JOURNAL AND PROCEEDINGS

OF THE

Hamilton Association

FOR SESSION OF 1894-95.

NUMBER XI.

CONTENTS.

AUTHORS OF PAPERS ARE ALONE RESPONSIBLE FOR STATEMENTS MADE AND OPINIONS EXPRESSED THEREIN.

PRINTED FOR THE HAMILTON ASSOCIATION BY THE TIMES PRINTING COMPANY.

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1886—J. Alston Moffat; Samuel Slater; Wm. Milne; James Leslie, M. D.; C. S. Chittenden.

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1888—J. Alston Moffat; B. E. Charlton; T. W. Reynolds, M. D.; S. J. Ireland; Wm. Kennedy.

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1890—Col. Grant; A. W. Hanham; W. A. Robinson; A. E. Walker; Thomas Morris, Jr.

1891. Col. Grant; W. A. Robinson; J. F. McLaughlin, B. A.; T. W. Reynolds, M. D.; Wm. Turnbull.

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1893.—James Ferres; A. E. Walker; P. L. Scriven; William White; W. H. Elliott, Ph. B.

1894.—James Ferres; A. E. Walker; P. L. Scriven; J. H. Long, M. A., LL. B.; W. H. Elliott, B. A., Ph. B.

Abstract of Minutes

OF THE PROCEEDINGS OF THE

Hamilton Association

DURING THE

SESSION OF 1894-95.

THURSDAY, NOVEMBER 8th, 1894.

OPENING MEETING.

The meeting was called to order by the late President, Mr. Alexander, who at once introduced to the members the newly elected President, Mr. Briggs.

The President in his inaugural address presented the aims and advantages of the Association, closing with an earnest request for the active co-operation of the members in the work of the coming session.

Applications for membership were received from Mrs. Thomas Beasley and Mrs. Carey.

The medals won in the photographic contest were then presented by Mr. D. B. Charlton and the President, as follows: The Charlton Gold Medal, A. H. Baker; Silver Medal, the gift of the Photographic Section, J. R. Moodie.

In accordance with the custom of previous years, the meeting was then given over to a display of the work of the various sections. This included exhibits in Botany, Microscopy, Geology, Chemistry, Electricity, and Pneumatics.

During the evening a short programme of music was rendered through the kindness of Prof. Aldous.

It was estimated that over five hundred members of the Association and others availed themselves of the opportunity of viewing the work of the various sections.

THURSDAY, DECEMBER 13th, 1894.

The President, S. Briggs, in the chair.

The minutes of the last regular meeting were read and confirmed.

An application for membership was received from Mr. J. M. Dickson, chemist.

Mrs. Carey and Mrs. Thomas Beasley were elected ordinary members of the Association.

The President then introduced Dr. P. E. Jones, Indian Agent, to read a paper on the "Early History of the Indians north of the St. Lawrence and the Great Lakes."

The doctor began his paper with a short description of the condition of the Indian inhabitants previous to the coming of the French settlers. Passing to the location of the various tribes at this early date, the speaker stated that two great nations of Indians originally occupied Canada, the Algonquins and the Hurons. The Algonquins occupied the land north of the St. Lawrence River and Lake Ontario. Before the French came they had been the most powerful of all the tribes, and were considered the masters of this part of Canada. They were described as having the mildest aspect and the most polished manners of all the Indian tribes. The remains of this once powerful nation are now the Ojibways, the Ottawas, the Western Algonquins and the Menomonies. The Hurons occupied a tract of land about 25 miles wide, along Lake Huron, and were remarkable for their industry. The Neuter nation, occupying the banks of the Niagara and the peninsula between Lake Erie and Ontario, were a small tribe. Very little is known of them, and they have long been extinct. Taking up the subsequent history of these once powerful nations, the speaker went on to show how, after the coming of the white settler, a deadly warfare had broken out between them and the more powerful Iroquois at the south of the St. Lawrence and Lake Ontario.

At the conclusion of the paper a vote of thanks was tendered to its author, and by a unanimous vote of the members the doctor was enrolled as a corresponding member of the Association. Chief Cheechalk, of the Ojibways, was also present, and gave a short address and a song in his native tongue. A large number of the members embraced the present opportunity by asking the doctor a number of questions relative to Indian history, which were satisfactorily explained. At the close of the meeting the doctor placed on exhibition a number of very rare Indian relics, concerning the use of which there is still much doubt among antiquarians.

THURSDAY, JANUARY 24th, 1895.

SPECIAL MEETING.

President S. Briggs in the chair.

Minutes of former meeting were read and confirmed.

Mr. J. M. Dickson was elected an ordinary member of the Association.

Rev. J. H. Long, M. A., LL. B., was then introduced to read a paper entitled "Europe during the Past Thirty Years." The lecturer treated his subject under the three following heads: The Origin of the German Empire; The Rise of the Kingdom of Italy; The Decay of the Turkish Power. In connection with this section, the lecturer predicted that the day was not far distant when the sick man of Turkey would disappear from the map of Europe, and when Constantinople would become the possession of the White Czar.

An interesting discussion followed, in which a large number took part, and complimented the lecturer on the learned research displayed in his paper.

FRIDAY, FEBRUARY 15th, 1895.

President Briggs in the chair.

The President announced that on account of the nature of the evening's programme the regular order of business would be dispensed with.

Mr. J. B. Tyrrell, C. E., was then introduced to read a paper entitled "A Two Thousand Mile Tour to the Land of Perpetual Ice and Snow." The lecture was illustrated throughout with oxy-calcium views, under the direction of J. R. Moodie, which added greatly to an appreciation of the many difficulties encountered by the young explorers on their hazardous journey. In describing the companions of his trip the lecturer said: "Our party comprised the following: J. B. Tyrrell, geologist; myself, topographer and Eskimo interpreter;

three Iroquois from Caughnawaga, Quebec, and one half-breed from Prince Albert. Several days were spent at Edmonton, where we found our supplies awaiting us, and by the morning of May 27th our outfit was loaded upon waggons and sent off upon the northern trail leading to Athabasca Landing. On the first day the weather was showery and the trail in many places very soft, but later in the day the weather cleared and permitted us to enjoy the lovely country through which we were passing. The soil was chiefly a rich black loam, well covered, even at this early season, by the rich prairie grass. Farther on the country became more hilly, the soil more sandy and covered by the most beautiful park-like forests of jack pine."

The party reached Athabasca Landing on the evening of the 30th of May. The town was described as consisting of six log buildings, situated in the deep valley of one of the greatest rivers in America, an important station of the Hudson's Bay Company, and the point from which all supplies for the many northern posts are shipped. The lecturer stated that for about one hundred miles up stream and fifteen hundred miles to the Arctic ocean, this great northern waterway, excepting at two rapids, is regularly navigated by large river steamers. The lecturer then continued a description of the trip down the Athabasca river and easterly through Lake Athabasca into Black Lake, from which point the journey extended north and east until Hudson Bay was reached. In connection with this part of the lecture many photographs were shown on the canvas, illustrating the wild and picturesque nature of the scenes passed on the way.

The lecturer closed his paper with a graphic account of the hardships encountered in the last few hundred miles of the journey, when overtaken by the early returning winter in this northern land. "On Oct. 14th," he said, "as we advanced, the ice became so heavy and extended so far out to sea, that in order to clear it we could not see land. Towards evening we began to look about for some opportunity of going ashore, but nothing could be seen but the sea and a field of ice, with occasional boulders protruding. We pushed on, hoping to find some bluff, point or channel of water by which we might be able to reach the shore, but the appearance of things did not change. We stood up, vainly hoping to get at least a glimpse of land. Soon the shades of night began to fall about us;

we tried our utmost to reach the shore, but failing, resolved to await the time of high tide, which was 10 p. m. Ten o'clock came, however, and we were still in the same condition, and so could do nothing but remain where we were. The hours of that night were the longest that I ever experienced. My brother was nearly frozen, having been obliged to sit or lie in icy water all night. One of our men had both his feet frozen, and several others were badly used up. At last, however, the day returned, but still we were in the same position. We could not hold out much longer; we must either gain the shore or perish. At the time of high tide, the ice being somewhat loosened, our canoes were thrust into the pack, and by great exertion we succeeded about one o'clock in reaching solid ice, and, for the last time, hauled out our noble little crafts. We had been in them just 30 hours, battling with the ice, exposed to a chilling winter blast, our clothing frozen, and our bodies faint and numb with starvation and cold." The lecturer then briefly outlined the subsequent journey of the two guides to Fort Churchill on foot through ice and snow, and the rescue of the party by a number of dog trains sent out from that point. A brief discussion followed the reading of the paper.

Mr. Garner, the celebrated investigator of language in the lower animals, who was present during the early part of the meeting, also gave an interesting account of his recent investigations in Africa into the nature of the language of the various monkey tribes.

THURSDAY, MARCH 7th, 1895.

SPECIAL MEETING.

The Association met in the rooms of the Hamilton Art School, President Briggs in the chair.

This being a special meeting the usual order of business was dispensed with.

The President introduced Prof. R. L. Garner in his lecture entitled "An Investigation of the Speech of the Lower Animals."

Mr. Garner began with an account of the circumstances leading him to undertake an investigation of the conditions of speech in the lower animals. He next outlined the results of his experiments among the animals confined in the zoological gardens of America.

These investigations were carried on, for the most part, by means of the phonograph, which was made use of to record the sounds of certain animals and then give them forth to others of the same species, whereupon the actions and sounds given in reply were noted in like manner.

The lecturer next gave the main circumstances connected with his African journey, which was undertaken that he might be able to pursue his investigations under more favorable conditions. This portion of the lecture not only set forth many facts relating to the habits and speech of the lower forms of animal life, but also threw much light on the character and customs of the inhabitants.

A spirited discussion followed.

WEDNESDAY, MARCH 20th, 1895.

President Briggs in the chair.

The Curator announced the donation by Mr. A. E. Walker of a valuable collection of fossils, representing the work of thirty years in that direction. The thanks of the Association were tendered Mr. Walker for his valuable donation.

Applications for membership were received from Messrs. Alex. McLagan, John Knox and H. P. Coburn.

Inspector J. H. Smith was then introduced and read a paper entitled "The Early History of Wentworth County."

Beginning with a short account of the early history of Upper Canada, the paper traced in a clear and instructive manner the main events relating to the early settlement and development of this part of the province by the sturdy and patriotic United Empire Loyalists. The paper was replete throughout with interesting incidents relative to the religious, intellectual and social habits of the early settlers.

A lengthy discussion followed the reading of the paper.

WEDNESDAY, APRIL 10th, 1895.

President Briggs in the chair.

The Corresponding Secretary announced the receipt of a number of exchanges.

Messrs. John Knox, Alex. McLagan and H. P. Coburn were elected ordinary members of the Association.

The Corresponding Secretary was then called on to read the papers of the evening; the first of which, entitled "The Idyl of a Rambler," was from the pen of Mr. H. B. Small, of Ottawa.

Mr. Small, in his paper, set forth the many aspects of joy and beauty in which nature is wont to display herself even to the casual student of her varied phases.

The second paper, which gave an accurate account of the events prior to and connected with the Battle of Stoney Creek, was written by Mr. Douglas Brymner, Dominion Archivist at Ottawa. The facts narrated were for the most part based on original documents contained in the Dominion Archives, copies of which were attached to the paper.

At the conclusion of the reading of the papers Mr. Small was elected to represent the Association at the annual meeting of The Royal Society of Canada.

TUESDAY, APRIL 30th, 1895.

SPECIAL MEETING.

President Briggs in the chair.

The programme for the evening consisted of an exhibit of lime-light views by the members of the Photographic Section.

The views, which were all relative to Canadian scenery, were much enjoyed by the large number of members and visitors present.

THURSDAY, MAY 9th, 1895.

President Briggs in the chair.

The Curator announced the donation by Dr. Gaviller of an Indian arrow from Arizona.

The annual meeting was then held, and the following reports read and adopted.

Report of the Council, by the Secretary.
" " " Curator, by Alex. Gaviller.
" " " Geological Section, by A. T. Neill
" " " Biological Section, by H. S. Moore.
" " " Photographic Section, by Wm. White.

The following officers were elected for the ensuing year:

President, - - - -	S. Briggs.
First Vice-President, -	A. T. Neill.
Second Vice-President, -	A. E. Walker.
Corresponding Secretary,	Rev. J. H. Long, M. A., LL. B.
Recording Secretary, -	S. A. Morgan, B. A.
Treasurer, - - - -	J. M. Burns.
Curator, - - -	Alex. Gaviller.
Asst. Secretary and Curator,	Walter Chapman.
Auditors, - - -	Geo. Black and F. Hansel.

Council: P. L. Scriven, J. E. P. Aldous, B. A., W. H. Elliott, B. A., Ph. B., Thos. Morris, Jr., Major McLaren.

As the report of the Treasurer had not been audited, it was resolved to adjourn the Annual Meeting, subject to the call of the Secretary.

FRIDAY, JULY, 5th, 1895.

Adjourned Annual Meeting.

President S. Briggs in the chair.

The report of Treasurer and Auditors, showing a balance of $206.10, was read and adopted.

President Briggs announced that through personal considerations it would be impossible for him properly to perform the duties of President for the coming session, and asked that a successor be appointed. In accepting the resignation, the meeting expressed regret that Mr. Brigg's private duties did not permit him to retain the office he had so ably filled for the past session.

The election of a new President resulted in the promotion of Mr. A. T. Neill, 1st Vice-President, to the office of President, T. W. Reynolds, M. D., being elected to the office of 1st Vice-President rendered vacant by the promotion of Mr. Neill.

The newly elected President announced that a section for the study of Microscopy would be organized at the opening of the session of 1895-96.

REPORT OF THE COUNCIL.

Your Council have pleasure in submitting their report for the session of 1894-5.

Since the last annual meeting the Council has held five meetings, the proceedings of which are duly recorded in the minute book of the Council.

The general meetings of the present session—eight in number—have been marked by the increased interest of the members and public generally, as evinced by the large numbers in attendance and the hearty discussions which have followed the reading of all the papers.

Following is a list of the titles and authors of the papers read:

1894.

Nov. 8th.—"The Purpose of the Association," President S. Briggs.

Dec. 13th.—"Early History of the Indians North of the Great Lakes," Dr. P. E. Jones.

1895.

Jan. 24th.—"Europe during the Past Thirty Years," Rev. J. H. Long, M. A., LL. B.

Feb. 15th.—"A Two Thousand Mile Tour to the Land of Perpetual Ice and Snow," J. B. Tyrrell, C. E.

March 7th.—"Speech in Lower Animals," Prof. R. L. Garner.

March 20th.—"Early History of Wentworth County," Inspector J. H. Smith.

April 10th.—"Idyl of a Rambler," H. B. Small.

April 10th.—"Battle of Stoney Creek," Douglas Brymner.

April 30th.—Lantern Slides, Photographic Section.

The membership has been increased by the addition of six ordinary members and one corresponding member, while none have withdrawn.

Through the kindness of the members and other friends of the Association a number of valuable donations to the Museum have been made during the present year, and the Council would take this opportunity of publicly tendering their thanks for the same.

At the annual meeting of the Royal Society of Canada, held at

Ottawa in May of last year, your Society was ably represented by H B. Small, Esq., and the same gentleman has been appointed as our representative at the approaching meeting of the Society.

In conclusion, we would urge upon the members the necessity of each applying himself, as far as possible, during the coming recess, to the work of his particular department, so that all may return with some new facts as material for the work of the coming session.

All of which is respectfully submitted.

S. BRIGGS,
President.

S. A. MORGAN, B. A.,
Secretary.

EARLY INDIAN HISTORY.

Read before the Hamilton Association December 13th, 1894.

BY DR. P. E. JONES.

When, in 1524, just 370 years ago, the first settlers from France laid the foundations of civilization in what is now this fair Dominion of Canada, they expected to find the aboriginal inhabitants a mere race of savages, meagre and starving wretches, whose constant exertions were only employed in attempting to escape the famine with which they, they supposed, were perpetually threatened. The discoverers were therefore surprised to find a proud race of dignified men, terrible in war and mild in peace, led by able warriors, statesmen and orators, capable of maintaining order without the restraints of law, and uniting by the closest ties the members of the same band. They found a wild but noble race, *in peace*, wandering over these beautiful hills and dales, securing easily a subsistence from the abundant game, or in their swift canoes gliding over these magnificent lakes and rivers, often meeting together as they now occasionally do in Grand Council, when the assembled people would sometimes enliven the proceedings by dancing or athletic sports, giving rise not seldom to merry peals of laughter. They were numerous, powerful, wise and happy, and nothing but the weight of many years bore them down to the grave. The Indian mother could then rear a large family of healthy and happy children; the Indian corn grew tall and rank round their villages; the old men made their feasts and smoked their pipes; the young men and women danced; the medicine men applied from nature's store such simple remedies as then sufficed to drive away the grim monster Death. These were happy days of sunshine and calm to the red sons of the forest.

