, J. Gardner, J. F. Hausen.

Report of the Council, 1892–93.

The Session of 1891-2, which closes with this meeting, has been an interesting and eventful one to the Society. Your Council has held seven meetings, and there have been six monthly meetings of the Society, at which interesting and instructive papers have been read. Eight new members were elected during the year. As stated in my last report, the Royal Society of Canada had received and accepted the invitation of this Society to hold its meeting in Montreal on the 27th of May, 1891, the first ever held outside of Ottawa. The members assembled in large numbers from all parts of Canada, and also from the United States. The different committees appointed to carry out the programme for the meeting, and for the comfort and enjoyment of the members and invited guests, were eminently successful, and we desire to tender to them the thanks of the Society. We are likewise indebted to the Governors of McGill College for granting the use of the building for the meetings of the Royal Society. Your Society have to record the loss by death of Dr. T. Sterry Hunt, an eminent scientist and an original thinker, who held at one time the positions of President and Vice-President of the Society, and labored long and faithfully in its interests. His death is a great loss to the scientific world, and also to the Natural History Society. We have also to mourn the loss by death of another earnest worker, Mr. F. B. Caulfield, who labored constantly to promote the interests of the Society. It will be difficult to find one to replace him in his department of the Society's work.

There is every probability of the grant for the "Record of Science" being continued by the present Government. Your Chairman has been in communication with the Treasurer of the Province for some time past. The building of the Natural History Society is in good order, and the Hall has been leased for 1892-3 to the same occupants as before. I may mention here that the Hall will require to be reseated at an early date, and we commend this work to our successors in office.

The Membership Committee has not met once this season, and, in consequence, the membership of the Society has fallen off this year very much. We recommend that this Committee should meet once a month and give their attention to new members, and prevent, if possible, the withdrawing of others from the Society.

The Hon. Curator will report on the museum, which has been well patronized during the year. The library has received considerable attention and shows improvement. An effort is being made to render it more useful to the members and students, as

will be shown in the Hon. Chairman's report. The "Record of Science" has been issued regularly, full of interesting scientific matter, and the thanks of the Society are hereby tendered to the Editing Committee. The free course of Somerville lectures, six in number, were delivered during the winter, and were well received and much appreciated. The attendance was fully as large as at any previous course. The museum was open as usual an hour before each lecture. The lectures were as follows:—

Thursday, February 25th—"How to Study Botany." By Dr. T. J. W. Burgess, of the Hospital for the Insane.

Thursday, March 3rd—"Canadian Trees and their Distribution." By Prof. J. Macoun, M.A., F.L.S., F.R.S.C., of the Geological Survey, Ottawa.

Thursday, March 10th—"Fossil Sunshine." By Sir J. W. Dawson, C.M.G., LL.D., F.R.S., etc.

Thursday, March 17th—"Canadian Woods—Their Economical Use." By Hon. J. K. Ward, M.L.C.

Thursday, March 24th—"Fruits and Fruit Culture," for the Province of Quebec. By Prof. J. Craig, of the Dominion Experimental Farm, Ottawa.

Thursday, March 31st—"A Talk about the Wild Flowers around Montreal." By Robert Campbell, D.D., M.A.

Your Council recommends that the thanks of the Society be tendered and conveyed to the gentlemen who gave their valuable time and labour in the preparation and delivery of these lectures. We have to express our regret that the health of our esteemed President has been such during the past winter as to prevent his attending the meetings of the Society.

The Annual Field day took place as usual, Calumet being the place selected. The attendance was unprecedentedly large. A number of the members of the Royal Society accompanied the excursionists, as well as several of our aldermen. A more delightful spot could not have been selected, and the weather was all that could be desired. A full report of the day's outing will be found in volume four, number seven, of the "Record of Science." The Society beg to tender their thanks to the Field day Committee for their very complete arrangements. Our thanks are due to the officers of the C. P. R., for their kindness and attention; everything done by them tended to promote the success of the excursion. We have also to thank the Hon. J. K. Ward for his kind offices, and for entertaining so many of our party at his lumber establishment. The Field day to be held on the fourth of June next, on the in-

vitation of the same kind gentleman, will be at the "Rivière Rouge." As this is a delightful spot for scientific work, we would like to see our members turn out in full force. We are to have a special train from the C. P. R., on this occasion, to leave Windsor St. Depot at 9 a. m.

Respectfully submitted
JOHN S. SHEARER
Chairman.

Report of the Editing Committee of the Record of Science.

An attempt has been made to maintain throughout the year the high standard which the Record has reached as an exponent of the science of the Dominion, and it is believed that in this your committee has been successful.

It would, however, render the journal more interesting to a larger number of readers if a greater proportion of papers on biological subjects could be secured.

Though a couple of the numbers for this year were late, owing to unavoidable circumstances, the quality of the matter did not suffer, and excellent original papers have been found in all the numbers.

It is desirable to introduce more and better illustrations into the Record, and for this purpose a sum not less than $150.00 per annum should be at the disposal of the committee.

We think it would be well if some one competent and willing to devote special attention to the subject of exchanges were added to the committee.

It is but right to mention that by far the greater part of the work in connection with the Record has fallen to Mr. Frank Adams, who has devoted much time, energy and ability very cheerfully to the work. The Committee feel deeply indebted to him, and trust that he may continue to give his valuable services in this field of work.

Wesley Mills,
Chairman.

NATURAL HISTORY SOCIETY OF MONTREAL IN ACCOUNT WITH JAMES GARDNER, Hon. Treasurer.

Receipts.		*Disbursements.*	
To Rents	$1,026 00	By Balance from last year due Treasurer	$ 40 99
" Members Annual Subscriptions	635 00	" Superintendent's Salary and Commissions	507 45
" Government Grant	400 00	" Sundry expenses	225 43
" Grant from Citizens Committee Royal Society meeting	300 00	" Light	285 64
" Field day surplus	48 55	" Fuel	155 04
" Interest	9 68	" Taxes	29 25
" Entrance Fees Museum	39 70	" Lectures	24 20
" Record of Science, 2 vols. sold	6 00	" Museum	140 39
" W. Badgley, per Bank of Montreal, amount deposited to the credit of the Society in 1845.	25 00	" Library	41 67
		" Record of Science	798 89
		" Balance on hand	240 98
	$2,489 93		$2,489 93
1892.			
May 30 To Balance on hand	$240 98		

E. & O. E.

Examined and found correct,

John S. Shearer.