But *in war* these Frenchmen found them different. Instead of the merry laugh the hills rang again with the fierce war-whoop, and the merry dance was changed to the savage war-dance. The pipe of peace was buried, and every brave, with tomahawk and scalping knife in hand, was ready to sell his life for his liberty.

There were two great nations of Indians originally occupying Canada, the Algonquins and the Hurons. The Algonquins occupied all the land north of the St. Lawrence River and Lake Ontario. Shortly before the French came they had been the most powerful of all the tribes and were considered the masters of this part of America. They are described as having the mildest aspect and the most polished manners of all the Indian tribes. The remains of this once powerful nation are now the Ojibways, the Ottawas, the Western Algonquins or Lenape, and the Menomonies. The Hurons occupied a tract of land about 25 miles wide along Lake Huron and were remarkable for their industry. There was also a small tribe called the Neuter Nation, occupying the banks of the Niagara, and the peninsula between Lakes Erie and Ontario, who were called by the Hurons Attiwondawonks. Very little is known of them and they have long been extinct.

The Iroquois or Five Nations, who occupied the country south of the St. Lawrence and Lake Ontario, have always been, more or less, connected with the history of this country. Their confederacy was composed of the following nations: The Mohawks, Oneidas, Onondagas, Cayugas, and Senecas. They were never found waging war against each other, and usually combined when attacked.

In 1608 the French sent an exploring party up the St. Lawrence, under Samuel Champlain, and passing up the river he fixed upon a high hill, richly clothed with vines and walnut trees, as the place to winter. This hill was called by the Indians, Quebeio or Quebec, and the city since built upon it has retained the name. Here he formed a settlement and built store houses, and next spring he pushed further up the river. When about 25 leagues above Quebec he met the chiefs of the Algonquins, and with them made his first treaty with Canadian Indians, which bound him and them to make war together upon the Five Nations south of the river. Going south with the Algonquins, he twice met the Iroquois in battle on the borders of a large lake, which he named after himself Lake Champlain. The Five Nations were soon put to flight with some loss by the use of fire-arms, something they had never before heard of or seen.

After this Champlain returned to France, but in 1615 again came to Canada with a new company, among whom were four Roman Catholic priests, the first missionaries to the Indians of Canada. The following year Champlain, accompanied by Algonquins to the number of 2,500, made another formidable raid upon the Five Nations, but this time they had to return after accomplishing very little. About 1620 a treaty of peace was entered into between the Iroquois and Hurons, in which Champlain and a Huron Chief named Wolf-stag took an active part. This treaty, however, was of short duration, for three years only passed when the Five Nations were again at deadly warfare with the French and Hurons. But just about this time, war having broken out between France and England, Sir David Kirk sailed with a fleet to the St. Lawrence and forced Champlain with his colony to surrender. Kirk sent his French prisoners to England, but by the treaty of peace in 1632 they were sent back and the Colony became again the property of France, which in the following year sent out enough new colonists to make the total white population about 6,000. Champlain died in about 1636, and in the meantime the Iroquois had been fighting fiercely with the Hurons and Algonquins, the latter of whom they completely subdued.

Montmorency, who followed Champlain as governor, succeeded in making peace between the hostile tribes. The Roman Catholic missionaries at the same time were actively at work, and no less than 3,000 of the Hurons are said to have been baptized at one time. But in 1648 the Five Nations again arose in war and attacked the French settlements with desperate fury, killing alike priests, women and children. They attacked the Hurons, who had of late been peaceful and flourishing, and filled the land with horror and blood. The Hurons fled to supposed places of safety, but their enemy pursued and killed them till at last they had reduced that once powerful nation to a little tribe of about 300 souls. This small remnant of the nation, with downcast heads and heavy hearts, wandered through the thickest forests to evade their savage enemies until at last they were able to throw themselves upon the charity of the French at Quebec. A little station called Sillery was there provided for them, which in a few years' time saw the last of the Hurons.

The Iroquois now lorded it over Canada, and they were continually attacking the French settlements, until in 1653 they, of their own accord, made overtures of peace. But while one part of them would make peace another would carry on hostilities, till in 1663 war raged with greater fury than ever. The Five Nations during all this time continually extended their territories, and having seen the powerful effects of fire-arms they procured them from the Dutch and English. They now attacked the Ottawas, who, as I have before mentioned, were a *part* of the Algonquins. They inhabited the northern part of Canada, and did not make even an attempt at resistance, but sought refuge among the marshes or on the islands of Lake Huron. They completely subdued the great Cat nation, and it is reckoned that the Five Nations held undisputed sway over a country 500 miles in extent. The very sight of one of them struck terror into the neighbouring tribes, and on the side of New England the cry of "A Mohawk! A Mohawk!" echoed from hill to hill, and all who heard it were filled with fear. To add fresh consternation to the people, Canada was at this time visited by a succession of earthquakes, which lasted for half a year, recurring two or three times a day.

In 1665 France sent out detachments of soldiers to protect her colony and subdue the Five Nations. Courcelles, who was governor at this time, built a number of forts and three of the Five Nations sued for peace. The fierce Mohawks and Oneidas, however, stood back and still kept up the conflict, although the French troops and forts kept them at a distance from the settlements. In 1667 Courcelles pushed the power of France farther westward, and commenced the building of a fort near Kingston, but he was recalled to France and succeeded by Frontenac, who finished building the fort and called it Fort Frontenac. The Roman Catholic clergy at this time succeeded in preventing the sale of spirituous liquors to the Indians, though they were opposed by Frontenac, who thought that fire-water was useful to him in his military and commercial dealings with the Indians. Frontenac was recalled to France in 1682, and M. de la Barre was sent out as the new Viceroy.

Canada was now in a critical state. The fine Hudson Bay Territory, which had been heretofore in possession of the Dutch, now fell into the hands of the English, and they laid claim to all the country occupied by the Iroquois. The Hudson Bay Company had pushed their agencies south as far as Lake Superior and were making friendly dealings with the Iroquois, and trying to stir them up against the French. As the English gave the highest price for furs, the Five Nations began to deal with them, and even bought up those that were intended for the French market. Barre met the chiefs of the Five Nations upon the north shore of Lake Ontario and endeavoured to frighten them into having nothing to do with the English of Hudson's Bay, but the Iroquois insisted on doing as they pleased in the matter. The English reproached the Five Nations for not having gone to war with the French, but they replied in the same noble and determined manner. "Barre," they said, "is our father," "Corlaer," as they called the governor of New York, "is our brother, "but neither of them is our master. He who created the world gave "us the land we occupy; we are free. We respect both, but neither "has the right to command us, and no person ought to take offence "that we prevent the earth from being troubled."

Barre, on account of his unsuccessful negotiations with the Indians, was recalled to France and succeeded by Denonville, a brave and active officer, who immediately took steps to extirpate the Indians if he could not reduce them to subjection. He opened his campaign with a measure most iniquitous and unjustifiable that could well be conceived. Having invited a number of Chiefs to meet him on the banks of Lake Ontario, he treacherously put them in irons and sent them to France. There could now be nothing but war to the utmost extremity. He marched against the Iroquois with 800 French regulars, and 1,300 Algonquins, but the expedition accomplished nothing worthy of note, except the building of Fort Niagara. On the return of the French they found Lake Ontario and the Upper St. Lawrence alive with the canoes of the Iroquois, who blockaded forts Niagara and Cataraqui and razed the former to the ground. They afterwards made a sudden descent upon the Island of Montreal, which they laid waste with fire and sword, and carried off two hundred prisoners without any resistance. They also blew up the fort at Cataraqui. In 1689 Count Frontenac was again sent out from France, for the purpose of putting a stop to the war, or if that could not be done to carry it on with more vigor.

After finding that it was useless to try to win the Iroquois from the English, he sent out several expeditions against the English settlements of what is now New York State, killing a number of the defenceless inhabitants and making the Iroquois still more bitter against the French. The English of New York and Boston retaliated by sending out two expeditions against Canada, but both returned without accomplishing anything. The Iroquois continued to harass the colony until 1694, when they made overtures of peace, which had the effect of suspending hostilities for two years. In 1696 Frontenac prepared the largest expedition against the Five Nations that had yet been attempted, but it turned out to be an act of heroic folly, accomplishing nothing but the destruction of some wooden cabins and some grain. The Indians did not show themselves till the expedition was retreating, when they followed and harassed the rear. The war continued till Frontenac died in 1698, but two years after peace was made with the Iroquois by his successor De Calleries.

After three years of peace, the English, who were now at war with France, determined to take possession of the whole of the northern part of America. To do this they called upon the Five Nations to assist them, but the Indians were very reluctant to take up arms. De Vaudreuil, who had meanwhile succeeded De Calleries, was able by good management to keep the British forces back, and they soon abandoned the attack, the Iroquois having done nothing to help them. During the interval of repose that ensued, both English and French were preparing for another great struggle, each endeavoring to gain the assistance of the Five Nations. The French succeeded in getting the assistance of the Senecas and Onondagas, but in the west the French had to meet a new enemy, the Foxes, whom they nearly exterminated.

In 1710 the English again sent out an expedition against Canada, partly by land and partly by water. That part going by water was wrecked at the mouth of the St. Lawrence, and the rest hearing of the disaster retired to New York. In 1713 occurred a change in the English ministry, followed by the famous Treaty of Utrecht, which closed the war in Canada. France gave up Acadia and Newfoundland, and surrendered all her claims to the sovereignty of the Five Nations, an empty concession by which she gave up that which she never possessed, and England acquired a nominal right which she could not enforce.

Now followed a period of 42 years of profound peace for Canada, during which several French governors ruled with more or less wisdom, and French settlements sprang up by the St. Lawrence with great rapidity. More attention was paid to agriculture, and the fur trade was carried on extensively, while Quebec reached a population of 8,000 souls. Charlevoix, a French traveller and writer, made a trip in a birch bark canoe, from Quebec up the St. Lawrence, along the south side of Lake Ontario and the Niagara river, along the north shore of Erie and up the St. Clair and Detroit rivers into Lake Huron and got as far as Mackinaw. In his splendid account of the trip he describes the country about Sarnia and the Detroit River as the most beautiful and lovely part of Canada. During all this time the Indians of Canada remained at peace, little change taking place in their affairs.

EUROPE DURING THE LAST THIRTY YEARS.

Read before the Hamilton Association, Jan. 24th, 1895.

BY REV. J. H. LONG, M. A., LL. B.

The world of to-day is very different from that of thirty years ago. The changes have been so gradual that they have, in many cases, escaped notice. But, could we suddenly be set down in the world as it was thirty or thirty-five years ago, we should scarcely be able to recognize our own identity. The great civil war on this continent was then at its height: the issue still lay in the future. Iron-clads, breech-loading rifles, and Maxim guns, were but in embryo; dynamite was virtually unknown; the Atlantic cable was an experiment; the telephone, the electric light, the electric railway, the bicycle, had never been thought of for practical purposes; while baccili and microbes were in indisputed possession of the physiological field. The Dark Continent was, then, not a name, but a reality; the Suez Canal was unbuilt; no Transcontinental Railway joined the Atlantic to the Pacific; slavery existed in civilized lands; Central Asia was unexplored; the Pope sat upon his temporal throne; there was no German empire, and France was ruled by Napoleon the Third. Truly, we should not recognize our surroundings could the hand be put back on the dial-plate of Time!

But it is not of all these things—it is not of scientific progress that I wish to speak: it is of the political changes that these years have brought about in Europe—changes fraught with the most momentous consequences to Europe and the whole world. In considering this matter it will be sufficient to confine our thoughts to three movements: the rise of the German Empire, the unification of Italy, and the decadence of the Turkish Power. There have been, it is true, other political movements: Spain has had her civil wars, England and Holland have had their colonial wars. But the reconstruction of the map of Europe has depended upon the three changes just mentioned. Let us take them in order.

First—the creation of the German Empire. In the northern part of Central Europe there is a little land that is now known chiefly for the excellence of its dairy produce, but which, from old Viking days, has played no unimportant part in history. I need scarcely say that I refer to Denmark. In the year 1863 the King of Denmark ruled not only over what is now Denmark, but also over the two provinces Schleswig-Holstein and Lauenburg. These lay to the south of the Province of Jutland, thus adjoining German territory; they were, moreover, the most valuable part of Denmark. The people of these provinces were very largely German in language and sentiment. They had, in fact, a double allegiance, being connected politically with both Germany and Denmark. This produced such friction between the Danish Government and the pro-German party in the Provinces—a friction increased by various other matters, *e. g.*, the question of the language to be used in the schools—that war broke out in 1864 between Denmark and the Germanic Confederation. "The Germanic Confederation," for; at this time, Germany was a loose league, at the head of which were the two rivals, Prussia and Austria. Following these at a respectful distance were certain kingdoms (Hanover, Saxony, Wurtemburg, Bavaria) and about forty principalities and duchies. The capital was Frankfort-on-the-Main. This war could have but one termination: two millions could not stand against seventy millions. After a heroic struggle Denmark succumbed: the territory in dispute was wrested from her rule. The question now arose: What shall be done with it? Upon this question Prussia and Austria could not agree. This disagreement and various old differences resulted in the war of 1866. This is sometimes known as "the seven weeks' war," and it ended by the Treaty of Prague. By the terms of that treaty Austria—the lineal successor of the Holy Roman Empire, and, still farther back, of the Empire of the Cæsars—was removed from her post as leader in the Germanic Confederation, and Prussia was installed in her stead. The rise of the Kingdom of Prussia from the little duchy of Brandenburg is one of the most important events in history, and shows how a determined and united people, under able rulers, can overcome apparently unsurmountable obstacles. For Prussia *had* had able rulers—the Hohenzollerns; and, as the founder of her greatness, that Frederick who, in the preceding century, had given her a military system such that she defied a Continent in arms. At the time of which I am now speaking (1866) Prussia was ruled by a worthy scion of this house—the late Emperor William, whose son, the late Emperor Frederick (called affectionately by his people "Unser Fritz") greatly distinguished himself in this, as in the later Franco-Prussian war. In addition to these men, Prussia had three who were veritable towers of strength: in statecraft, Bismarck; in strategy, Von Moltke; in finance, Von Roon. More than this: her army was furnished with the breech-loading rifle ("the needle-gun"), while the Austrians used the old muzzle-loader. These and other circumstances explain the result of a campaign unexampled in history—the Bohemian campaign of 1866, ending in the great fight at Sadowa. At one blow, then, the ancient house of the Hapsburgs, which had held sway for 600 years, was hurled from its position as arbiter of Germany, to make way for a power whose very name was first heard but yesterday in the councils of Europe. But Prussia, although young, was very swift in action and very stern in dealing with conquered foes. She deposed Hanover from her position as a kingdom because she had sided with Austria [North Germany had generally sided with Prussia and South Germany with Austria]; and her ultimatum to her enemy was, that she should withdraw from German affairs, should pay a large war indemnity, and should give to Italy, who had helped Prussia, and whom the Austrians very easily disposed of, the old Italian territory of Venetia. But William was only King of Prussia after all—not Emperor of Germany. A further step must be taken before "manifest destiny," as the Prussians termed it, should be fulfilled. The old score with France must be settled. Prussia went on, therefore, quietly perfecting her army, obtaining information as to France and her defences, uniting the North-German people, and in general preparing for the struggle which she felt must some day come, and which she determined should come when she was best and France worst prepared. France was at this time an empire, under the rule of Napoleon III., nephew of the great Napoleon. The people were, to a certain extent, restless—they had not forgotten the *coup d' état* by which the Emperor had reached the throne. Yet they were proud of the military successes they had won under his rule—the victories of the Crimea, of Algeria, of the Austrian campaign. They were proud, also, of their progress in the arts of peace, of the extension of their commerce, of the embellishment of their capital. A little cloud, however, hung in the sky. Germany had not forgotten that the legions of the great Napoleon had once laid waste her smiling valleys and her vine-clad hills. She had allowed to stand the monuments which the invaders had set up, that these monuments might be a perpetual reminder to her sons of the duty of avenging the dishonor offered to the Fatherland. But France, light-hearted, careless France, had closed her eyes to the present, and lived wholly in the glamor of the past. To her Germany was still the somewhat uncouth neighbor across the Rhine, whose growing aggressiveness it would some day be necessary to curb. The opportunity soon presented itself. The Spanish throne became vacant, and the provisional government elected Prince Leopold, a scion of the Hohenzollern dynasty. France at once objected, alleging that this was German intrigue, a deliberate scheme to extend Prussian influence over Spain, France's nearest neighbor to the south. She called upon Prussia, therefore, to disallow the act. Prussia refused, somewhat brusquely, and war was declared by Napoleon in July, 1870. The old passion for war, "the furor celticus," at once burst into a flame. "On to Berlin!" was the rallying cry; and the soldiers boasted that within a month they would sing the Marseillaise along her streets. But France had calculated without her host. Silently, but with wonderful rapidity, the German armies (for the South German States had joined Prussia) were mobilized upon the frontier, and, before the echoes of the boasts of the boulevards had died away, they were on French soil, their faces turned toward Paris. France discovered, when it was too late, that her army was largely on paper, that the German officers knew more about France than Frenchmen did, and that it was a question, not of taking the enemy's territory, but of holding their own. Then followed in rapid succession Verdun, Gravelotte, Mars-la-Tour, Woerth, and many another blood-stained field; with the sieges of Strassburg and Metz, and the fateful day of Sedan, ending in Napoleon's capture, State imprisonment, and death. But Germany had not done with her ancient foe. Paris must surrender. In vain were made overtures of peace. Inch by inch the invading host crept nearer, until, with famine stalking through her streets, the victorious legions entered her gates; and then, in the battle-hall of the

French kings, and surrounded by the trophies of French arms, William, King of Prussia, was crowned the Emperor of United Germany. The French Empire had now fallen, and the Commune reared its ensanguined head. Frenchmen fought with Frenchmen. The spirit of '93 again burst forth with lurid glare. Again Notre Dame was desecrated; again the capital became the sport of the fickle, frenzied mob; once more her streets ran red with blood. The Commune crushed, Germany demanded her pound of flesh. The terms were: $1,000,000,000 in money; the support of an army until that sum was paid; and the cession, with all their fortresses, of Lorraine and French Alsace. How that debt was paid is one of the marvels of history. Day by day cars laden with bullion crossed the frontier, until, with the recuperative power she has so often shown, France stood once more before the world, no foeman's foot upon her soil. A stable republic, she set herself calmly and determinedly to profit by the errors of the past. In 1878, and again in 1889, she gave the grandest expositions the world had seen; her empire has extended itself in Farther India, in Madagascar, in Africa, to a degree undreamt of before; her army is larger than that of Germany; her navy second only to that of Britain; her school system in certain respects is the best in the world; and she stands to-day far stronger than when her troops set out so boastfully to cross the German Rhine.

Let us now turn to the second great movement of the last thirty years. There is no more wonderful page in recent history than that which describes the rise of the Kingdom of Italy. The story can be told in a few words. For hundreds of years before the middle of this century, Italy had been merely what Napoleon had called it, "a geographical expression." But there had never died out in the people's heart a desire for unification, a longing for the day when the flag of a united nation should wave "from the base of the Alps to the shores of the sea." The memories of Rome in ancient days, of Florence and Pisa, of Venice and Genoa, in modern days, fired the Italian heart; and the cry of "Italy, one and free," never entirely died away. Fortunately there was, at the time of which I am now speaking, in the province of Savoy [Savoy which lies just beneath the shadows of the Alps back of Genoa], a royal house fit to undertake this patriotic task. Fortunately, also, Italy was rich in great men: the King, Cavour, Mazzini, and the lame lion of Caprera—Garabaldi.

Indeed, more than thirty years ago, this house of Savoy had accomplished much of this task, for in 1860 it had acquired Naples, Tuscany, and other minor states; and, in the war of 1859, it had wrested from Italy's hereditary foe, Austria, the rich plains of Lombardy, with its capital Milan. But there were two important divisions to be gained: the Pontifical States, *i. e.* the city of, and the country round about Rome; and Venetia, the land of Venice and her lagoons, of Padua, "whence Portia came," and of "fair Verona." The latter of these, Venetia, Italy obtained, as we have seen, from Austria, as a result of the war of 1866. But it was felt that there could be no real national unity so long as the Pontifical States were not sharers therein. Turin was only a provincial capital—the real capital must be Rome. It was deemed necessary, therefore, that the Pope should yield up his temporal sovereignty, and that his States should be added to the Italian Kingdom. Whether the Pope was entitled to such secular sovereignty or not is a disputed question, into a discussion of which I shall not enter. It was decided in Italy by the sword. Notwithstanding aid given to the pontifical cause by various organizations, *e. g.*, the Canadian Papal Zouaves, Rome opened her gates to the Italian army, and the City of Tiber became the capital of a United Italy. The year 1870 was a memorable year in Papal annals. It saw the assembling of the Oecumenical Council, which proclaimed the doctrine of the infallibility of the Pope when speaking "ex cathedra;" it saw the withdrawal of the French troops from Rome, which withdrawal led to the fall of the Pope's temporal power; and it saw the defeat of France, the eldest daughter of the church. The changes which the last thirty years have accomplished in Italy are incredible. Commerce has gone forward by leaps and bounds; a Colonial Empire has been founded in Africa; the navy is large and well equipped; the army large and well drilled; the cities have made wonderful progress in sanitary and municipal matters, and many of them have grown with great rapidity, Rome's growth offering a parallel to that of the western cities of this continent; the Italian people have become accustomed to constitutional government; and an excellent educational system has been established. In a word, Italy, which, 30 years ago, was regarded somewhat as Portugal or Greece is now, to-day ranks among the great powers of Europe. It is true, this has not been brought about without great cost. The taxatiôn has been enormous; and, as a result, emigration has been excessive. The financial condition of the Kingdom is, therefore, anything but satisfactory. But this is a mere passing phase; and, before many years, Italian finances will be put upon a sound basis. The second great movement in Europe during the epoch which we are considering is, then, the unification of Italy.

To study the third we must turn to the extreme East, to Russia and the Balkan Peninsula, the head and front of "the Eastern Question," which, like a great sea serpent, periodically rears its head and agitates the waters of international diplomacy and journalism. Thirty years ago Russia had but recently recovered from the Crimean war. This war very rudely dispelled the belief which had prevailed in Russian military circles since Napoleon's retreat from Moscow, that the army of the Czar was invincible. It also shattered for a time the dream upon which the Russian heart has always been set, viz., the conquest of Constantinople and of the Balkan Peninsula. In the extreme south-east of Europe is to be found the only nation that has remained non-Christian in religion, and Asiatic in custom, language, and blood: non-Christian in religion, for the Turks are Mohammedans; Asiatic in blood, language and custom, for they are Mongolian by blood, Turanian in speech, and polygamous in marriage relationships. The only race of any size in Europe that resembles them to-day is the Hungarian, or Magyar race; but this people long ago laid aside its most distinctive Eastern manners, and accepted the Cross of Christ. Its peculiar Turanian speech, composite or agglutinate in structure, and, therefore, allied to the Turkish language, it still retains. It is not in place to trace the early history of the Turks in Europe. We remember that in 1453 the Sultan, Mohammed II., forced the gates of Constantinople, changed the Church of St. Sophia into the Mosque of Omar, and put an end to the Greek division of the Roman Empire. We remember that the invading Moslems carried their crescent northward to the walls of Vienna. Hurled back by Sobieski, the Pole, they took refuge behind the Balkan mountain ridges, seizing Greece, Bulgaria, Roumania, Servia, and what are now other independent states, along with what is Turkey proper to this day. From the time of the conquest the most bitter hatred existed between the invaders and the old inhabitants of the land. Differing in language, race, and religion—for the latter were of the Greek Church—there was, from the first, rebellion on the one side and oppression on the other. In the early part of this century the first successful revolt was inaugurated, the extreme south wresting its independence from Turkey and forming the Kingdom of Greece. This was an inspiration to the other States. They, too, dreamed of liberty, either as separate, autonomous powers or else as members of a vast Slavonic Union under the aegis of Russia, Turkey's ancient foe. For Russia was drawn to their side by sympathy and interest: by sympathy, arising from community of blood and faith; by interest, because she had never forgotten the old prophecy that some day the white Czar shall water his charger in the Bosphorus, and that he who is master of Constantinople shall be master of Europe and Asia. But, although the Great Powers sympathized with these Christian provinces as against Turkey, yet they did not wish to see Russia absorb Turkey. This for various reasons: because they mistrusted Russia's kindly solicitude; because they wished to preserve the so-called balance of power; and because Russia at Constantinople would be dangerously near certain possessions of their own, *e. g.*, Malta and the Ionian Islands. Therefore, when in 1854 Russia interfered in the affairs of Moldavia and Wallachia (now the kingdom of Roumania), she found herself confronted by the Allied Powers; and the Crimean War, ending in the defeat of Russia, broke out. The result of this war was that she was checked in her advance towards the Bosphorus, that she was shut out from the Dardanelles and the Black Sea, that certain provisions were made for the better treatment of the Balkan peoples, and that, to some of them, was granted a limited independence. Nothing was heard, therefore, of the Eastern question for some years. After a time, however, it began to be whispered that Turkey was disregarding her obligations, and that Russia had ambitious designs. So, in 1876, the Servians, Montenegrins, and Bosnians rose against Turkish rule; in 1876 the Bulgarian atrocities were committed by Ottoman soldiers; and in 1877 Russia declared war. Now the Turks have this peculiarity: when others can be got to fight for them—as in the Crimean War—they show little disposition to fight for themselves, but when they must fight alone, they are among the best troops in the world. In 1877-8 they had no allies, and their defence against the overwhelming forces of Russia is one of the most brilliant chapters in military story. The names of Plevna and the Shipka Pass have shed a never-dying glory upon Turkish arms. But even the valor of desperation must yield to numbers. One by one the lines of defence were broken, and the Russian troops found themselves at the gates of Constantinople. The prize was within their grasp, when a British fleet passed the Dardanelles, and Admiral Seymour sent a message to the Russian commander, that the taking of Constantinople would mean the opening of his guns upon the invading camp. The Russians, therefore, halted their troops without the city gates, and the Treaty of San Stephano was signed: a treaty amplified by that of Berlin. By the terms of these treaties further protection was guaranteed to the Christian subjects of the Sultan; Austria obtained Bosnia, and England the Island of Cyprus; while an enlarged measure of self-government was granted to various of the Balkan States. The results, then, of the events of the last 30 years in this quarter of Europe are these. The Ottoman Empire, while still preserving her Asiatic possessions, has been cut down in her European possessions from a population of 15 to one of 4 millions; and there have arisen several new Christian states, allied to Russia by interest and sympathy, but somewhat suspicious of her as having designs on their independence. These states have, since 1878, made great advances in military strength and general civilization, and their existence has given a new turn to the yet unsolved Eastern Question.

Let us now consider the probable political future of Continental Europe. And (1): There is the possibility that the present status may be preserved, *i. e.*, that there may be no great war. Since 1878 there has been no such war, and many persons are becoming dubious of this terrible cloud which is supposed to be forever hanging over Europe. Possibly it may not be a war-cloud; it may be that the volcano, said to be ever upon the point of eruption, is only an extinct volcano. On the other hand, there are many elements of danger; there is much inflammable material ready for a conflagration. There are dynastic jealousies; there are religious and race feuds, centuries old; there is the newly-awakened longing for nationality on the part of rising states; and there are the standing armies. A word as to this last point. There is, I think, a good deal of exaggeration about the excessive war establishments and the unbearable taxation. As a matter of fact, Germany's war expenditure is not so large as that of the United States; and the time spent in the army—two years, shortened, in certain cases, to one year—is not lost time, by any means. The results are seen in the improved physique of the people, in the lowered death-rate, and in the increased national health. There can be devised no system for the thorough training of a people, for their all-round development—schools, libraries and other means of mental instruction are attached to continental army-stations—there can be devised no system for such training, and for training in habits of obedience, promptness, and thoroughness, that can compare with compulsory military service for a reasonable term. Therefore, as has often been said, were there no danger of war, conscription would, in all probability, still be maintained. On the other hand, the existence of large bodies of armed men is a provocative of war. The officers desire promotion; the men become restless in inaction; the rulers (whether Emperor or Parliament) wish to test the efficiency of their military system. Taken altogether, then, it may be reasonably assumed that, sooner or later, Europe will be plunged into a great conflict.

The disturbing cause will be one of two: The Franco-German quarrel and the Eastern Question. As to the first. It does seem almost incredible that a nation so highly civilized as is France can deliberately and avowedly prepare for a war of revenge: a war which shall deluge two lands, possibly a whole continent, in innocent blood. This shows how backward, according to our ideas of right and wrong, France is. But there are many countervailing considerations. We must not forget that the French believe Prussia to have intrigued and provoked the war of 1870; that her terms to the conquered were of unexampled severity; and that France had no opportunity in the war of showing her real strength. We must not forget that she lost two provinces which had been in her possession for more than 200 years; and that the people of these provinces, even yet, would much prefer French rule. At any rate, right or wrong, that a nation in many things the foremost in the world, a nation of whom it was said in times of old, "Deus omnia per Francos"—"God does all things through the Franks"—that such a nation shall lie prostrate before this rude upstart from northern forests; that her battle-flags, which have waved in victory in every quarter of the world, shall be trailed in the dust—these are things never to be thought of, not to be entertained for a single moment, by a true-born son of France. I fear, therefore, that she is but biding her time; when she is sufficiently strong she will strike the blow. And the France of to-day is very different from the France of 1870. She has laid aside much of the boastful spirit that came from the victorious campaigns of Louis XIV. and the Great Napoleon. She has learned wisdom by defeat. What shall be the result of that war between giants (for Germany has not been inactive since 1870, she is quite aware of the designs of France): what the result shall be, time alone can tell. But, unless other nations interfere, the war will be waged to the death. For, if France be the victor, she has the old score of 1815 and 1870 to wipe off; and she has a good deal of the Latin love of vengeance. If Germany be the victor, then, as Bismarck once said, "Future generations will ask, Where is the country which was once called France?"

The second disturbing cause is to be found in the Eastern Question—the persistent determination of Russia to absorb Turkey, and her encroachments in Central Asia. Now, if Russia were a civilized nation in the true sense—a nation in whose pathway freedom and justice walk—there would be no such antipathy felt toward her as is now felt by other nations. But Poland, Siberia, and Finland forbid that belief. Moreover, on many occasions she has broken her pledged word, *e. g.*, in the case of the navigation of the Dardanelles and the Black Sea a few years ago. It is considered unwise, therefore, by Great Britain and the other powers to allow her to move toward Constantinople. Not that they love Turkey more, or indeed at all, but that they love Russia less.

My own belief is, that the time-honored policy of Great Britain is unwise. It is true that Russia is faithless, that she has silently and ruthlessly advanced her posts through Central Asia towards the Afghan frontier. Great Britain is, therefore, amply justified in acting as she does, as far as ground of action is concerned. But I do not believe that Russia in Constantinople would be more dangerous to the Suez Canal, Egypt, Cyprus, Malta, or any of the other points in that chain of fortresses and stations which guard Britain's pathway to India, than she is now. She will never be satisfied until she reaches an open southern sea. If she does not reach it at Constantinople, she will elsewhere. If she were allowed to do this without interference, we should hear much less of attempts upon India. The two supreme powers in the east are Russia and Britain. It would be the wise policy, I believe, on Britain's part, to acknowledge that, like her own, the Russian Empire must increase year by year, and to leave to Time, the great magician, the softening and ennobling of the Muscovite nature. The one and only strong argument against this is the loss of Britain's prestige among the Mohammedans of India if she failed to check Russia's advance or to support Turkey in holding Constantinople.

In conclusion, I am going to do a rash thing, to attempt a forecast of the political map of Europe—a rash thing, because one should not prophesy until after the event. It seems to me that the present conditions point to the following results: (1) If France and Germany go to war they will be so evenly matched that it will be necessary for other nations to interfere in order to avert mutual destruction. From such interference disarmament will naturally ensue. (2) The Austrian Empire is the least homogeneous of all European states. Its discordant elements are held together, in fact, by the respect and love for the good Emperor Francis Joseph, and by fear of foreign attack. Before many years, in all probability, the German part will join the German Empire, and the other parts will be attracted by race affinities to surrounding nations, or else will form independent states. (3) Italy will acquire the long-coveted strip of Italian territory on the Adriatic Sea, with the great seaport of Trieste, and the reproach of *L'Italia Irredenta* will have lost its sting. (4) Russia will reach Constantinople, and "the sick man of the east," Turkey, will at last really die, as far as Europe is concerned.