Montreal, 30th May, 1892.

Curator's Report.

To the President and Members of the Natural History Society :

Gentlemen :—It gives me pleasure to report that the results which it was expected would follow a better arrangement and a more comprehensive classification of the contents of the Museum have been largely realized, the cost has been comparatively small, while the increased advantages offered to the student of nature can hardly be over estimated, and fully justify the expenditure.

During the year a larger nnmber of persons have visited the Museum than for many years past. And a comparison of the last few years warrants me in saying that the new order of things is being appreciated.

For the year ending May 1888—451 persons visited the Museum.
" " " " 1889—1192 " " " "
" " " " 1890—2094 " " " "
" " " " 1892—2596 " " " "

Note—the Museum was closed for alterations during the greater part of 1891, and therefore no record of visitors was kept.

The donations to the Museum have increased in proportion, not only in number, but also in value.

The natural products from the Island of Jamaica and St. Vincent, presented through Mr. John Fulton, have proved of considerable value to those interested in West Indian products.

The space occupied by the Museum is I regret to say altogether inadequate to the amount of material to be displayed, and we are in consequence obliged to store away a large number of interesting specimens, thus greatly detracting from the value of our collection in certain branches.

An order has been given for a new cabinet to hold the balance of the entomological collection, which Mr. Winn has kindly consented to label and classify.

Mr. Griffin as usual has aided me greatly in maintaining the Museum in its present satisfactory condition, and I refer with pleasure to the perfect harmony which has existed between the members of the Museum Committee and those who have assisted in the work of the Museum throughout the year.

I desire to record my sincere regret at the death of Mr. F. B. Caulfield, so long an active member of this Society, and in whose demise the Museum loses a warm friend and a zealous worker. For some time past Mr. Caulfield—I may say—had taken the entire charge of our ornithological collection; to his energy and ability are we indebted for its present classification and arrangement, while the splendid condition of the specimens testify to the faithfulness with which he performed this work.

In conclusion allow me to thank you for the confidence which you have shown in me during my administration. I feel that there is still much to be accomplished, indeed, there is always work in a museum for willing hands to do; other duties would prevent me giving the time which this important office requires even were you disposed to re-elect me, and in assigning to others the work which for the past four years has given me so much pleasure, I desire to assure you of my continued interest in the progress of the museum, and that I will gladly assist in any measures calculated to increase its usefulness.

Respectfully submitted

J. STEVENSON BROWN.

Hon. Curator.

MONTREAL

May 30th, 1892.

DONATIONS TO MUSEUM.

Brown Thrasher,—*Harporhynchus Rufus.*
Red Shouldered Hawk,—*Buteo Lineatus.* (nestling)
Wood Thrush,—*Turdus Mustelinus.*
Yellow Legs,—*Totanus Flavipes.*
Golden Pheasant,
Nest of Long Billed Marsh wren,—*Cistothorus Palustris.*
Swallow's Nests.
Two large cases of Birds (various)
Wood Chuck,—*Arctomys Monax,* (Black Variety)
Land Crab,—*Gecarcinus Lateralis.*
Rattle Snake skin, with rattle attached.
Bivalve,—*Ambronychia Radiata* from Hudson River group.
Collection of Insects. (various)
Collection of Natural Products from Jamaica and St. Vincent.
Leaden Plate, with inscription, found in 1867 while demolishing a building owned by the late Joseph Tiffin senior, situated opposite Bonsecours Market. The building is supposed to have belonged to the French Government, and this plate is regarded as a relic of the former rule *of France in this Country.*

By Purchase

Greebe

J. STEVENSON BROWN,

Hon. Curator.

Report of the Library Committee.

The following books and pamphlets have been received during the past year in addition to the exchanges.

Dana's Manual of Mineralogy from Mr. H. Martin.

Laboratory Manual of Chemistry from American Book Company.

Illustrations of North American Grasses, from Department of Agriculture, Washington.

Transactions of the American Institute of Mining Engineers.

Report of Geological Survey of Canada.

Report of U. S. Geological Survey.

Monographs of U. S. Geological Survey.

Geology of Illinois, 2 vols.

The following were presented by the Authors :—

Systematic Mineralogy, by Dr. Sterry Hunt.

Our Trees, by J. Robinson of the Essex Institute.

Old Memories, by Mrs. Macpherson.

Notes on Parka decipiens, by Sir J. W. Dawson.

Select extra-tropical plants eligible for naturalization, by Baron Von Mueller, Victoria, Australia.

Polyzoa of the St. Lawrence, by Rev. T. Hincks.

Mollusca, collected in Japan, By F. Stearns.

Catalogue of British fossil Vertebrata, by Woodward & Sherborn.

The Society has been enabled by the purchase of twelve of the earlier volumes of the German Geological Survey to make up what is believed to be the only complete set in Canada of that useful geological work.

At the request of your Committee the Council have appropriated the sum of $100 for the purchase of Standard works on the different departments of Natural History, books which are so often enquired for by the members. The following have already been received from the booksellers :—

French's Butterflies of the United States.

Say's Entomology of North America, 2 vols.

Coue's Key to North American Birds.

Ridgway's Manual of North American Birds.

Micrographic Dictionary.

Scientific Papers of Asa Gray, 2 vols.

Treasury of Botany, 2 vols.

Text Book of Mineralogy, Dana.

Compendium of Geology, Le Conte.

Handbook of Canadian Geology, Sir J. W. Dawson.
The Earth and Man, Guyot.
Characteristics of Volcanoes, Dana.
The Human Species, Quatrefages.
The Primitive Condition of Man, Sir Jno. Lubbock.
Fossil Men, Sir J. W. Dawson.

Nearly one hundred volumes of exchanges have been prepared for binding, and as soon as the works in the French language have been selected and arranged, will be placed in the binder's hands as directed by the Council.

It has been thought fit for the information of members to present with this report a list, as complete as possible, of the publications now received in exchange for the Record of Science.[1] In looking through this list it is seen that it requires revision, and on comparing it with the lists of other similar institutions, it is evident that it might be much extended. It is therefore suggested that the exchange committee might be asked to take this matter in hand.

The Hon. Librarian in concluding his report cannot but express his sense of the loss sustained by the death of the late Mr. F. B. Caulfield, who was for so many years a member of this Committee. He was for some time Librarian, and as he always took great interest in examining new books as they were added, was so well acquainted with the contents of the cases, that his knowledge and advice were at all times of the greatest assistance.

Respectfully submitted,

E. T. CHAMBERS.

ANNUAL FIELD DAY.

The students of the different branches of natural history, organized under the name of the Natural History Society, have a good field for the pursuit of their specialties on Montreal Island, but with the view of extending the field of research, the annual outing of the society is an established institution. This year, as last, their destination was the River Rouge, near Calumet, to which they flocked in large numbers on Saturday, June 4th.

A special train under the courteous and efficient charge of Abe E. Wright, left the Windsor Depot at 9 o'clock.

Three handsome Canadian Pacific Railway cars were comfortably filled with the party, which was under the guidance of Mr. J. Stevenson Brown and Mr. J. S. Shearer, who acted as an arrangements committee, so to speak. The Rouge was reached about 12 o'clock, and family parties were soon discussing cold collations beneath the shade of forest pines and oaks. A large number of others accepted the invitation of Hon. J. K. Ward to partake of pot luck in the lumber camp. The dining room was a typical lumbering shanty and the bill of fare consisted of pea soup, made over a camp fire outside, pork and beans with potatoes, white bread and dried apple sauce, or molasses and tea *a la Russe*, but without the lemons. The plate was of tin and the service given by "Chef" Jean Baptiste Cadieux and his assistants excellent. Epicures who dine off turtle soup, oysters, etc., cannot appreciate the merits of pea soup when seasoned with the appetites a scientific exploring party possessed. The dinner was a novelty and a success.

The different sections set out immediately after dinner and their expeditions proved most successful.

The tumultuous cascades of the Rouge down which the logs were precipitated, was a constant source of enjoyment to many, and those who labored higher up the stream to the immense "chutes" 60 feet in height, were amply rewarded. The timbers dived madly down them and on striking the river were immersed for a distance of at least one-twelfth of a mile. Large square timbers 30 feet in length were broken like pipe-stems on becoming crossed at the foot of the chute. These sights alone were worth going to see, and sketchers certainly did not lack for interesting subjects.

"Old Probs" also was kind to the party. He hung out portents of rain at one o'clock, but kindly deferred the execution of his threats till all were safely returning home. The cloudiness only rendered the day cooler and more enjoyable.

The courtesies extended by the Canadian Pacific Railway

authorities to the excursionists were much appreciated. On the return journey tea, coffee and sandwiches were handed round on the cars by assiduous waiters, and this course was followed by strawberries and cream *ad lib.* In return, when the depot was reached, the party assembled and heartily carried a vote of thanks to the company, proposed by Mr. J. S. Shearer. Neither did the Hon. J. K. Ward's hospitality go unrecognized, for before leaving camp, Mr. Henry Lyman and Mr. J. H. R. Molson, in brief speeches, expressed the gratitude of all for his kindness and courtesy. Mr. Ward made a suitable reply in which he invited the society to visit the Rouge again whenever they wished.

The results of the competitions were as follows :—

GEOLOGICAL SPECIMENS.

[1] J. C. Saxe, 16 named.
[1] R. B. Van Horne, 15 unnamed.

BOTANICAL SPECIMENS.

[1] Miss A. Van Horne, 50 named.
[1] Miss Jessie Brown, 51 unnamed.
[1] Prize sketch, Miss Foudrinier.

The leaders, and in such case the judges, of the different sections were: Botany, Messrs. J. B. Goode and James Gardner; geology, Messrs. W. E. Peeks and Evans; entomology, Mr. A. F. Winn, and sketching, Mr. Henry Carter. In the sketching class several excellent oil and water color paintings were submitted for competition, but the prize fell to Miss Foudrinier for a pleasing and careful oil sketch of the Ottawa River as seen from the mouth of the Rouge. In the entomological section several good collections were made, but there was no competition as the collections are mostly professional.

Among those present were noticed :—Mr. and Mrs. Robt. Miller, Mr. and Mrs. J. W. Mills, Mr. and Mrs. J. H. R. Molson, Hon J. K. Ward, Mrs. Ward and Miss M. Ward; Dr. Burgess, Superintendent of Verdun Hospital for the Insane; Mr. and Mrs. J. S. Shearer, Mr. and Mrs. J. Steven-

son Brown and family; Mr. E. T. Chambers, of the British Canadian School; Messrs. A. W. Smith, A. Falconer, S. Carmichael, R. B Van Horne, Alfred Winn, C. B. Chisholm, and Alfred Griffin; Mr. Henry Lyman and Miss Lyman; Miss and Mrs. A. Van Horne, Miss Boissvaian, Miss Turner, Miss Burland, Miss Reid, Miss Jessie Brown, Miss Smith and Miss Rankin, Mr. and Mrs Albert Holden and family, Mr. and Mrs. James Gardner, Mr. and Mrs. Thos. E. Hodgson, Mr. and Mrs. R. W. McLachlan, Captain R. C. and Mrs. Adams, Mr. John Fair and Mr. Harry McLaren, Mr. and Mrs. Walter Drake, Professor Fowler, ex-Ald. Shorey, Mrs. Stephenson, Mr. and Mrs. Charles Garth, Mrs. Hollis, Mrs. Elliott, Mrs. Campbell, Mrs. Pennell, Mrs. and Miss Bulmer, Mrs. and Miss Verner, Mr. J. F. Hausen, Mr. Walter Le Rossignol, and Mr. and Mrs. Fredericks.

Notices of Books and Papers.