These are, at any rate, the directions in which recent movements have pointed, *viz.*, the unification of scattered nationalities, and the drawing of lines of cleavage based on race distinctions.

What effect on political Europe the accession of the young Czar, who is said to be of a somewhat progressive mind, will have, or what effect the Armenian atrocities will have, it is too early to attempt to judge. But, whether these or any of these prognostications shall come true, one thing is reasonably certain, that far in the future is the dawn of universal peace, and that not soon shall the dove return with the olive branch from her weary wanderings o'er Europe's troubled sea.

THE BATTLE OF STONY CREEK.

Read before the Hamilton Association, April 10th, 1895.

BY DOUGLAS BRYMNER, DOMINION ARCHIVIST, OTTAWA.

At the opening of the campaign of 1813, in the war of 1812, the United States had determined to abandon their ambitious attempt to take possession of the whole Continent of America, and to concentrate their efforts on the capture of Upper Canada. On the frontier between Prescott and Lake Erie there were only 2,100 British troops all told. To attack this force and reduce Upper Canada 6,000 men were to be sent by the United States. And by this numerical superiority the capture of Ogdensburg by the British forces was soon offset by the taking and occupation of York. This, with the naval superiority acquired by the United States on Lake Ontario, placed Upper Canada in the most critical position. The number of the United States troops was fully five times that of those for the defence of Upper Canada, and they were in possession of the most important points, either for attack or defence.

It was doubtful if a battle could be risked by the force under Vincent at Burlington Heights, and in event of a retreat being determined on, there were no means of carrying off the few field pieces remaining, or even the wounded. Should it be thought prudent to risk a battle the quantity of ammunition Vincent had was only ninety rounds, so that the position of that part of Upper Canada seemed desperate. To make assurance doubly sure, two brigades, under Chandler and Winder, with dragoons and a strong detachment of artillery, were ordered down to secure the complete defeat and capture of the regular British force, and with it the possession of Upper Canada.

This was the position of Vincent's command previous to the battle of Stony Creek. Nothing seemed open to him but a retreat, leaving the wounded and the field pieces in possession of the enemy, and had Vincent taken this course few could have blamed him. But he would not give up without a struggle. One of the first acts of the United States reinforcement, after encamping, was to drive in the British advanced posts at Davis', eight miles from Burlington Heights, towards Forty-mile Creek, the picket consisting of the light company of the 49th regiment. The attacking party then took camp at Stony Creek. On hearing of this Vincent sent off Lieut.-Col. Harvey, the Deputy Adjutant General, to reconnoitre. On his return he recommended a night attack on the enemy's camp, whose force consisted of 3,500 men, that of the British 704, being five companies of the King's (that is, the 8th) Regiment, 280 in number, and the 49th, 424, a total of 704, or, as stated in Harvey's original letter, 700. Vincent agreed to the proposal, and in the most noble manner entrusted the command of the expedition to Harvey, although he accompanied it himself. In his official report Vincent says: "To Lieut.-General Harvey, the Deputy Adjutant General, my obligations are particularly due. From the first moment the enemy's approach was known he watched his movements and afforded me the earliest information. To him, indeed, I am indebted for the suggestion and plan of operations."

The night of the 5th June was unusually dark; at half-past eleven the march began; strict silence was ordered and enforced; the light companies of the King's and 49th in front, the 49th in the centre and the King's as a reserve. "In conformity," says Harvey, "with directions I had given, the sentries at the outskirts of the enemy's camp were bayonetted in the quietest manner, and the camp immediately stormed."

The matter of fact statement that the sentries were quietly done to death by the bayonet makes us forget to think of the grief stricken homes to which these men may have belonged, just as we read with nerves unmoved the "butchers' bill" after every battle, feeling mechanically that the dead and wounded were but machines, forgetting that they were human beings like ourselves, and connected by ties of love with others who were watching with anguish for the return of their loved ones. Not with much pathos, but with natural feeling, the French girl in the song says to her conscript lover:

Oh! if I were Queen of France, or still better Pope of Rome,
I'd have no fighting men abroad, no weeping maids at home;
All the world should be at peace, and if kings must show their might,
Why let them that make the quarrels be the only ones to fight.

And if kings should fight equally so should the rulers of republics.

The surprise was only "tolerably" complete. A few muskets were fired in spite of orders, and the charge being made across the line of camp fires, the small number of the attacking force was plainly seen, and the enemy gaining courage posted themselves on the heights and poured in a destructive fire of musketry, but the bayonet dislodged them, took possession of the field pieces, and in less than three-quarters of an hour the Americans were in full retreat, having abandoned the guns and everything else, including the two Brigadiers Chandler and Winder, other officers and 100 rank and file. Before dawn, as previously arranged, the victorious force of 700 against 3,500 retired in perfect order to Burlington Heights, with Vincent and Harvey leading.

The stories of Vincent having lost his head, and of Harvey being obliged to take command, of Vincent having wandered in the woods and being found two days afterwards, and of the disorderly flight of the attacking force are completely and absolutely contradicted by the official and other reports. The work was carried out as previously arranged, and Vincent, so far from being lost, wrote his official report at Burlington Heights on the very day the action took place. Other stories, such as that Harvey entered the camp at Stony Creek in the disguise of a quaker selling potatoes and taking notes, are equally contradicted, as are some of the incorrect statements which have obtained currency in the received histories. The value of this night attack does not appear to have been sufficiently realized. In itself, perhaps, not of great importance as an isolated expedition, the result was to clear the frontier of a formidable enemy and greatly to discourage him. The enemy retreated to seek shelter at Fort George, which was garrisoned by 5,000 men, but so great was the alarm caused by the success of Vincent that even Fort George, strongly as it was fortified, was not considered secure, and the great bulk of the American baggage was sent across the river to Fort Niagara.

It was the most important movement, in that respect, of the whole war.

On the 8th June, two days after the attack, Vincent wrote to Sir George Prevost, and I copy the letter from the original among the Canadian Archives (Series C., Vol. 679, p. 53):

BURLINGTON BAY, 8th June, 1813.

SIR : In consequence of our attack on the enemy's camp on the morning of the 6th inst., they have made a movement to their rear and retired back to the Forty-mile Creek, which has given me an opportunity of pushing out my patrol to their late camp.

I have had the honor to receive your letter of the 2nd inst., with a memorandum enclosed. The fleet are this moment reported. I am, therefore, confident I am perfectly secure in this post as long as we have the lake open to us. I have this morning made a change of position to a place named Coots' Paradise, on which I am throwing up a strong fortification in my front ; all other parts are so strong as to secure themselves from an attack of an enemy. In this situation I am determined to hold out if their whole force of 12,000 is brought against me. Col. Harvey and Capt. McDonall will write very fully on the subject of their new situation to Col. Baynes.

I have to report the arrival of Sir James Lucas Yeo. He informs me that he cannonaded a camp at the Forty-mile Creek, which he dispersed with some bateaux. I had hardly given orders for the detachment of the 8th being disembarked, when I received a private express from the Forty-mile Creek that in consequence of our fleet being up the lakes the enemy struck their tents and are retiring to Fort George. I have, therefore, sent this detachment back to the Forty-mile Creek with the Commodore, and I have pushed forward my outposts with some Indians to co-operate with our fleet and take up their quarters this night at the Forty as my advanced post.

I can assure Your Excellency that a troop of dragoons will be of the greatest service in this country.

I have the honor, etc.,

JOHN VINCENT, *Brig. Gen.*

His Excellency Lieut.-Gen. Sir George Prevost, Bart., Etc.

A letter from Col. Harvey to Col. Baynes, dated the 11th June, copied from the original, among the Canadian Archives (Series C., Vol. 679, p. 76), is of some interest. An extract is given :

FORTY-MILE CREEK, 11th June, 1813.

MY DEAR COLONEL : General Vincent has desired me to forward to you the enclosed report from Lieut.-Col. Evans and accompanying return from Lieut.-Col. Nichol, Q. M. G. of Militia, who have been actively and usefully employed here for this day or two. The panic of the American army, you will perceive, has been most complete, and had the whole of this division been at hand to take advantage of it, doubtless very many prisoners might have been taken, and probably some more guns; but I am not aware that any further results could have rationally been hoped for. It was quite impossible, however, for us to know to what a degree the panic prevailed, and even if we had, to have moved sufficiently rapidly with all the troops to take advantage of it. What we could do was, however, done, and I think you will be of that opinion when you know that the enemy only retired from his post at 12 o'clock on the morning of the 8th, and our advanced troops (amounting to 400 men) were in possession of it, and advanced from it after the enemy by seven of the same evening. The distance is 20 miles from our position at the head of the Lake.

The principal objects Gen. Vincent has had in view in making a forward movement with the greatest part of the troops to this place are to communicate with and give every support and assistance in his power to Sir James Yeo and the fleet, to be at hand to take advantage of the success we sanguinely anticipate from his approaching recontre with De Chauncey, to give encouragement to the militia and yeomanry of the country, who are everywhere rising against the fugitive Americans, making them prisoners and withholding all supplies from them, and lastly, and perhaps chiefly, for the purpose of sparing the resources of the country in our rear, and drawing the supplies of the army, as long as possible, from the country immediately in the enemy's vicinity. Our position here secures all these important objects, and so long as our fleet is triumphant, it is a secure one. Should any disaster (which God forbid) befall that, we have no longer any business here or in this part of Canada.

Enclosed is the report sent by Major Evans, dated 10th June, of which the following is a copy:

FORTY-MILE CREEK, 10th June, 1813.

SIR: Conformable to the wish of Brigadier General Vincent, commanding, I herewith transmit a concise and connected narrative of the late operations of the detachment with which he honored me with the command. In consequence of your order given immediately after my arrival on 8th June, I embarked in company with Sir James L. Yeo and proceeded for the squadron, then lying off the mouth of Burlington Bay, which on our reaching was ordered by signal to weigh and stand for the Forty-mile Creek. A steady breeze soon enabled us to gain and come to an anchor close in with the enemy's position, with which we had a brush (on passing in the morning). By the excellent arrangements of the Commodore, the whole of my detachment, composed of about 220 of the King's, was on shore and in possession of the enemy's encampment at half-past seven p. m., little more than three hours after receiving my instructions. Lieut.-Colonel Dennis, with the detachment ordered on by land, joined me soon after, and the Indians quickly followed. The enemy's flight and terror is best evidenced by the precipitate manner in which he abandoned everything which was valuable or could be called to constitute his equipment for field operations. Aware from the nature of the country that a further co-operation of the naval force could not be expected, I lost no time in taking measures for a close pursuit by the Indians, detaching Lieut.-Colonel Dennis with the Grenadiers of the 49th and part of a company of the 41st to the Twenty, with directions for that officer to push his dragoons and Indians just to the skirts of Fort George. These movements, though not coming up to my expectations, by the capture of the enemy's cannon, were otherwise productive of the most beneficial results. Many prisoners were taken, the spirit of the loyal part of the country aroused, the little remaining baggage of the enemy destroyed, his panic increased and confirmed, and what is of the utmost consequence, certain information received of all his movements. On the evening of the 9th the enemy set fire to and abandoned Fort Erie, withdrew his forces from Fort Chippawa and Queenston, concentrating them at Fort George, and hastily began throwing up field works, either there to defend himself or cross the river by means of boats, which he holds in a constant state of readiness according to circumstances. Yesterday I had information of the militia having taken a depot of arms in the neighborhood of Queenston, and in the evening had actually possessed themselves of the town.

I have everything to say in praise of the good conduct of my men and officers, but have most particularly to remark the zeal, spirit and ability with which Lieut.-Colonel Dennis conducted his share of the operations.

I have the honor, etc.,

THOS. EVANS, *Lieut.-Colonel.*

Lieut.-Col. Harvey, *Deputy Adjutant General.*

The contents of these letters I might have thrown into a narrative, but I have preferred to give them as they are, to prove how little dependence can be placed on the accounts given by United States writers of the operations during the War of 1812. A comparison of the preceding letters, with that from General Dearborn, addressed to the United States Secretary at War, will still further prove the distortion of truth in the reports which form the groundwork for the histories of that war written by United States authors. It may be remarked that, contrary to what Dearborn says, there were no Indians with the expedition which attacked the camp at Stony Creek, and it should further be borne in mind that all the events which followed—the flight of the United States troops, the occupation of the camps they had held, the evacuation of the posts, were all visible and so well known that no successful contradiction is possible.

HEADQUARTERS, FORT GEORGE, June 6th.

SIR: I have received an express from the head of the Lake this evening, with intelligence that our troops commanded by Brigadier General Chandler, were attacked at 2 o'clock this morning by the whole of the British and Indian forces; and by some strange fatality, though our loss was but small (not exceeding 30), and the enemy completely routed and driven from the field, both Brigadiers Chandler and Winder were taken prisoners. They had advanced to ascertain the situation of a company of artillery when the attack commenced. General Vincent is reported to be among the killed of the enemy. Col. Clark was mortally wounded and fell into our hands, with 60 prisoners of the 49th British regiment. The whole loss of the enemy is 250. They sent in a flag, with a request to bury their dead. General Lewis, accompanied by Brigadier General Boyd, goes on to take the command of the advanced troops.

I have the honor, etc.,

HENRY DEARBORN.

Hon. General John Armstrong, *Secretary at War.*

Such a ludicrous travesty of events has scarcely ever been placed on record. It is not to be wondered at, that with official reports of this nature to draw from, historical writers of the United States should fall into the most egregious errors in their accounts of the War of 1812. The loss on the British side is given as 250. The casualty return shows that of killed, the total was 23, namely, 1 officer, 3 sergeants and 19 rank and file; wounded 136, namely, 12 officers, 9 sergeants, 2 drummers and 113 rank and file; and of missing, 3 sergeants and 52 rank and file, many of whom subsequently found their way back to headquarters. As to the loss of the United States troops given by Dearborn as 30, the number of prisoners alone, besides the two Brigadiers, was 100; the number of those killed does not appear. It is unnecessary to criticise the other statements in General Dearborn's letter, which are sufficiently refuted by the clearly ascertained facts.

The flight of Proctor from Moravian Village left the Niagara frontier open to the enemy, and led to the following proposal, addressed to Noah Freer, Military Secretary to Sir George Prevost (Canadian Archives, Series C., Vol. 680, p. 322.)

SIR: I beg leave to acquaint you for the information of His Excellency the Governor-General, that having taken a step of an extraordinary nature, I think it my duty to make my designs and motives known to his Excellency. The country between Stony Creek and Fort George being abandoned to the enemy, I have presumed (induced by personal ambition and a desire to be of service to my country), to select a township in the neighborhood of Fort George and erect it into an independent district *pro tempore*, and declare it in a state of neutrality; in this manner to prevent the marauding of the enemy, and to organize it so that when our army advances in the spring I shall be able to join it with two or three hundred men. When that happens the nominal and temporary independence will of course cease. Should it happen (which Heaven forbid), that that part of the country is to be totally abandoned to the enemy, I hope to continue its independence, and by forming an English party make the possession of the country never cease to be a thorn to the Government of the United States; by this means I am confident I can be of more service to myself and country than if

I remained a humble subaltern without a name and without distinction.

I remain, etc.,

JAS. M. CARDWELL, *late Ens. 100th Reg.*

Stony Creek, 26th October, 1813.

N. Freer, Esq., Etc.

What was done in reference to this proposal, or whether the letter was ever answered, does not appear on record.

AN IDYL OF A RAMBLER.

Read before the Hamilton Association, April 10th, 1895.

BY A. B. SMALL, OTTAWA.