Lessons in Botany.[2] Part II, Flowers and Fruit, of Miss Newell's book, is before us. As indicated by the title page, it is intended "for the use of teachers, or mothers studying with their children." The object in view has been very successfully attained, and the book cannot fail to be useful to those for whom it is written. The style is simple and pleasing, and the facts are presented in a way to make them readily understood. One very commendable feature of the book, but one not usually made use of, is the relegation of the figures to separate plates closely associated with the corresponding text. Descriptions of the various species treated of will serve an important purpose in guiding the teacher to proper methods of treatment in the analysis of flowers. A simple but serviceable glossary completes the volume, which the publishers have put into a very readable form.

[1] It is intended to publish a revised list in a future number.

[2] Outlines of Lessons in Botany, for the Use of Teachers, or Mothers Studying with their Children, by Jane H. Newell. Part II: Flowers and Fruit. Illustrated by H. P. Symmes, Boston: Ginn & Heath. 8vo., pp. 393. 1892.

ABSTRACT FOR THE MONTH OF MARCH, 1892.

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 pressure of vapour	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles perhour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	10.29	23.6	3.0	20.6	30.4278	30.469	30.353	.116	.0537	76.5	4.3	N.	39.5	5.0	10	0	85	....	0.1	0.01	1
2	8.85	16 1	1.3	14.8	30.4602	30.526	30.393	.133	.0490	75.3	2.7	N.E.	34.1	5.5	10	0	81	....	....	....	2
3	13.68	21.6	5.4	16.2	30.2340	30.343	30.144	.199	.0652	79.2	8.5	N.	25.2	4 0	10	0	88	....	....	....	3
4	21.58	26.6	11.0	15.6	29.9097	30.079	29.780	.299	.0948	81.3	17.0	S.W.	12.8	4.5	10	0	27	....	....	..	4
5	26 88	35.0	19.3	15.7	29.6498	29.743	29.574	.169	.1127	78.2	20.8	W.	20.3	2.3	6	0	84	....	....	....	5
SUNDAY... 6	.....	35.0	23 5	11.5	.....	.....	.....	.....	.....	....	....	S.W.	25.9	....	..	..	0	....	....	....	6 ..... SUNDAY
7	32.23	36.2	28.8	7 4	29.8435	29.882	29.813	.069	.1442	79.2	26.7	S.W.	19.2	5.2	10	0	59	...	....	....	7
8	31 07	36.2	23 2	13.0	29.6070	29.819	29.380	.439	.1508	86.7	27.3	S.W.	11.5	8.3	10	0	0	Inap.	1.2	0.19	8
9	34.35	36.2	33 8	2.4	29 3243	29.485	29.262	.223	.1842	92.7	32.5	S.W.	11.3	10.0	10	10	0	Inap.	1.3	0.13	9
10	35.02	39.1	33.0	6 1	29.5533	29.678	29.259	.419	.1675	82.3	30 0	S.W.	16.0	8.3	10	0	0	0.03	1.5	0.18	10
11	19.45	25.2	11.3	13.9	29.2403	29.568	30.035	.533	.0362	87.7	16.2	S.W.	35.3	10.0	10	10	0	Inap.	15.9	1.59	11
12	10.37	16.4	4 2	12 2	29.7008	29 843	29.630	.213	.0503	72.5	3.0	S.W.	29.5	6.3	10	0	26	.. .	....	....	12
SUNDAY 13	.....	10.5	-0.5	11.0	.....	.....	... .	... .	.....	....	....	W.	31 5	....	..	..	96	....	....	....	13 .....SUNDAY
14	7.22	11.7	2.5	9.2	29.0445	30.054	29.888	.166	.0423	70.3	-0.3	W.	24.6	8.3	10	0	34	....	....	....	14
15	7.58	12.3	2.4	9.9	30.2248	30.342	30.118	.224	.0408	67.2	-1.3	W.	17.5	7.0	10	0	72	....	....	.	15
17	9.17	15.3	0.5	14.8	30.3767	30.407	30.359	.048	.0450	68.5	1.0	S.W.	11.4	1.0	5	0	74	....	....	....	16
16	16 23	22.9	7.6	15.3	30.2912	30.315	30 227	.118	.0662	72 0	9.0	S.W.	8 7	7.3	10	0	42	....	....	....	17
18	21 83	25.8	14.0	11.8	29.9103	30 167	29.603	.564	.0977	82.3	17 3	N.E.	11.2	8 0	10	0	0	....	0.6	0.06	18
19	25 13	28.8	19.5	9.3	29.2792	29.404	29 159	.245	.1238	90.7	22.8	W.	29.0	8.3	10	0	0	....	5.3	0.41	19
SUNDAY.....20	.....	24.0	11.5	12.5	.....	.....	.....	.....	.	....		W.	30.2	....	..	..	0	....	1.2	0.12	20 ..... SUNDAY
21	16 98	23.9	9.2	14.7	30.3367	30.382	30.270	.112	.0732	78.0	11.3	S.W.	24 4	0.5	3	0	95	....	...	....	21
22	25.25	31 5	15.4	16.1	30 3012	30.424	30.090	.334	.1102	79.5	20.0	S.E.	16.3	5.3	10	0	53	....	Inap.	Inap.	22
23	32.80	35.4	28.0	7.4	29 8543	29.994	29.738	.256	.1697	91.2	30.5	S.E.	20 9	10.0	10	10	0	0.26	7.5	1.15	23
24	30 72	35.4	27.3	8.1	29.9638	30.016	29 919	.097	.1390	81.0	25.3	S.W.	20.7	4 8	10	0	73	....	....	....	24
25	31.43	36.8	27.9	8.9	30.0240	30.154	29.999	.155	.1292	73.8	24 0	W.	10.0	8.3	10	0	0	?...	....	....	25
26	28.75	34.2	24.4	9.8	29.9452	30.041	29.870	.171	.1243	78.5	23.0	W.	3.7	0.0	0	0	96	....	....	....	26
SUNDAY.....27	.....	37.9	23.0	14.9	.....	.....	.....	.....	.....	....	....	N.E.	10.2	....	..	.	95	....	....	....	27 ....SUNDAY
28	35.80	40.8	29 4	11.4	29.8520	29.938	29.768	.220	.1220	57.8	22.5	N.W.	12.8	6.5	10	0	76	....	....	....	28
29	32.88	39.2	27.4	11 8	30.1360	30.251	30.048	.203	.1075	57.5	19.7	W.	15.2	0.8	5	0	96	....	....	....	29
30	30.00	36.0	25.5	10.5	30 3157	30.353	30.293	.060	.0992	58.7	17.8	N.	8.8	0.2	1	0	96	....	....	....	30
31	32.60	40.8	22.9	17.9	30.3230	30.399	30.355	.044	.1127	62 0	20.7	E.	6.2	0.5	3	0	95	....	....	...	31
....Means	23.26	33.0	19.1	13.9	29.9644	....	.....	.216	.1026	76.3	16 8	W. 10° S.	19.2	5.3	...	....	50	0.29	34.6	3.84	Sums .....
18 Years means for and including this month.....	23.95	31.3	16.5	14.9	29.9669	.....	.....	.261	.1067	75.5	....	.....	....	6.1	....	....	¶46.8	0.93	25.6	3.46	18 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.....	1564	2200	249	972	144	4816	3987	318	
Duration in hrs.	75	107	26	58	18	215	214	18	13
Mean velocity....	20.9	20.6	9.6	16.7	8.0	22.4	18.6	17.7	

Greatest mileage in one hour was 63 on the 11th.
Greatest velocity in gusts, 70 miles per hour, on the 11th.

Resultant mileage, 5203.
Resultant direction, W. 10° S.
Total mileage, 14,250.

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

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ 11 years only.

The greatest heat was 40°.8 on the 28th and 31st; the greatest cold was 0°.5 below zero on the 13th, giving a range of temperature of 41.3 degrees. Warmest day was the 28th. Coldest day was the 13th. Highest barometer reading was 30.526 on the 2nd; lowest barometer was 29.035 on the 11th, giving a range of 1.491 inches. Maximum relative humidity was 98 on the 8th. Minimum relative humidity was 42 on the 28th.

Rain fell on 5 days.
Snow fell on 10 days.
Rain or Snow fell on 10 days.
Auroras were observed on 10 nights.

ABSTRACT FOR THE MONTH OF APRIL, 1892.

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 pressure of vapour	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles perhour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	33.57	47 5	27.0	20.5	30.3598	30.455	30.213	.242	.1590	67.5	28.7	S.	10 5	3.2	10	0	92	....	....	....	1
2	43.15	47 0	37.5	9.5	30.9175	30.131	29.752	.379	.2243	79.8	37.3	S.	26.3	5.0	10	0	41	0.10	....	0.10	2
SUNDAY... 3	.....	51.6	45.3	6.3	.....	.....	.....	.....	....	....	...	S.W.	33 3	6.5	10	0	91	....	....	....	3 . SUNDAY
4	43.58	52.3	37.2	15.1	29.9720	30.017	29.909	.108	.2143	75.8	36.2	N.E.	11.2	9.2	10	5	0	0.07	....	0.07	4
5	42.53	58.0	35.3	22.7	29.7060	29.920	29.501	.419	2487	90.5	39.7	N.E.	17.6	4.5	10	0	0	0.33	...	0.33	5
6	42 60	57.8	35.5	22.3	29.7277	29.922	29.606	.316	1915	68.5	33.2	S.W.	33.2	4 2	10	0	83	....	Inap	Inap	6
7	41.10	49.9	33.4	16 5	29.8297	29 946	29.699	.247	.1787	59.2	31.2	S.W.	14.7	8.2	10	5	92	....	....	....	7
8	43.40	52.0	36.3	15 7	29.5942	29.661	29.538	.123	.2157	77 0	36.3	W.	11.5	10.0	10	10	25	0.12	....	0.12	8
9	34.92	39.1	33 8	5.3	29.4688	29.502	29.453	.049	.1835	90.3	32.3	S.W.	26.4	.	..	.	0	0.03	3 6	0.39	9
SUNDAY.. .. 10	.....	35.0	29.6	5.4	.....	.....	....	....	....	....	....	N.W.	21.4	9.8	10	9	18	....	3.2	0.32	10 ... .SUNDAY
11	30.02	35.7	25.8	9.9	29.8372	29.944	29.758	.186	.1268	76.0	23.5	N.W.	28.1	0.5	10	0	34	...	0.1	0.01	11
12	28.88	34.8	20.6	14.2	30.0378	30.097	29.976	.121	.1192	74.2	21.8	N.W.	21.2	5.0	10	0	0	.. .	0.3	0.03	12
13	34.25	43.7	28.6	15.1	30.0873	30.134	30.046	.088	.1222	64.0	22.3	N.W.	18 3	2.3	10	0	91	....	....	....	13
14	33.97	41.2	26.2	15.0	30.0038	30.115	29.909	.206	1292	67.3	24 0	N.W.	7 7	2.2	6	0	97	....	....	....	14
15	39.57	49.4	29.5	19.9	29.7778	29.863	29.706	.157	1242	51.0	23.3	N.W.	15.2	10.0	10	10	93	....	...	.	15
16	35.23	42.3	30.6	11.7	29.8953	29.829	29.779	.050	.1067	52 3	19.8	N.W.	13 9	....	..	..	18	....	....	....	16
SUNDAY.. 17	.....	43.1	29.4	13.7	.....	.....	.....	.....	.	....		N.W.	15 2	6.2	10	0	25	....	....	....	17 ..... SUNDAY
18	39.40	44.5	33.5	11 0	29.9567	30.051	29.904	.147	.1175	49.0	21.5	N.W.	10.5	2.0	7	0	38	....	....	....	18
19	44.80	54.8	34.2	20.6	30.2517	30.362	30.126	.236	.1308	45 0	24 2	N.W.	12.8	0.3	2	0	98	....	....	....	19
20	47.52	57.1	37.9	19.2	30.4217	30.499	30.352	.147	.1048	33.0	19 0	N.W.	11.5	0 7	10	0	99	....	....	....	20
21	50.22	62.0	35.5	26.5	30.1725	30.375	29.937	.438	.1613	47.3	28.7	S.E.	12 0	9.2	10	5	51	0.07	...	0.07	21
22	52.10	63 0	43.9	19.1	29.7368	29.850	29.675	.175	.2935	72.8	44.7	S.E.	15.4	7.8	10	x	35	0.05	....	0.05	22
23	47.63	57.5	42.8	14.7	29.7082	29.739	29.650	.089	.2163	65.2	36.5	S.W.	20 8	....	..	..	48	0.02	....	0.02	23
SUNDAY.... ...24	.....	49.3	20.7	28.6	.....	.....	.....	.....	.....	....	...	W.	18.9	0.0	0	0	91	....	....	....	24 ....SUNDAY
25	36.30	46.4	20.7	25.7	30 4018	30.460	30 349	.111	.1207	58.7	22.3	N.W.	21.0	0.0	0	0	98	...	....	....	25
26	43.53	54.0	32.0	22.0	30.3967	30.440	30.348	.092	.1060	39 3	19 5	N.	16.1	4 2	10	0	97	....	....	....	26
27	46.63	53.3	36.7	16.6	30.3657	30.512	30.157	.355	.1373	42.8	25.0	E.	8.9	8.3	10	0	76	...	....	...	27
28	48.53	58.2	43.4	14.8	29.7690	29.957	29.624	.333	2478	73.0	39.8	S.	24.4	8.0	10	3	0	0.22	...	0.22	28
29	44.37	58.2	39 6	18.6	29.9170	30.031	29.813	218	.1563	53.0	29.0	N.W.	17.1	3.2	10	0	0	....	....	....	29
30	39.28	46.7	35.5	11.2	30.2822	30.358	30.164	.194	.1057	44 7	20.2	N.E.	14.7	....	..	.	80	....	....	....	30
....Means	41.23	49.6	33.3	16.3	29.9817	....	.....	.201	.1632	62.2	28.5	.....	17.7	5.5	...	....	54	1.01	7.2	1.73	Sums ....
18 Years means for and including this month.	39.84	48.30	32.24	16.05	29.9434	.....	.....	.202	.1690	66.4	...	.....	....	5.9	...	....	¶52.2	1.61	6.6	2.27	18 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.....	213	765	215	1064	1203	2882	976	5403	
Duration in hrs ..	16	58	27	78	58	110	54	319	
Mean velocity....	13.3	13.2	8.0	13.6	20.7	26.2	18.1	16.9	