When Man was banished from the Garden of Eden he received the dread sentence that "the ground should be cursed for his sake," and that "in sorrow should he eat of it all the days of his life." But we are all aware that this language, though true in its general application, is not to be understood in a literal and exclusive sense. Man was told that the earth should "bring forth thorns and thistles," but it also produces flowers to gratify and fruits to nourish him. The Infinite Being has said that "the days of our life shall be marked with sorrow," and they are; but the afflictions to which we are subject are attended with blessed antidotes. Moral sources of enjoyment are given us, as fruits and flowers, for the Soul, and the teachings of interest should lead us to consider with attention those gifts which enlarge the capacities of the spirit, and call forth wonderment at the mighty workings of all bounteous Nature. For instance, who is insensible to the beauties of the rising or the setting of the summer sun? Who can behold the moonbeams reflected from silent river, lake or sea, and not feel happy in the sight? None, I believe, in early life. But, when hardened in the ways of the world and of man; when the chief end pursued is the accumulation of wealth, acquisition of power, or pursuit of pleasure, then mankind loses sight of the beauties of Nature. Were the inherent love of them cherished by early education, how seldom would it be destroyed or become dormant, as it too often is. But the student of Nature finds in every sphere of existence a means of rational enjoyment—a pleasure so fascinating when grasped at, that the mind for the time forgets the ills of life, and the glories of Eden spring up in imagination through the mists of troubles; for in every bank and woodland, and running stream, in every bird among the boughs, and every cloud above his head, stores of interest abound, which enable him to forget awhile himself and man, and all the cares of life, in the inexhaustible beauty and glory of Nature, and of the God who made and controls her.

Let us walk, side by side, in imagination, with a naturalist in his daily ramble; let us blend our mind with his, to receive those impressions which he feels, to share the train of reflection that comes crowding on his mind, as the affinities of objects lead his ideas to wander from the leafiness of the Temperate to the exuberant foliage of the Torrid Zone. We approach a woodland; how inspiriting are the odors that breathe from the upland turf, from the rock-hung flower, from the hoary and solemn pine. Deep, and dark, and still, are the shadows of the surrounding trees and bushes. The green leaves seem to infuse into our hearts a portion of their happiness as "they clap their hands in glee," and the joyous birds make melody all around. Here let us pause and gather a single blade of grass, and examine for a minute quietly, its narrow sword-shaped strip of fluted green. Ruskin says of this: "Nothing, as it seems, there, of goodness or beauty. A very little strength, and a very little tallness, and a few delicate long lines meeting in a point; not a perfect point, either, but blunt and unfinished; by no means a creditable or apparently much cared for example of Nature's workmanship; made, as it seems, only to be trodden on to-day, and 'to-morrow to be cast into the oven.'" And yet, think of it well, and judge, whether of all the gorgeous flowers that beam in summer air and of all strong and goodly trees, pleasant to the eyes, or yielding fruit, stately palm and pine, strong ash and oak, scented citron, or burdened vine, there be any by man so deeply loved, by God so highly graced, as that narrow point of feeble grass. And well does it fulfil its mission. Consider what we owe merely to the meadow grass, to the covering of the dark ground by that glorious enamel, by the companies of those soft and countless spears. The fields: follow forth but for a little time, the thought of all we ought to recognize in these words. All spring and summer is in them; the walks by silent paths, the rests in noonday heat; the joy of herds and flocks, the sunlight falling in emerald streaks and soft blue shadows, where else it would have struck upon the dark mould or scorching dust; pastures beside the babbling brooks; soft banks and knolls of hills, thymy slopes of down, overlooked by the blue line of the distant sea-crisp lawns, all dim with early dew, or smooth in evening warmth of sunshine; all these are summed up in the simple words—"The Fields."

Whatever course our thoughts may take, we must remember that there is no plant, however humble, no flower or weed that springeth from the earth, but is an organized and living mystery. The secrets of the abyss are not more inscrutable than the work that is wrought in its hidden germ. The goings on of the Heavens are not more incomprehensible than the growth of a simple plant, as it waves in the summer breeze. The functions that constitute its growth, flower and fruit, the organs and affinities by which every part receives the material that answers its purpose, who can unfold or explain them? As the fruit of one year falls, the seed of centuries of growth is sown. By the mechanism of Nature, the stocking of the earth with every kind of growth, from the oak of a thousand years, to the weed of to-day, is carried on. The acorn falls into moist earth, and is trodden in by man or beast, to become an oak in course of years, whose timber may resound to and tremble under the roar of warfare on the ocean; berries are carried by birds, and dropped on ledges of rock in any handful of soil that may be there, to sprout and germinate and grow, and to reproduce in their turn, seeds for future growth. Winged seeds, such as those of the thistle, the dandelion, etc., are elevated by the winds till they stop in some favoured places; hooked seeds, such as are familiarly called "cleavers" or "burrs," entangled on the dress of the passer-by, or hanging to the hair or fleecy coverings of animals, may be carried miles away, and find their resting place in even other lands.

Whilst men, with due care, put seeds into the ground by millions, Nature plants and sows on a larger scale, surpassing man while he is busy, and going on with her work while he is sleeping or making holiday. For every tree that falls thousands are sown; for every flower that fades millions are provided. What we do with pains and care in our flower beds, is done silently all over the islands and continents of our globe. New life is provided before decay begins.

How beautifully are the lights and shadows thrown abroad, and the fine transparent haze diffused over the valleys and plains. The shadows play all day long at silent games of beauty; everything is double if it stands in light. The tree has an unrevealed and muffled self, lying darkly along the ground; the slender stems of flowers, golden rod, wayside asters, meadow daisies and rare lilies, cast forth a dim and tremulous line of shadow, that lies long all the morning, shortening till noon, and creeping out again all afternoon, until the sun descends yon western horizon. Meanwhile, the clouds drop shadows like anchors, that reach the ground, but will not hold; every browsing creature, every flitting bird, every unconscious traveller writes itself along the ground in dim shadow. And, speaking of the clouds, let us pause a few moments while we look with admiration at the ever changing variety and beauty; at the gorgeous scenery of summer cloudland, the exquisite variety of tints, the graceful motions, and the changing shadows which flit over hill and dale. The finest dyes and most skilful looms can never equal the tapestry with which God decorates our earthly abode. These are pictures shut up in no secluded gallery, to be seen only by the rich, but they are spread alike before the lowly and the lofty, in the city, and in the remotest solitudes, where all may drink in their beauty, and discern the wisdom and skill of Him who made them. Even the child, as he gazes dreamily at the tiny white speck floating far away in the blue ether, has his little soul filled with interest, and when he sees dark masses of vapor come rolling up slowly and majestically, fold after fold, from the distant horizon, his imagination will transform those fantastic shapes into gigantic snow-capped mountains, towering peak upon peak, until he almost longs for wings to fly and explore their far-off summits. But, how comparatively few, children or adults, ever pause to give themselves a matter of fact explanation of the actual formation of clouds, the unerring laws of their creation or dispersion, or the vast beneficent part they take in the economy of Nature. The question may be asked why there are on some days clouds, and again on others none? The answer is, there are clouds always, although not always visible, or to be more correct, the material of which clouds are made is always there; for if the air is warmed by the shooting down of the sun's rays for days past, it holds in solution, invisible, the vapor it has imbibed. But let that air begin to cool, and it parts with its mass of moisture; in other words it deposits it in the shape of white vapor, being no longer able to retain it in an invisible form. This delicate little cloud, or mass of vapor, however, is of very precarious existence. One ray of bright sunshine, the faintest return of heat, would send it back again from a state of visible vapor to invisible moisture. Its outward form would be gone, and although we know that its essence would still subsist, indeed, could never be destroyed, yet its apparent existence would be ended. It would thus vanish like many an infant at its very entrance into life, before accomplishing any specific purpose of its being; but, again, like the infant, it is only the outward form which sustains annihilation. But heat is not the only thing by which clouds are affected. Life is ever changing with them as with mortals; they are liable at any moment to be whirled into the most fantastic shapes by every fickle wind that passes. If the temperature of the atmosphere continues to lower, the delicate gossamer-like vapor (beautifully compared by Lamartine to the world's incense floating upwards to the Throne of God), will resolve itself into large dark masses of rolling clouds, and the mass of vapor, no longer able to poise itself in the air, descends to earth in grateful refreshing showers, and perhaps in the bosom of the cloud now passing overhead, are liquid treasures sucked up from swamps of Florida, to go and shower fertility and wealth on the plains of the far off West. Winter and summer "the clouds drop fatness." But they have other offices to perform, besides those of merely dispensing showers, of producing the rains, and of weaving mantles of snow for the protection of our fields. They have other commandments to fulfil, which, though less obvious, are not therefore the less benign in their influences or the less worthy of our notice. They moderate the extremes of heat and of cold; they mitigate the climate. They spread themselves out, preventing radiation from the earth and keeping it warm; at another time they interpose between it and the sun; they screen it from his scorching rays and protect the tender plants from his heat, the land from the drought. Having performed this, they are evaporated and given up to the sunbeam and the winds, to be borne on their wings, away to other regions which stand in need of their offices. And here I would say that I know of no subject more fit for profitable thought on the part of the knowledge-seeking student, than that afforded by the atmosphere. Of all parts of the physical machinery, of all the contrivances in the mechanism of the universe, the atmosphere with its uses and adaptations appears to be the most wonderful, sublime and beautiful. In its construction, the perfection of knowledge and wisdom is involved, and, to turn to Holy Writ, how appropriately does Job burst forth in laudation of the latter, as God's handiwork, in the xxviii. chapter.

The sighing of the wind as it sways the branches of the forest, which now bend before the summer zephyr like courtiers doing homage, now bend before the fury of the storm like strong men in adversity, sounds to our naturalist as angels' whispers in its gentleness, or in its fury as the voice of One mightier than Manoah's son speaking in anger—"The voice of One who breaketh the cedars, yea, the cedars of Lebanon." But he will tell you this Nature's music is never still, never silent, though often varied; for each tree has its part—the surging of the oak, the whispering of the elm, the rustling of the beech, the laugh of the birch, the sighing of the willow, the moaning of the hemlock, the dirge of the cyprus. The pine alone remains constant to melody throughout the year. Every breeze that touches the pine in any season of the year wakes up myriads of fairy harps which, united, set the air trembling with the most moving harmony that Nature affords—the harp-music of Nature's orchestra. Even the aspect of the woodland itself: if thick with tangled underbrush, the unexplored impervious forests of the Amazon rise up to the imagination; or, if thick with fern and grass, it recalls visions of Australian fern-trees and wattles—fern-trees, now the only corresponding and connecting link to the fossil plants of the coal formation, beneath whose heavy coverts the Saurian monsters roamed, the giants in the earth of those days; monsters extinct and passed away, leaving their epitaph in stone to be deciphered only by the researches of science centuries after their existence.

Should the road lead by or near a pond, our naturalist shrinks not from the wet and swampy ground surrounding it, for the forget-me-not is there, with blossom blue as the sky of Heaven, and its golden eye bright as Hope itself; there is the calamus, or sweet-scented flag, the iris, the bulrush, heavy and swaying in the wind, the water-lily, rivalling in its blossom the magnolia of the southern climes, and harboring under its broad leaves the pike and the perch, the bass and the pickerel, those favorites of meek Walton's followers. The delicate whites and pinks and yellows and blues of the aquatic blossoms—how bewitching are they in the sunlight! Adhering to the pond weed, or slowly drawing their homes along with them, are visible the water snails, amongst which is conspicuous the Planorbis, or Coil Shell, a representative left us of the Ammonite, one of the most universal fossils of the secondary rocks ; shells whose proportions have dwindled down from their colossal size in days of yore, when their circumference equalled that of a wheel, to that of an ordinary small coin, contrasting in their diminution the present pigmy race of man with his predecessors. Here we see the dragon fly disporting on its gauzy wings, itself glittering with blue and green flashing back the sunshine, now hovering poised above the surface of the pool as if desirous of telling its kindred larvæ, who still remain below, and from one of which it lately sprung, the glorious beauty hereafter awaiting them when their transformation takes place ; but the watery element defies the advance of insect life, and between them there is a great gulf fixed. Fancy may lead us to picture to ourselves the Grub, preparatory to bursting his prison house by the water side and rising on glittering wings into the summer air, promising tidings to its fellows of the state it is about to enter, and the longings of those left behind to hear something of that state, dimly fancied by them, but unknown. We could fancy him returning amidst the transports of his wildest flights, ever and anon, to the precincts of that watery world which had once been the only world to him ; and thus divided, yet near, parted, yet united by love, he hovers about the barrier that lies between them, darting over the crystal water in the rapture of his new life.

Let us scoop up a handful of water from the pond, and carefully examine it. Our naturalist will tell us that there is in it a creature with neither arms nor legs, properly so called, but which catches animals more lively than itself, and twice its own size ; with no eyes, yet loving the sunshine : whose stomach can be turned inside out, apparently without hurting it, and which, if cut in two, will not die, but each part grow into a perfect creature. To inexperienced eyes it looks like a tiny piece of green sewing silk, about a quarter of an inch long, and a little untwisted at one end. This, however, is really a set of delicate limbs placed round the thicker end of the slender body of the little Hydra (for such is the name it goes by). These tentacles, or feelers, float in the water like fairy fishing lines. Little creatures, invisible to our unaided sight, that have been frisking round full of life and activity, are seized by them, and one tentacle after another being wound around its prey, the process of digestion takes place. When we laugh at the idea of two or three Hydras growing out of one, if severed, we are told the reason is that the principle of life is diffused equally in all its parts ; that any part can live without the rest, and, like the cutting of a plant having life in itself, it can grow into a perfect creature.

Journeying onward, he tells us of another animalcule provided with two hairy wheels upon its head, whirling continually around, producing a strong current towards its mouth placed between them, carrying in all lesser objects floating near, and like the rotary wheels of a steamboat, carrying him onward, unless desirous of a rest, he grasps with his prehensile tail some friendly water plant. With still greater surprise we hear that these animalcules each have shells, which in some places during the course of centuries, have formed thick layers of white fine earth, so fine, that on the shores of a lake near Urnea, in Sweden, the peasants have for many years mixed with their flour this so-called "mountain meal." When we come to think that the vast thickness of the chalk cliffs were all formed from the deposition of animalcular exuviæ, surely the mind of man is inadequate to count the myriads of ages through which this process was going on, a process still silently and invisibly working in the depth and darkness of the Atlantic.

Skirting the pond, which has thus engrossed our attention, we may see rocks now rising up precipitously in rugged masses, now sloping quietly to the water's edge, partly clothed with lichens and moss, here covering the stone to the depth of several inches, there clustering around some bare patch of rock. From this we learn how the first accumulation of soil took place, when order was first produced from chaos ; soil, which year by year increasing from the decomposition of those rudiments of vegetable life, afforded depth and life for plants of a higher order and larger growth, to be in turn succeeded by a more luxuriant vegetation adapted for the support of animal life.

As we gaze upon the distant mountain range, what thoughts come crowding on our minds. How solemnly and majestically they raise their rugged peaks to heaven. Now, in token of their royalty crowned with a diadem of clouds, and now with every one of their cliffs gleaming in the sunlight like the pictures of a dream. For ages they have held communion with the mysteries of the midnight sky.

The earliest beams of the morning have bathed them in living light, and theirs too have been the kisses of departing day. Man and his empire have arisen and decayed, but they have remained unchanged, a perpetual mockery. Upon their summits Time has never claimed dominion. There, as of old, does the eagle teach her brood to fly, and the wild beast prowls after his prey. There do the waterfalls still leap and shout on their way to the dells below, even as when the tired hunter, centuries ago, bent him to quaff the liquid element. There, still, does the rank grass rustle in the breeze, and the pine, and the cedar, and the hemlock take part in the howling of the gale. Upon man alone falls the curse of Time. Nature has never sinned, therefore her glory is immortal. In such scenery we can understand the full meaning of the words—" The hills stand round about Jerusalem," and their unchanging aspect whispers into the ear of man that he is but the moth which flutters in the noontide air.

Again, the voice of Nature is perpetually singing the saddened strain, "farewell." It is in the sway of the boughs overhead, and by presentiment, when they shall stand bare and stark ; the brook ripples already to think how soon it will be choked by frost into a subterranean gurgle ; the mountains are beautifying themselves before they lay off their robes of beauty for a season ; even the sea, with its gentle rise and fall, and swelling breast, is telling how its line of beach will soon be driven snow, and its sands no longer warm. What is there in life or Nature that says "farewell" more punctually and more sweetly than Nature herself. In Spring she sends the early flowers, her children, to foretell her coming, and in Autumn, instead of merely disappearing, she summons all her children and all her works, to stand in full array and make their tender adieu. The order of departure reverses that of coming. As Summer goes, she makes this presentation of herself and hers ; then she sends the rest away one by one, lingering herself until the last in our memories of the bygone season.

There are certain things in Nature in which we can discern a human sympathy, a veritable kinship; and if we dismiss these things by referring them to a general fixed law, then the sympathy and the friendship are merely transferred to the law. How persistently and ingeniously she thrusts herself upon our senses, claiming our notice and beseeching our sympathy. There is nothing unsightly of all the unsightly things in the world which she does not try to cover with her fresh growths; she greens over battle and ruin and wipes off the blackening of fire. We do our best to shut her out in our cities, but it is all in vain. She sends her little blades of grass to push themselves up beside the flagstone; her ivy climbs the stone churches and castles, hiding the ravages of time, and her trees are the fullest representation of herself; the agent of Him at whose fiat the world emerged from chaos.

But, to resume our walk: Abounding everywhere, and full of interest, are the birds we meet with in the deep solitudes of the woods; the lugubrious cawing of the crow grates upon the ear with hollow voice, which has for ages been an object of evil omen to the credulous and the ignorant; the monotonous sound of the distant wood-pecker, "tapping the bark of the hollow beech tree," or making the woods resound with his notes of laughter, takes up the tale; the bluebird, the titmouse, or "chicadee," that happy restless easy-going creature, who scorns to leave us for the snow of winter, and picks up a scanty living round the outhouses of the farm; the finch tribe with their never ceasing cry, make the very copse alive with their melody; whilst the bobolink on the wing, surveying the grassy plains below him, chants forth a jingling melody of short variable notes, with such confusion and rapidity that it appears as if a whole colony of birds were tuning their notes for some great gathering in Nature's concert hall. And, as he is so well known a bird, I cannot refrain from dwelling on his character a little while. Rivalling the European lark, he is the happiest bird of spring; he comes amidst the pomp and fragrance of the season, his life seems all sunshine, all song. He is to be found in the soft bosoms of the freshest and sweetest meadows, and is most in song when the clover is in bloom. Near by we may see a tyrant kingbird, poised on the topmost branch of some veteran tree, who now and then dashes down, assassin-like, upon some homebound honey-laden bee, and then with a smack of his bill, resume his predatory watch. Over the pool, the swifts, the martens and the swallows, seem to vie with each other in acrobatic flight; now skimming the surface of the water, now making with a touch of the wing a scarcely perceptible ripple.

Besides the birds, flicker and flit hither and thither the butterfles, small and large, white, grave and gay; grasshoppers are noisy beside long stretches of green paths; improvident fellows who sing all through the livelong summer day, unmindful and heedless of coming storms and winter's stern array; and who would think, when looking on the painted butterfly, flashing its gaudy colors in the sunlight, that a few weeks ago it was a grovelling worm, an emblem of destruction, a caterpillar. How wondrous the change; how beauteous the transformation. How typical of the spirit of man, who, fettered to earth in the flesh, shall one day emerge from the chrysalis of death, and wing its flight to the Bowers of Eden.

Bounding through the highest tree tops in fearless leaps, light and graceful in form, with bright black eyes, and nimbleness in every movement, the squirrel enlivens the scene, who, after scrutinizing around some mossgrown branch for the disturber of his haunts, hies away from our gaze, with a defiant chattering that seems to say, "catch me if you can," to his nest in some hollow limb, where his booty of acorns, chestnuts or beech nuts is stored up for winter use; and, we think, when following his nimble movements, how some of our species might relieve our charitable societies of many of their cares if they would only take this provident little fellow as an example. But the lengthening shadows warn us to retrace our steps ere the dark pall of night settles over mountain, valley, tree and stream. The fogs are rising in the meadows; a thin, white line of vapor marks, with well-defined outline, the course of some stream flowing through them. Long before we reach home the curtain is raised that concealed the celestial host; those fires that glow forever, and yet are not quenched. There they move as they moved and shone when "the morning stars sang together, and the sons of God shouted for joy." It was the same blue spangled dome on high above old Rome, when she rioted in all her magnificence and luxury. The "Shepherds who watched their flocks by night;" the Magi, whose knowledge of the heavenly host was more enlarged than any others of their time, were warned to study that living page for a light to guide them to the expected Messiah. The Arab, as he travelled the boundless fields of sand with his trusty camel, the "ship of the desert," trusted of old to those burning orbs, for they alone were his chart and his compass. Beyond the grasp of poor frail man, they light him from the cradle to the sepulchre. Their beams are shed upon his monument, until that, too, has crumbled away, and no token remains to point to the spot where his ashes lie. Could a voice be heard from their blue home, doubtless it would speak of a race that passed from this continent long ere the canvas of Columbus was furled on these shores ; a race that preceded the Indian ; a people whose remains are yet among us, but whose history lies deep in oblivion. All on earth has changed, but the glorious heavens remain unchanged ; sun, moon, planet and satellite, stars and constellations, galaxy and nebulæ, still bear witness to the power, the wisdom and the love which placed them of old, and still sustains them where they are.

And now, our ramble over, we feel we have associated ourselves more closely with Nature, and her mighty Master, God. The materials with which that eternal power writes His name may vary, but the style of the handwriting is the same. And whether in illuminated characters he paints it in the field, or in the starry alphabet bids it flame forth from the face of the firmament : whether He works in the curious mosaic of a shell, or inscribes it in Hebrew letters on tables of stone, devotion recognizes its Heavenly Father's hand, and admires with reverence His matchless autograph.

In conclusion, let me impress upon the minds of all, how everything in Nature daily speaks to us in the plainest language, points out to us in its every phase something yet to come ; a something yet unknown, a mighty hereafter.

As the swallows homeward fly, their young brood raised, their summer work accomplished, instinct points out to them an unknown land to which to betake themselves from the chills and storms and tempests of winter. Something, we know not what, tells them this is not their rest. As the leaves fall off withered and sere, having done their work in Nature's mighty laboratory, the tree lies dormant for a time, but only to gain strength to burst forth in fresh beauty at a future time ; as the seed is committed to the ground, a dry, shrivelled object, to all appearance destitute of life, its future as the plant is provided for by Nature's hand ; as the sun goes down behind the mountains, or is shrouded behind cloud, its light is hidden but for a time, to burst forth again resplendent. As the river flows travelling onward to mix its waters in the unknown depth of ocean, leaving as it were forever the hills from whence it sprung, it is but to assume the form of vapour to replenish those springs. As the reedbird builds its nest, a home for its little ones yet unborn, an unknown sweet voice of kindness bids it, she knows not why, thus look to the future. Yes, the river is rushing forward, the clouds are hurrying onward, the winds are sweeping past, because here is not their rest. Ask the river; ask the clouds; ask the winds where they go to. Another land! Ask the great sun as he descends out of sight, where he goes to. Another land! And when the appointed time shall come, man also must go; where? To that other land to which those voices of Nature have all along directed him: into the presence of Nature's God.

REPORT OF THE GEOLOGICAL SECTION.

Read before the Hamilton Association May 9th, 1895.

The Section, in submitting this report, desire to state that though the attendance of members has not been large, the usual interest in the work of the Section has been maintained by a few, so that at the end of another year we are able to report that considerable progress has been made towards making the geological part of the museum more complete, although it is yet far from perfect, and it is scarcely expected that the dream of the most sanguine will be reached for some time to come.

The result of last year's work has been the means of proclaiming to the geological student that the fossil fauna of the rocks in Hamilton and vicinity has not been exhausted. These rich stores have been drawn upon from time to time by our worthy and indefatigable Chairman, and distributed throughout the world. As the result, Hamilton is credited with three new genera of fossil sponges, and seven new species, and the end is not yet. This locality is also renowned for its rich stores of graptolites which have been attracting the attention of some of the most eminent men of graptolitic lore on this continent, as well as those of the European.

Mr. A. E. Walker presented to the section a very valuable collection of fossils, properly classified and named, being the result of forty years' collection. These fossils are representatives of the different formations, ranging from the Trenton up to the sub-carboniferous. There is a specimen in this collection obtained from the Utica-shale which requires particular notice because it reveals to the palæontological world an important discovery, now recorded, so far as is known, for the first time in that horizon.

This specimen referred to has a circular mass of spicules on its surface bearing a close resemblance to those found in the Niagara chert beds at Hamilton, and forms the connecting link which traces back the glass rope sponges, or closely allied forms of to-day, to their predecessors in the far-off ages of the earth's history.

Mr. Walker's modesty would not allow him to claim this discovery, but we cheerfully proclaim him as the proper person who should receive credit for it.

The papers read at the meeting of the section have been of more than ordinary interest, especially to the local geologist, some of them dealing with questions of local importance, affording a stimulus to the novitiate, while others dealt with questions about which there is still some uncertainty because of insufficient data upon which to draw, so as to come to a definite conclusion.

The section has held seven meetings during the year, at six of which papers were read.

Following are the subjects treated in these papers, and the dates on which they were read :

May 25th, 1894.—"Geological Notes," by Col. C. C. Grant.

Nov. 2nd, 1894.—" Opening Address " by the Chairman.

Dec. 22nd, 1894.—"Notes on the Devonian Rocks," by Col. C. C. Grant.

Jan. 25th, 1895.—"Geological Notes Continued," by Col. C. C. Grant.

Feb. 22nd., 1895.—"Geological Notes Continued," by Col. C. C. Grant.

Mar. 22nd, 1895.—"The Glacial Man Controversy," by Col. C. C. Grant.

Apr. 22nd, 1895.—"Short Notes on Recent Discoveries," by Col. C. C. Grant.

All of which is respectfully submitted.

A. T. NEILL,
Secretary.

OPENING ADDRESS.

Read before the Geological Section, November 2nd, 1894.

BY COL. C. C. GRANT.

A good many new *Graptolites* have been obtained since the stone crusher has been at work in the corporation quarry here; several were forwarded, by request, to the Geological Survey Office, Ottawa, and a still greater number to the United States Survey, the authorities at Washington's intention being to publish a work on this class of organic remains. In a paper read to this section on a former occasion, I stated that there were about 76 in our local rocks undescribed by Dr. Spencer. I have now come to the conclusion that I then underestimated the number. This opinion I communicated to Dr. R. R. Gurley, F. C. S. A., of Washington, a leading authority on the graptolites, who has been selected to describe the Niagara ones. In many instances I succeeded in obtaining *the Radix*, or initial point, a circumstance of much importance.

Strange to say, the reticulated species, *Dictyonemæ* (Hall) are furnished, with bases widely differing—the cup-shaped—with a short stalklike process not unlike the shortened stem of a wine glass. It was probably buried in muddy sediment, and does not appear to have been attached to other objects, indeed, none of the graptolites here were obtained presenting this appearance, except in a few instances only.

The *Dictyonemæ* generally had spreading rootlets, *Inocaules* (Hall) and *Rhizograptus* (Spencer), bulbous ones; *Callograptus* and *Callyptograptus* slight single stems.

Since I forwarded my last parcel to Washington, I succeeded in obtaining a new species of the former by splitting the upper glaciated chert bed in which the base is well defined. The free graptolites, of course, display no attachment process. These are not unlike the forms described and figured by Hall, from Quebec, and were probably direct descendants, or at least closely allied varieties of the more ancient ones, known at the time of publication as Lower Silurians.

The low swampy fields close to the Corporation Drain have contributed as usual some interesting specimens of what we may call flint flake fossils. I have already expressed astonishment at the inexhaustible supply turning up annually there. A new drain on the McVittie Farm throws considerable light on the matter since the swamp was drained many years ago. It appears clear enough now. That the plough has never penetrated deep enough to disturb the chert beds (in situ) underneath was Dr. Spencer's view. While admitting its probability, I felt inclined to believe the swamp water had rotted away the softer portion of the upper chert, leaving no impression on the hard part composed of silex (flinty matter.)

Both theories are quite erroneous. This new drain exposes the thin flakes, embedded, in countless numbers, in a white stiff clay, viz., the ground-up meal of local rocks, pulverized by the glacier. When it retreated, while it left *Moraines* in some localities adjacent, there it dropped what we now find resting on the chert beds below. This escaped observation when the Corporation Drain was first opened. When it was subsequently deepened, the layers removed would only hide more effectually the matter originally thrown out.

Water or *Weather-worn Greenstones* and *granites* are sometimes found with the *flint flakes*. Occasionally the latter occur below, displaying a similar conveyance as regards both. The *boulder clay* or *till* of Europe in many places exactly corresponds with the clay resting on our local chert beds, and underlying that ancient lake beach, known to us as the Burlington Heights.

The remarkable preservation noticeable to us in the beds at the top of the escarpment of the glacial *striae* is mainly owing to the resistance it offers to the penetration of surface water. The color proves it was little affected by the stagnant marsh which existed before the Corporation Drain was excavated, where *bog iron* penetrated and stained the flint red or yellow. It was absent, probably, when the workmen were cleaning out the drain a few years ago. I remarked the coloring was confined to isolated patches. I think, therefore, I cannot be far astray in arriving at this conclusion. Many of the large travelled Niagara boulders resting on the Barton Ridge beyond the drain, as well as the *till*, have been removed by the farmers even since I arrived at Hamilton. I had no difficulty in recognizing that some few at least belonged to the same horizon as the upper glaciated *stromatopora* bed of the Carpenter Quarry at Lime Ridge.

The *Cryptazoon* I forwarded some years ago to the Redpath Museum was derived from some higher layer than the one above. I think no organic remains corresponding to it have been remarked in this upper layer, and it is impossible to estimate the thickness of the rock removed or ground down during the great ice age. I cannot claim the discovery of many new species (graptolites excepted), but I am enabled to add a few to the local list of Hamilton fossils, published by Dr. Spencer.* Some have already been discovered by Hall, and others are perhaps new to Canada, as I cannot find any record of their existence here.

Debarred as we have been for many years by the Grand Trunk Railway from our scientific pursuits, not only along the line, but even inside the fences, I am no longer enabled to contribute any specimens from the Bluff and Rock Cutting to the Hamilton Museum. The localities in question are unquestionably the most interesting about here to a collector. Seven Silurian Star-fishes were obtained at the former, together with the oldest colored *Brachipods* known (*Lingulæ*). The latter, which begins at Niagara Shale, lays bare the Crinoid beds of the series containing two species, *Eucalyptocrinus* and several heads of *Caryocrinus* and *Stephanocrinus*. Unfortunately no specimens of the former Crinoids are in possession of the Museum. The General Manager of the Railway alleges he has no option in the matter, as they are bound by a clause inserted in the Railway Act. I do not think it ever was the intention of our law makers to include men in pursuit of science with *ordinary tramps*. No civilized country throws obstacles in its way. When I mentioned the matter recently to a gentleman from the States he remarked "that is about the most contemptible thing I have heard for some time. But it may be only a stupid blunder on the part of ignorant officials. If it is as you say, the Act of the Legislature, why, sir, that only makes it the more disgraceful to Canada."

The Niagara Waterlime beds at Russeux Creek have afforded

*You will find the list appended.

nothing new, but the quarry at the Jolley Cut, worked by the Corporation, presented a remarkably fine *Fucoid* from the blue building limestones. I am inclined to think it an undescribed species of *Buthotrephis* (Hall). It may be a detached branch only, yet I believe now a species of the plant existed in the Palæozoic Sea which did not possess a main stem like *Buthotrephis Gracilis*. Hitherto I supposed some specimens were accidentally separated from the parent stock. I doubt whether this affords a satisfactory explanation; it may be so, in some instances, but decidedly not in all. I noticed recently in the waterlime beds above the Albion Mills, where the quarry-men had uncovered the "Erie Clay" or "Till" resting on the upper layer a few darker patches than I had previously remarked. Possibly they may represent vegetable remains pushed on by a glacier. The clay appeared undisturbed, containing rounded pebbles, both above and below. I doubt if modern trees could produce the appearance in question, even while admitting the roots sometimes strike deeply into the soil.

FOSSILS RECENTLY OBTAINED.

Buthotrephis—New species, perhaps.

Acidaspis tail—Not obtained hitherto. New species.

Dalmania Verricosa—Hall, not recorded in Hamilton List, Spencer.

Calymena Platys—Hall; omitted also in Spencer's List.

Cornulites Proprius—Hall; not recorded as occurring at Hamilton in the above.

Cornulites, Sp.—Undetermined yet.

Crania—Siluriana, Hall.

Crania—New species perhaps; this has a straight hinge line and raised upper valve not unlike a Bonnet Limpet (not known to Dr. Spencer). I believe there is no record of the other as occurring in Canada.

Several Bryozoons in the glaciated chert beds—*Fenistillidæ*, *Ptilodictyæ*, *Cladoporidæ*, omitted in Spencer's List, and not recorded by others as occurring in Canada.