Greatest mileage in one hour was 47 on the 6th.
Greatest velocity in gusts, 52 miles per hour, on the 6th.
Resultant mileage, 5340.

Resultant direction, N. 84° W.
Total mileage, 12,721.
Average velocity, 17.7 m. p. h,

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

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ 11 years only.

The greatest heat was 63° on the 22nd: the greatest cold was 20°.6 on the 12th, giving a range of temperature of 42.4 degrees. Warmest day was the 22nd. Coldest day was the 12th. Highest barometer reading was 30.512 on the 27th; lowest barometer was 29.453 on the 9th, giving a range of 1.059 inches. Maximum relative humidity was 96 on the 5th. Minimum relative humidity was 16 on the 20th.

Rain fell on 9 days.
Snow fell on 5 days.
Rain or Snow fell on 13 days.
Auroras were observed on 7 nights.
Lunar halos on 3 nights.
Fogs on 2 days.
Thunderstorm on the 5th.

ABSTRACT FOR THE MONTH OF MAY, 1892.

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 pressure of vapour	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles per hour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
SUNDAY. . . . 1	.....	52.2	34.0	18.2	.....	.....	.....	....	.....	....	....	S.E.	9.2		..		00	Inap.	....	0.00	1 ..... SUNDAY
2	46.15	54.8	36.2	18.6	29.9275	29.956	29.903	.053	.2033	67.8	35.0	N.E.	10.4	7.5	10	1	00	Inap.	....	0.00	2
3	50.85	63.0	38.6	24 4	29.9440	30.060	29.780	.280	.2817	73.7	42.7	S.E.	16.6	10.0	10	10	15	Inap.	....	0.00	3
4	58.58	72.5	52.5	20.0	29.8310	30.148	29.676	.472	.2947	58 7	42.8	N.	29.8	3.7	10	0	68	0.05	....	0.05	4
5	48.55	59 8	37.4	22.4	30.2055	30.292	30.121	.171	.1358	40.8	24.8	N.W.	16.7	2.8	10	0	76	....	....	. ..	5
6	42 68	51.4	34.0	17.4	29.9863	30.145	29.861	.284	.1205	43 3	22.2	N.	11 0	3.3	10	0	43	....	....	....	6
7	42.07	48.1	35.5	12.6	29.9137	29 999	29.854	.145	.1327	49.2	24.7	N.W.	18.6	8.3	10	0	22	....	....	....	7
SUNDAY.. 8	.....	64.5	39.4	25.1	.....	.....	.....	....	.	....	....	N.	15.1	....	..	..	84	....	....	....	8 .....SUNDAY
9	53 10	61.8	41.1	20.7	30.2903	30.365	30.223	.142	.1793	44.8	31.7	N.	18.7	2.0	10	0	98	. .	....	..	9
10	52.80	62.8	41.0	21.8	30.1233	30.283	29.939	.344	.1612	40.8	29 0	N.E.	9.5	1.2	5	6	87	...	....	....	10
11	47.37	52.5	44.0	8 5	29.7723	29.886	29.696	.190	.2567	78 2	40.3	N.E.	12.6	10.0	10	10	00	0.39	....	0.39	11
12	47.22	52.2	43.6	8.6	29.8388	30.016	29.656	.360	.2860	88.2	44.0	N.	15.7	8 8	10	3	00	0.16	....	0.16	12
13	55.00	66.1	41.4	24.7	30.1723	30.189	30.145	.044	.2582	60.8	41.2	N.W.	7.5	2.5	10	0	92	....	....	..	13
14	60.03	69.8	46.6	23.2	30.2010	30.262	30.150	.112	.2990	59.8	44.7	S.	10.8	1.8	3	0	92	....	....	....	14
SUNDAY 15	.....	62.4	50.8	11.6	.....	.....	... .	....	.....	....	....	S.	14.7	....	..	..	00	....	....	....	15 ..... SUNDAY
16	55.60	64.7	47.4	17.3	29.8400	30.050	29.699	.351	.3188	70.8	45.7	W.	26 2	7.3	10	0	35	0.05	....	0.05	16
17	57.23	69.7	45.7	24.0	30.0152	30.063	29.963	.100	.2418	52.8	39.2	W.	25.0	1 7	10	0	73	...	....	....	17
18	58 23	70.8	48.8	22.0	30.0580	30.126	29.985	.141	.1835	39.8	32.2	N.	15.9	0 0	0	0	58	....	....	....	18
19	56.08	69.5	41.3	28.2	29.8995	30.041	29.78.	.257	.2265	52.0	37 7	N.E.	14 7	0.5	3	0	96	....	....	....	19
20	46 08	52 0	44.3	7.7	29.9658	30.094	29.831	.263	.2118	67.8	35.8	S.	11.1	8 3	10	0	05	....	....	....	20
21	44.60	49.5	41.9	7.6	30.0735	30.127	29.981	.146	.2308	78.5	38.0	E.	13 8	10.0	10	10	00	0.28	....	0.28	21
SUNDAY.... ...22	.....	55.1	39.6	15.5	.....	.....	.....	....	.....	....	...	N.E.	18.9	....	..	..	00	0.05	....	0.05	22 .....SUNDAY
23	41.43	46.5	39 1	7.4	29.6403	29.766	29.557	.209	.2352	90.2	38.7	N.E.	17.6	9 8	10	9	00	.0.44	....	0.44	23
24	54.52	65.0	41.4	23.6	29.5888	29.618	29.559	.059	.2742	74.2	42.3	W.	20.6	10.0	10	10	49	0.05	....	0.05	24
25	57.87	64.8	51.5	13.3	29.6815	29.704	29.662	.042	.3390	71.3	48.3	N.W.	20.2	9.3	10	6	37	. .	....	....	25
26	61.43	71.1	51.6	19.5	29.6503	29.715	29.573	.142	.3702	68.5	50.7	W.	11.9	8 2	10	5	63	Inap.	....	0.00	26
27	52.77	60.0	48.7	11.3	29.4887	29.569	29.435	.134	.3602	90.0	50.0	N.W.	15 3	10 0	10	10	00	0 62	....	0 62	27
28	55.02	64.2	47 7	16.5	29.7825	29.875	29.682	.193	.2565	60.6	40.8	N.W.	15.2	2.8	10	0	91	0.05	....	0.05	28
SUNDAY.....29	.....	65.9	45.0	20.9	.....	.....	.....	....	.	....	....	S.W.	16.0	....	..	..	39	0.06	....	0.06	29 .....SUNDAY
30	65.35	76.5	58.2	18.3	30.0073	30.066	29.948	.118	.4737	77.3	57.3	W.	10.0	6.7	10	0	50	....	....	....	30
31	68.32	81.2	54.0	27.2	30.1132	30.164	30 066	.098	.5472	80 0	61.5	S.	5.1	6.2	10	0	57	....	....	....	31
....Means	52.92	61.95	43.95	18.00	29.9234	....	.....	.187	.2646	64.6	40 0	°	15.3	5.87	....	....	43	2.20	....	2.20	Sums .....
18 Years means for and including this month.....	54.36	63.59	45.35	18.24	29.9364	....	.....	.164	.2821	65.2	....	.....	.	6.3	....	....	¶50.9	2.87	....	2.87	18 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.....	1820	1652	794	765	822	640	1938	2935	
Duration in hrs.	125	127	50	52	76	47	113	152	2
Mean velocity....	14.6	13.0	15.9	14.7	10.8	13.6	17.2	19.3	

Greatest mileage in one hour was 46 on the 4th.
Greatest velocity in gusts, 52 miles per hour, on the 4th.
Resultant mileage, 3810.

Resultant direction, N. 30° W.
Total mileage, 11,366.
Average velocity, 15.3 m. p. h,

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

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ 11 years only.

The greatest heat was 81.2 on the 31st; the greatest cold was 34.0 on the 1st and 6th, giving a range of temperature of 47.2 degrees. Warmest day was the 31st. Coldest day was the 23rd. Highest barometer reading was 30.365 on the 9th; lowest barometer was 29.435 on the 27th, giving a range of 0.930 inches. Maximum relative humidity was 96 on five days. Minimum relative humidity was 20 on the 18th.

Rain fell on 15 days.

Auroras were observed on 4 nights, the most brilliant display being on the night of the 18th.

Lunar halos on 2 nights.

Fog on the night of the 30th and morning of the 31st.

Solar halo with parhelic arcs on the 10th.

ABSTRACT FOR THE MONTH OF JUNE, 1892.