Conularia—New species.

The Barton water lime furnishes a *Chetætes* or *Nauticulipora*, which may be new. It is better represented by one placed in a side case of the Museum for determination. This was obtained from a base bed of the series Barton Niagaras. It also furnished a small *Cyrtoceras* probably unrecorded, a very slender *Graptolite*, and a *Brachiopod*, not well preserved, which may prove to be the one already discovered in the States and named by Dr. Jas. Hall *Anastrophia Intisplicata*. It does not appear among the Canadian organic remains recorded by the late Dr. Nicholson.

BRIEF NOTES ON THE DEVONIAN ROCKS, ONTARIO.

Read before the Geological Section, December 24th, 1894.

BY COL. C. C. GRANT.

The Corniferous Limestones of Hagersville, in the neighborhood of Hamilton, are merely a portion of a great formation known to geologists as the Devonian system. They overlie the Upper Silurian. Murcheson and Sedgwick calculated the rocks deposited in the old world, so called, during that age had a thickness of nearly three miles. It appears to be a little more on this continent—however there appears to be no material difference. Whence was this great amount of sediment obtained? Evidently from the degradation of pre-existing "Archæan" and "Silurian" lands.

The limestones present many forms of marine life, especially corals in Ontario, but appear deficient in fish remains, which are so abundant elsewhere, that we frequently notice "the Devonian" called "the age of fishes." A few shark spines from the quarries at St. Mary's represent all I have seen, and on reference to Nicholson's work, Palæontalogy of Ontario, I am unable to find that the Toronto Professors were more successful than I have been in my researches.

Through the persevering efforts of the late Professor Hartt, Sir W. Dawson, Matthews and others in New Brunswick, Gaspe, etc., we are enabled to form an idea regarding the land vegetation of this age. The record, doubtlessly, is very incomplete, and it is only quite recently that anything was known respecting it. Flowerless plants (Acrogens) seem rather scantily represented in the Dominion. I have heard some highly interesting land plants have been discovered in the Devonian beds in the United States within the past few years. *Conifers* occur in Canada, and the late Dr. Newberry detected a well marked portion of a *Tree-fern* in the coniferous limestones of Ohio. The latter, probably, was brought down by a river in flood, which undermined the bank where it grew. It was only within the past quarter of a century that I learned that "the calamites" of the carboniferous had put in an appearance at an earlier period of this world's history in a geological point of view. I was once endeavoring to give an incredulous friend a little insight regarding the coal measures of England, stating coal itself was nothing more or less than mineralized vegetable matter, the production of Paleozoic swamps, "lake basins" or "rafts," not widely differing from such as we now see in a great river on the American continent. He noticed near Edinburgh, that the miners had discovered a large tree in an erect position, the roots plainly recognized, partly imbedded in indurated sand or sandstone. How did it come there? was the question. The Duke of Argyle probably would have afforded a far more satisfactory explanation than American geologists, for who can doubt the universal deluge brought together land plants and sea shells, and buried both indiscriminately in the places where discovery is claimed? For such things, however, in the course of conversation I called my friend's attention to a small jointed plant growing in moist, swampy places, commonly called Mare's Tail, and informed him it was closely allied, if not a degraded descendant of a tree-like form some 50 or 60 feet long, which flourished in Paleozoic times, named *calamites*. Do you really mean that? "What, sixty feet!" he exclaimed, in astonishment. And then, after a brief pause—"Well, Charlie, it may not be a Mare's Tail, but a mare's nest that you and your stonebreaking friends have found."

The oldest air breathers—insects and land snails, were discovered by Hartt and Matthews in New Brunswick in the formation. The flora there, in Iceland, and Gaspe Bay leads us to infer that it enjoyed a warm and damp atmosphere, a tropical climate. Indeed, the numerous corals amount to positive proof of the latter.

Quitting this portion of the subject, let us proceed to investigate the organic remains in the limestones and shales, the sea or fresh water deposits. "Many parts of the coniferous limestones," remarks Nicholson, in Palæontology of Ontario, "are almost wholly made up of corals, and as these are silicified, they usually weather out from the softer matrix. In the shales (Hamilton) they are obtained free from adhering material. In both they are obtained in exquisite preservation." I conclude from the foregoing that the Professor discovered, as I did many years ago, the most likely place to procure perfect specimens was in fields, where the glacial drift was exposed on the surface, and not in quarries.

What first strikes the stranger in a Devonian district here is the extraordinary number, as well as great variety of these *Zoophytes*. Nicholson and Hinde added some new species to 80 or 90 already known, and I am satisfied there are several still undescribed. The *Polyzoa* also are quite abundant. Perhaps owing to the condition in which they are usually found—fragments and very seldom complete —this class has been greatly neglected. Many of them are exceedingly small, and are calculated to escape observation altogether. The authors of Palæontology of Ontario added some new genera, and, I think, about 15 species to the ones previously determined, but the number may be largely increased if some one residing in a Devonian district could be induced to make these organic remains a particular object in collection. Let us imagine we are standing by the coniferous seashore, and looking down into the clear, warm waters of the great sea which then spread over a very large submerged portion of this continent. What a beautiful picture would have been presented to the Naturalist! Look on a coral reef in the tropics! Every bright and brilliant color that our gardens on land display, are there reproduced with added brilliancy and beauty. "In passing over these splendidly adorned grounds the boat seemed to float on air," remarks the German Naturalist, Schoph. On the clear bottom the spectator floats over groves of sea plants, gorgonas, corals, alcyoniums, sponges, burning red, intense blue, lively green, golden yellow, perpetually varying, they afford no less delight than the most exquisite garden on earth.

Now, if we reflect for a moment on the fossilized corals in our museum, and our cases are yet incomplete; if we restore the living creatures that built up the stony cells and reefs, Hagersville for example; clothe the various species with their varied tints and hues; add the sea anemones (*Actineæ*) which I consider undoubtedly existed, but left no record of such existence, as they do not secrete a calcareous skeleton, like the other members of the family; without taking into account a few matters, we may form a faint idea of the ancient sea and its living wonders, which no human eye has ever witnessed.

A recent traveller, Mr. Boyle, gives us a description of what he saw at Chaughi, near Singapore. During my military career I never had the good fortune to visit any one of the United Kingdom's Eastern possessions, but a near relative of mine is well acquainted with the locality, and has assured me the account is not exaggerated, nor the picture he sketches too highly colored. I need not hesitate, therefore, to place before you the extract I have taken from an eloquent and interesting work recently published, bearing the title of "Odd Quarters." "The smooth sand below high water mark was a parterre of sponges, green and red, and purple-blue intermixed with coral. Corals! Imagine their beauty in the spot where Nature placed them, every lip and hollow on the cream white surface traced out in vividest pencillings of green, with the sea-flowers of sponge around them. After the first impulse of delight, one almost comes to overlook the charming foreground; for beneath the water lies a tangle and a maze of all things lovely, for shape and color, for growth and motion. Coral takes a hundred flowery forms, weeds branch like trees or wave like serpents. Sponges are cups of amethyst and ruby. One sees just as clearly into the depths below as into the air above, and almost as far as it seems there are corals shaped like an Egyptian lily and as white, three feet in diameter, in which a mermaid might take her bath; others in a thicket, have each branch covered with showy rosettes which bear a morsel of green velvet in their bosoms; small fish, as quick as hummingbirds and almost as gay, dart to and fro."

Such a scene as Mr. Boyle so eloquently describes may also have presented itself by the shore of the ancient Devonian Sea. If we except the fishes—the latter widely differ from their predecessors, but there is one in the North Pacific, *Monocentris Carinata*, possessing so many characteristics of the fossilized remains discovered in Paleozoic rocks, that research or accident may reveal its existence, also at the olden time, when the empire of the sea was fiercely contested by mail-clad fishes with bony armour, gigantic cuttles, and crustaceans whose size may be estimated not only by feet but yards. Its coat of scale mail is so hard as to resist the most powerful thrust of any sharp instrument, and this would insure its preservation in the stony sediment of the ancient seas, if it really existed then. Little was known of the Devonian fishes until Hugh Miller's discoveries in the old red sandstone of Scotland. Their prodigious abundance there now led Sir Archibald Geikie to infer that they were essentially inhabitants of lakes and rivers. "Some," he adds, "found their way to the sea, as indicated by the occurrence of the remains with the true marine fauna." The various colors so characteristic of the family in modern times (the so-called parrot fish of the North Pacific, for instance) we may not expect to find, but the bone plated and bone scaled presented, perhaps, no less brilliant appearance than the *Lepidostens* (Garfish), which in the current at Fort Erie, looks as if it had been encased in silver scale armour. "The *Ganoids* in the Corniferous rocks, U. S. A.," remarks the late Dr. Newberry, "including the *Onychodus, Macropetalicthy*, greatly surpass the *Elasmo* branches in number and size, and I examined many thousand fish remains from these Devonian beds," he adds. Perhaps the most wonderful member of the family was the *Dinichtes* the lamented Palæontologist described, from the shale of Ohio, furnished with a head buckler three feet long, and provided with such formidable teeth that rendered it the equal of, if not superior to, any sharks then existing. It may be asked what reason was there for substituting the term Devonian for the older name—old red sandstone? Dr. Page and others could see no good grounds for the change either, but the old red sandstone of Hugh Miller merely represents a portion only of a vast series of beds, which attain a thickness of some 15,000 feet nearly three miles, and such a name could be hardly applicable to limestones, shales, etc.; but it is retained by general consent for the fresh water lake or lagoon deposits of the formation. Undoubtedly true, sea fishes are occasionally found embedded therein, but Newberry remarks: "The majority I examined on this continent very likely inhabited inland lakes, and, like the modern salmon and white trout, a few found their way there perhaps for spawning purposes." A similar opinion has been expressed by Sir A. Geikie since, when referring to specimens discovered in the red sandstones of Scotland, and among others which he thinks were inhabitants of inland lakes. These latter must have swarmed in the waters. Their bodies lie piled on each other, and so well preserved as to show they were suddenly killed. He attributes their destruction to earthquake shocks and escaping gasses, and alleges that some of the larger lakes in central Scotland were once marked active volcanoes that erupted lava and ashes 6,000 feet thick. We have evidence also of great disturbances on the American continent about the close of the age. Sir W. Dawson considers a portion of the Nova Scotia granite belongs to that period. You may recollect in a former paper I called attention to a remarkable discovery made by the Rev. M. Harvey in Newfoundland, viz., seals living in fresh water lakes away inland and breeding there. No doubt their predecessors occupied bays or reaches that had been cut off from the sea, and they gradually became accustomed to the brackish, and finally to fresh water. Now, such a circumstance may have also occurred in former times, and would afford an explanation how things in general got occasionally mixed up, and throws some light on the vexed question, viz., How can we account for crustaceous remains, *Pterygotus*, for example, occurring in fresh water deposits? The common cray fish is considered to be merely a degenerate descendant of the lobster, which accidentally had been cut off from the open sea, and contrived to increase and multiply despite its uncongenial surroundings.

There has been degeneracy as well as progress in life. Every geologist knows that. We frequently hear it stated, "God saw that it was good," or, as commentation explains, every living thing was perfect of its kind, as it came direct from the Creator's hand. Palæontologists know such to be a popular error. You may notice a marked capacity for improvement in the living descendants of the *Encrinites*, or sea lilies even. The earliest *Trilobites* are also greatly inferior to their successors, and thus through the ages. We cannot ignore the unquestionable progress of the various families. Does Nature ever produce a perfect creation? was a question put by a city clergyman recently, and answered in the negative. All experience appears to be of the opinion expressed, and in accordance with Nature's law of development. Compare, for instance, the two figures (Crinoids) of the late E. Billings, Palæontologist, Canadian Geological Survey.

About two years ago a farmer from Hagersville brought a box of corals to the city for sale. Mr. Charlton requested me to take charge of it until called for, as he was leaving Hamilton for the season. On examining the contents I noticed the posterior half of a large shell, which I felt assured must be unknown. The part preserved displayed coarse ribbing, and was 9 inches across. As the beak and hinge were absent I felt it could not be restored. I requested the owner to be on the lookout for one in better preservation. Professor Whiteaves obtained a like specimen from St. Mary's. On examining the figure I found it agreed with the Corniferous one incomplete from Hagersville. It was named by the Palæontologist, *Paneuka Grandis*.

GEOLOGICAL NOTES IN CONTINUATION.

Read before the Geological Section, January 25th, 1895.

BY COL. C. C. GRANT.

No doubt many of the fossils found in this neighborhood may prove to be of more common occurrence in the higher portions of the formation elsewhere, still their appearance here, at or near the base of the Niagara, may be put on record. In the paper read on a late occasion, viz., 2nd November, I confined myself chiefly to pointing out organic remains in local beds that are rare, little, or altogether unknown. In the Palæontology of Ontario (Nicholson) eleven pages only are devoted to describing or naming the fossils found in the Medina, Clinton and Niagara rocks of the entire Province. Surely this must be insufficient to convey an adequate idea of the richness in organic remains contained in the entire Ontario series.

Dr. James Hall, of Albany, emphatically pronounced what now remains of our chert beds (12 feet) on the brow of the escarpment to be a most interesting sub-series of the middle Silurians, apparently of local occurrence. Yet I find we are not credited with possessing above half a dozen common *Brachiopods* and a single *Dictyonema* (D. Gracilis, Hall). The Barton, or Waterlime, subdivision, 85 feet in thickness, resting on the Niagara chert, with its once concealed treasures of Spencer, so rich in plants and corals, *Brachiopods*, was quite unknown to the Toronto professors. I cannot find even a characteristic mollusc of the beds referred to, since *Atrypa reticularis* occurs all through the formation, and even that is mentioned as being abundant at Thorold merely. Our cases are very incomplete as regards Barton specimens, and several of the more characteristic ones are unrepresented, viz., *Trochoceras desplainense*; a large *Cyrtoceras*, an *Avicula* found in a layer considerably above the former (a new species probably), and *Murchesoniæ*, which merely leave empty cast in a limestone bed. However, as the beds in which they were found are noted, we may expect to procure some, at least, for our cases yet. The new proprietor of the Albion quarry expresses his intention of working the cement on a more extended scale, and he believes there will be an increased demand for it when it is better known.

The glacial grooves at the lime ridge (Carpenter's quarry), on the upper layer of the Bartons, known to us as the Stromatopora bed, in general are not so well defined as in the chert at the brow of the escarpment, but on a recent visit I noticed a very remarkable exception—the oversoil had been removed recently and a furrow underneath was exposed. Its dimensions exceeded any I have seen on this continent as yet, although larger grooves, I understand, have been observed in other parts of the Province. It was three feet broad and six or seven inches deep ; the stripping was too limited to afford me an opportunity of ascertaining how far it extended. A local glacier would probably (subsequent to the general retreat of the great ice sheet) obliterate some of the previous markings. The striæ, however, in this particular case corresponded, as regards direction, with the grooving of the underlaying chert at the escarpment. The adjoining rocks on both sides (same horizon) displayed merely scratches and a polished surface. We can scarcely conceive what appearance this locality presented at the beginning of the glacial age. This consideration appears to me to be frequently overlooked. Hundreds of feet of hard Niagara limestone must have been ground down and removed before the chert was exposed to the grinding process in the immediate vicinity of this city. We can hardly realize the vast changes, the different aspects, presented in the present and the past. Mr. A. E. Walker mentioned at the late meeting of the Geological Section how surprised a friend of his (a stranger) appeared to be when he pointed out to him the glacial markings near the Jolley Cut here, adding, "In the portion of the upper beds I examined in New York State there was little, if any, grooving, but polishing and scratches as far as my examination went." Well, such an experience strikes me as the one to be expected, for, as the great glacier travelled on southward, shod with or bearing frozen boulders, sand or gravel, is it not natural to suppose the former were the first to be loosened from the moving mass and to be detached closer to the source in valleys where they have been dropped ? I am, unfortunately, unacquainted with the glacial Moraines, or glaciated areas, in New Jersey, Ohio. The localities at present are attracting considerable attention since the publication of "Man and the Glacial Period." But while one may notice a difference of opinion among the able scientific men—the Wrights, Holmes, Leveretts, Claypoles, Salisburys, Uphams—on one point, all agree that the drift and boulders from the north were undoubtedly transported by land ice, and were derived originally from the Canadian Highlands. The writers above named have omitted to afford us information respecting the size of the Archæan rocks observed so far south in the boulder till. This term is seldom used by geologists on this continent. The stiff blue clay, charged with masses of stone of various weights, is known best in the Old Country by this name, and the material resting on the chert and underlaying the Burlington Heights sand gravel and water-worn shingle and boulders precisely agrees with the European boulder till so frequently mentioned by Sir A. Geikie.