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 pressure of vapour	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles per hour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	77.28	88.6	65.5	23 1	29.9865	30.087	29.887	.20c	.6255	67.8	65.5	S.W.	11.6	5.0	9	0	91	....	....	. ..	1
2	69.17	80.6	58.8	21.8	29.9227	29.995	29.840	.155	.5730	79.7	62.5	N.W..	18.8	9.3	10	7	19	0.35	....	0.35	2
3	58.48	67.1	52.4	14.7	30 2165	30.299	30.102	.197	.2813	57 5	43.3	E.	12.0	7.3	10	0	73	....	....		3
4	61.52	70.7	52.2	18.5	30.2852	30.354	30 233	.121	.3373	63.7	48 0	S.	12.2	6.2	10	0	36	0.03	....	0.03	4
SUNDAY.. 5	.....	64.2	54.2	10.0	.....	.....	.....	....	.....	...	....	S.W.	12.5	....	..	0	00	1.35	....	1.35	5 ..... SUNDAY
6	66.78	79.5	57.0	22.5	29.8930	30.041	29.819	.222	.4978	72.8	58.2	N.W.	16.4	6.2	10	0	73	0.69	....	0.09	6
7	58.12	67.3	49.0	18.3	30.1880	30.236	30.155	.081	.2932	60.8	44.3	E.	10.3	0 0	0	0	98	.	....	....	7
8	62.65	70.9	51.0	19 9	30.0810	30.191	29.976	.215	.4125	72.8	53.3	S.	9.3	8 3	10	0	04	0.15	....	0.15	8
9	65.27	73 0	60 0	13.0	29.8872	29 943	29.821	.122	.5010	80 2	58.8	W.	9.2	7.7	10	0	30	0 17	....	0.17	9
10	58 53	67.1	48.2	18.9	30.0038	30.060	29.950	.110	.2282	46.8	38.0	E.	13.9	1.5	5	0	88	....	....		10
11	66.70	75 6	56.1	19 5	29.8737	29 977	29.792	.185	.3467	51.8	48.2	W.	27.1	4.7	10	0	56	....	....	....	11
SUNDAY 12	.....	82 0	62.1	19.9	.....	.....	.....	....	.....	....	.	W.	15.9	....	..	.	60	0.06	...	0.06	12 .....SUNDAY
13	78.30	87.6	68.0	19.6	29.7800	29.868	29.700	.168	.7118	73.5	69 0	N.W.	29.8	6.0	10	0	81	....	..	....	13
14	69.78	81.9	55.8	26.1	29.7422	29.939	29.574	.365	.5578	74.2	61 2	E.	19.1	6.2	10	0	50	0.06	....	0.06	14
15	63.08	74.5	52 0	20 5	30.0233	30.074	29.988	.086	.3545	62.2	49.5	N.W.	10.6	0.7	2	0	97	....	....	....	15
16	73.55	84.5	55.1	29.4	29.8987	29.973	29.811	.162	.5798	70.3	63.0	S.W.	14.4	5.2	10	0	42	0.10		0 10	16
17	58 63	71.1	52.8	18.3	30.1477	30.217	30.048	.169	.3497	70.8	48.8	W.	14 0	5.8	10	0	37	0.08	....	0.08	17
18	63 68	71.8	52.8	19.0	30.1748	30.275	30.039	.236	.4095	70.2	53.2	S.E.	7.9	8.3	10	0	44	....	....	.	18
SUNDAY..... 19	.....	66.8	60.6	6 2	.....	.....	...	....	.....	....	....	S.	5.4	....	..	..	00	0.94	....	0.94	19 ..... SUNDAY
20	64.20	68.6	62.0	6.6	29.5482	29.599	29.497	.102	.5410	90 5	61.0	W.	5 8	8.5	10	1	00	2.14	....	2.14	20
21	73.08	81.5	64.0	17 5	29.5747	29.607	29.535	.072	.5973	74.7	63.8	N.W.	16.8	6.0	10	0	60	0.02	....	0 02	21
22	70.90	80.5	64.0	16 5	29.6157	29.730	29.563	.167	.5540	74.8	61.8	N.W.	14.8	6 8	10	0	58	0.01	....	0.01	22
23	62.70	69.0	58.0	11 0	29.7820	29.892	29.650	.242	.4962	87.5	58.7	N.E.	6.0	6.7	10	0	14	0.06	....	0.06	23
24	65.57	74.2	58.2	16.0	29.8790	29.951	29.824	127	.4507	72.5	56.0	S.	5.0	6.0	10	0	80	0 21	....	0.21	24
25	62.93	75.0	58.3	16.7	29.8673	29.914	29.830	.084	.4890	85.5	58.3	N.	6.1	7.7	10	0	15	0.44	....	0.44	25
SUNDAY.....26	.....	68.8	56.8	12 0	.....	.....	.....	.	....	....	.	N.E.	5.8	.	..	0	07	0.34	....	0.34	26 .... ..SUNDAY
27	63.38	71.3	54.4	16.9	29.8242	29.952	29.626	.326	.4903	86.5	58.7	S.	8.8	8.0	10	0	21	0.61	....	0 01	27
28	60.60	72.9	61 3	11.6	29.5535	29.685	29 486	.199	.4990	77.0	59.0	W.	20.3	7.5	10	4	32	0.08	....	0.08	28
29	65.95	77.3	60.0	17.3	29.8150	29.887	29.756	.131	.5018	79.3	54.2	W.	16.2	4.5	10	0	66	0.26	....	0 26	29
30	62.18	65 2	57.7	7.5	29.7980	29.877	29.720	.157	.4960	88.3	58.8	W.	14 3	7.7	10	2	00	0.45	....	0.45	30
....Means	65.73	74.24	57.28	16 96	29.8985	.....	.....	.169	.4725	72.8	56.1	.....	12.95	6.1	...	....	44	8.00	...	8.00	Sums ... ...
18 Years means for and including this month.....	64.57	73.32	55.99	17.32	29.8990	.....	.....	.154	.4244	68.8	....	.....	.	5.7	....	....	¶54.5	3.35	....	3.35	18 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	250	628	903	271	709	1210	3123	2228	
Duration in hrs ..	32	52	70	34	84	99	192	140	16
Mean velocity....	7.8	12.1	12.9	8.0	8.4	12.2	16.3	15.9	

Greatest mileage in one hour was 40 on the 13th.
Greatest velocity in gusts, 44 miles per hour, on the 13th.
Resultant mileage, 3898.

Resultant direction, N. 84° W.
Total mileage, 9322.
Average mileage, 12.95 m. per hour.

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

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ 11 years only.

The greatest heat was 88.6 on the 1st; the greatest cold was 48.2 on the 10th, giving a range of temperature of 40.4 degrees. Warmest day was the 13th. Coldest day was the 7th. Highest barometer reading was 30.354 on the 4th; lowest barometer was 29.486 on the 28th, giving a range of 0.868 inches. Maximum relative humidity was 97 on four days. Minimum relative humidity was 34 on the 10th.

Rain fell on 22 days.

Aurora was observed on 1 night.
Fog on 3 days.

Thunderstorms on 9 days.