In referring to "The Great Ice Age" at the conclusion of a paper read at the late meeting, I alluded to a local "Moraine" close to the Barton school-house and toll-gate that is merely one of a series of mounds irregularly parallel to the stone road, extending to the Kerr farm on the Glanford road, and perhaps beyond. The material consists chiefly of coarse sand, clay, Niagara limestones (similar to the ones at Lime Ridge), fragments of chert and occasionally rounded weathered boulders (of rather small dimensions), of Gneiss, greenstone, etc.

The different theories regarding the phenomena presented by the great ice age are known to all the older members of the Geological Section. The astronomical theory regarding the cause which led to appearances in post-tertiary days has even now defenders in Europe, while it certainly appears to be discredited generally on this continent by leading geologists. If "an ice age" was developed at the termination of every ten or twelve thousand years, they ask, surely we must see sufficient proof in the older rocks, from "the Cambrians" upward. Why not produce any evidence that may show such was obtainable? We might point to "the Millstone Grit," "the Devonian Conglomerate," (capping Slieve Na Mon in Ireland), or the older loose, uncemented conglomerate, which forms the foundation of our Quebec Citadel. A granite boulder discovered in the English chalk some years ago was pointed out as positive proof of "a glacial age" during the time of the cretaceous formation, because, as alleged, it was found in undisturbed layers or beds, and most probably was conveyed by an iceberg. A tree undermined on the bank of a flooded river frequently has a mass of rock entangled in the roots. I saw, when a boy, one carried a considerable distance in an almost upright position on the Munster Blackwater. Such, perhaps, was the means of conveyance in this case, and not ice. When we reflect at the time the chalk was deposited palms, myrtles, magnolias, sequiras flourished, that corals and tropical or sub-tropical shells abounded in the English seas, it is difficult to imagine the existence of floating ice. We have undoubted evidence that a real tropical climate prevailed a little later in "Eocene time." Unless we recognize the importance of a paper (to which I have already referred), by Prof. Matthews, New Brunswick, it appears impossible to account for well-developed Cones, Nautidi, Volutes, Olives, Mitras—habitants of warm seas—occurring in Tertiary beds containing an undoubted Fauna, now characteristic of a colder climate. I considered formerly that the minute cowrie of Ireland was merely a degenerated descendant, dwarfed by a change in climate, but I subsequently noticed a member in the tropics, which, corresponding in size and general appearance, I looked upon as a mere variety of the living Irish shell. I have seen fossilized Moluscs which were obtained from London clay, England's Eocene. They presented a blanched appearance, not unlike what we call dead shells, but yet retaining a considerable portion of the original color. If we examine the Flora of the Eocene rocks, and the Strata, estimated at not less than 12,000 feet, we find plants (remarks Geekie) having living representatives in the hotter part of India, Africa, Australia and America. Now, although we may find mingled with the above the Chestnuts, Willows, Elms and Laurels, characteristic of more temperate climates, yet it does not follow that they flourished precisely at a similar level above the sea. Many of the remains possibly were conveyed from high hills to the plains below by streams or river floods. Near Newcastle, Jamaica (up in the Blue Mountains), I have often seen, after heavy tropical rains, the swollen brooks carrying down to the lowlands trees, ferns, etc., torn from the banks. These vegetable remains would undoubtedly be mixed with a Flora below, foreign to the hills. May not this have occurred also in ormer times? It seems reasonable to think so, and would it not sufficiently explain why we now find tropical plants embedded with ones which flourish in more temperate climates?

I believe ice to have been the sole agent capable of transporting some of the large rocks noticeable in the Conglomerate at the base of the Citadel, Quebec, and icebergs were probably the means of transport at a later period than a Silurian or Cambro-Sil. age. The Devonian Conglomerate of this Continent, Jamaica, and Ireland, is composed of pebbles, varying from 1 to 4 inches in diameter, of Trap, Quartz, Greenstone, Porphyry, all rounded or waterworn, cemented by Silex. The description will do for all, and each appeared to me to represent portions of older sea beaches.

One thing I remarked at "The Devil's Bit," in the south of Ireland. Although limestone pebbles in the Devonian Conglomerate which caps the Silurian hill there were not altogether absent, I never succeeded in obtaining a complete fossil, or even a fragment of one, which could be recognized. Their hardness was very great, and the cementing material of these rounded pebbles resisted fracture even better than *Igneous Porphyries*. The Bit looks as if a big wedge had been cut out and removed altogether bodily. The story is that the old gentleman was in such a rage with a Cowherd there who deceived him, and slipped through his claws, that he took a bite out of the mountain, flew off with it and dropped it on the spot now called "The Rock of Cashel." We may hear many remarkable stories of what are called Metamorphic rocks. I think we may reasonably claim this gentleman in black as one of our oldest field geologists. Wonderful to relate, during his flight he converted that mass of Devonian conglomerate into fossiliferous mountain limestone. I know this, and can vouch for the fact, for I passed some days in its examination. Surely this circumstance ought to convince the most sceptical individual.

NOTES.

[1] Carbonized wood has been found, it is said, on this continent in the early tertiaries. It has been remarked half a century ago also in Europe in the same beds. What folly to adduce this as a proof of man's existence at such a period! Would not lightening fire the forests then as in our own days, leaving the charcoal in evidence, which is almost indestructable, like baked clay?

The following extract, recently received from the States, is of some interest to conchologists. The writer, Chas. T. Simpson, claims that even in land shells of the same species the color is not always persistent. It may be remembered that in a paper published some years ago in the Proceedings of the Association the claim that the color of sea shells was owing solely to light was disputed at a time when the statement was generally accepted. "While living at Braidentown, Florida, I found *Bulimulus Dormani* quite abundant, living and dead, in heavy lands north of Manatee River, and with the typical form on the very same trees I found quite a number of specimens without a vestige of color. The ground of most of these shells was a lovely pale porcelain, the spots were reddish brown, sometimes forming uninterrupted bands, clouded, and more or less distant."

Detached remarks like the above are rarely published in our proceedings. They may be, perhaps, incorporated as Notes. The foregoing is of considerable interest to concologists, more especially collectors of land and fresh water shells.

NOTES ON GEOLOGICAL MATTERS IN CONTINUATION.

Read before the Geological Section, February 22nd, 1895.

The Council of the Association were kind enough to publish, perhaps, more papers on Geological matters than we could have reasonably expected. Still many written or verbal remarks in explanation are necessarily omitted, and could not well be incorporated in the proceedings. I am not surprised to learn that a doubt I expressed relative to the age of a portion of the rocks on the north shore of Anticosti requires a little additional light, more especially since the views expressed appear to be opposed to the opinions of Sir W. Logan and Professor E. Billings. My remarks, I believe, to this effect, were as follows, in reference to the Silurians of the North shore: "While these rocks undoubtedly hold many organic remains, found below the Hudson River series, I doubt whether any of these beds themselves occur there." The conclusion arrived at by Sir W. Logan and Prof. Billings rested solely on organic remains obtained by Richardson, an officer of the Canadian survey. Evidence of this sort may not prove altogether reliable. For instance, between the West Point Light-house and Ellis or Gamache Bay there are a good many well-preserved fossils in shale at the foot of a small cliff. They represent a curious mixture of Upper Hudson River (Bala) and Niagara (Wenlock) specimens. The majority obtained by Richardson there belonged to the latter series, whereas the ones I extracted belonged to the former, and I looked upon these shales as true passage-beds, connecting the Cambro-Sils. and the Silurians.

I wish to call particular attention to the following paragraph, taken from page 221, "Geology of Canada, 1863:" "Loose frag-
" ments of black, strongly bituminous shales (Graptolitic) in every
" way resembling those of the Utica formation and of some of the
" interstratified beds of the Hudson River, are met with on the
" beach on the North side of Anticosti. These are probably washed
" up in storms or pushed up by the ice from the intermediate chan-

" nel (viz., between the Mingan Islands and Anticosti)." Now, is it not natural to suppose we must have had indications of these shales in the cliffs of the island also, if the Bird's Eye, Black River, etc., actually existed there? The Utica shale occurring at Collingwood, etc., if you examine some of the specimens in the Museum cases, will be found to contain large numbers of Trilobite fragments *(Asaphus Canadensis)* (Chapman), and occasionally a few Brachipods, but the former are altogether absent from the shales you find among the shingles on the Anticosti shore. It certainly closely resembles the Utica rock, but one may well hesitate to confidently recognize it as such.

The Hudson River, or "Bala beds," are said to be some twelve feet in thickness in the Quebec Province. That Anticosti was once joined to the main land can scarcely be doubted. The Flora and Fauna, with a few exceptions, are similar. No snakes have ever been seen there, however, and, stranger still, notwithstanding the many wrecks along the coast, rats are never seen there alive. The French fishermen believe the climate proves fatal to them. Hawks, eagles, foxes and martins may, perhaps, have more to do with it. It can scarcely be imagined that the air of one of the healthiest islands on the globe, where sickness is almost unknown, is responsible for their absence.

Lever in "Con Cregan" lands the hero of the work on the island, and gives an amusing account of the means taken to rid himself of his unwelcome predecessors, the rodents, which shared with him the shelter afforded by his cheerless domicile. Putting aside this circumstance as an exaggeration, merely intended to heighten the effect for his readers, the novelist's description of the surroundings, both in Anticosti and Quebec, bear the impress of personal observation, and could scarcely have been otherwise acquired.

NOTES ON THE GLACIAL MAN CONTROVERSY (AS REGARDS ONTARIO).

BY COL. C. C. GRANT.

Read before the Geological Section, March 22nd, 1895.

Since the discoveries of human implements in Trenton drift gravel beds by Dr. Abbott, the late Miss Babbitt, and others, an unnecessarily angry discussion has been going on for years in the States respecting Glacial Man on this continent. Personally the locality is unknown to me, so I prefer to abstain from any remarks on this particular find. If man existed here in the ice age (viz., in North America), as a hunter he would naturally follow the different animals driven Southward by the great ice sheet as it approached. Now, where should we look for evidence of man's existence then? Where but in places which contain terminal Moraines, derived from the continental glacier? We can hardly expect to find it elsewhere, since all human records would probably be obliterated wherever the moving mass passed over.

Even admitting that Dr. Abbott may be mistaken (a circumstance many eminent men deny), some of us may feel we are indebted to the scientific pioneers who first called attention to a very important and highly interesting subject, which some carping critics themselves neglected.

The writings of another glacial geologist (Professor Wright) we cannot afford to lose sight of, whose views coincide with Abbott's. The most formidable opponent these are likely to encounter is the archæologic geologist, W. H. Holmes. He describes how he went systematically to work in opening up trenches in the undisturbed portion of the gravel beds in question without obtaining a trace of an "art relic." "Relics of art," he states, "were found upon the surface and in such portions of the talus as happened to be exposed. Nothing in the gravels in place, and we closed the trench with the firm conviction that it was absolutely barren of art." After all, the above evidence is merely negative, and there is just a possibility that accidental absence from a particular portion of the gravels has not been taken sufficiently into account.

I have been collecting Indian relics in the Province of Ontario for upwards of a quarter of a century, and previously in Quebec, yet I never found anything which led me to believe that the red men had been here for any considerable time. I have ascertained from old residents that the gravel ridge which runs through Hamilton from the Church of Ascension, by Central School to Burlington Heights, was formerly an Indian trail. It represents the old lake beach, when the waters of Ontario were about 130 feet higher than at present (the Lake Iroquois of Dr. Spencer). Many thousand years must have elapsed since these water-worn shingles, pebbles and sands were first deposited on the glacial till underlying.

When the cutting was made at the Desjardins Canal, the remains of a deer, a beaver, and portions of the jaws and teeth of two elephants, were discovered there. Accompanied by Mrs. Holden, a lady who takes great interest in local history, Indian antiquities, etc., I paid a visit last summer to the gentleman who had the contract for the excavation. He informed me that the bones were lying in the consolidated gravel several yards from the surface (they did not appear to have been rolled up by the waves on the beach). Horns of the buffalo or bison were also discovered there, but these were taken away by a bystander, who kept them. The circumstance was probably unknown to Sir W. Logan, the then director of the Canadian Geological Survey, who fortunately succeeded in securing the other organic remains. As I am unable to find it recorded in the Proceedings published in 1863, I may be permitted to refer to this omission. I must admit I have been greatly disappointed in obtaining no proof as yet of the existence of man in the consolidated gravels of this ancient beach. A few Indian relics were found on the surface soil, but little importance can be attached to that. I was likewise mistaken in supposing I might probably find other portions of the two extinct elephants there. Large masses topple down every year west of the canal, and although carefully examined I can find no indications of bones or flint implements. We know from experience in the Old Country that tusks frequently break into small fragments when you attempt to remove them from loose gravel. The carbonate of lime which binds the pebbles and sand together would likely act as a preservative at the Iroquois beach.

Although unsuccessful in this instance, personally I do not doubt for a moment that the red men lived in North America before the Mammoth became extinct. The proof seems too strong to be affected by carping denial or charges of fraudulent manufacture in recent times by white men. "Doctors, parsons" (and geologists are not included), remarks the late Judge Haliburton (Sam Slick), "do not meet face to face like these gentry (J. E. Sawyers), and then shake hands like good fellows, after a fair, stand-up fight. They fire long shots at their opponents when their backs are turned, and insert scalping, cutting and venemous articles in works devoted to science *and defamation.* Your parson sends to religious newspapers, in a truly charitable spirit, anonymous communications displaying scanty sympathies with sinners, which they believe all to be who differ from them."

Many centuries probably have passed since the primitive forest first appeared on the brow of the escarpment south of the city. The glacial till rests on the polished and striated beds of the Niagara chert. The surface soil above that again is so exceedingly thin that one is surprised that so little decayed vegetation is shown there. Did the local glaciers linger longer here than we suppose? or was the re-foresting, after the great ice sheet retreated, slowly progressive? How long since they disappeared we cannot tell. "In a certain sense it may be said," remarks Sir A. Geikie, "the ice age still exists among the snow fields and glaciers of Europe."

In an apparently undisturbed portion of the till at the city quarry I extracted a few years ago an irregular-shaped piece of polished chert with a deep-cut groove (V) in the centre (there is one also on the opposite side not so well marked). While it presents the appearance of human workmanship, this may be deceptive. The grooving and polishing may be owing to ice passing over and attaching it to its base. There are no indications that roots of trees penetrated the subsoil there; the blue clay (weathered) was quite hard about it. I recently learned that a flint arrow-point was discovered by some workmen employed by Mr. C. Myles in sinking the foundation of a row of houses at the foot of his property on Hannah street, in the red Medina clay. The land in rear is very steep, and a land slip would have buried a surface implement probably lower than six or seven feet, or it may have fallen into the hollow left by an uprooted forest tree.

We have no right to assume that mound-builders (Indians) were the Aborigines of America. Indeed, it seems more likely they were recent immigrants from Asia by way of Behring Straits. Look to the burial mounds recently opened in the Canadian North-West. The bark in which the crumbling bones were enveloped was so completely preserved as to be easily recognized. What we want to know is something regarding the real Aborigines—some one who can throw light on the ancient inhabitants of Yucatan, the Pigmies (smaller than the race of dwarfs in Central Africa), whose diminutive arches, temples, houses and tombs are still existing. In a paper on "Man and the Glacial Period," by Professor Warren Upham, the following invitation occurs: "Every worker who comes into this field and devotes his spare time to glacial explorations and studies as Prof. Wright, deserves the hearty welcome of all fellow-glacialists." This is the only excuse I can offer for inflicting this paper on the Section, which possesses, in the present state of things, this only merit, viz., it is *non-committal.* But, respecting the "Paleoliths" of America and Europe, probably ninety-nine per cent. of those I have seen were merely rejected coras or damaged implements, such as one can obtain in the vicinity of any modern Indian camping-ground of less than a century ago.

I recently received from Arizona a few small "bird arrow-points," so called, made from onyx, agates, etc. I cannot believe these exquisite little implements were formed by Turanian red men. I would be more inclined to attribute their manufacture to a people more advanced in civilization—the Mayas, for instance. I have not heard they were ever discovered in northern burial mounds, and I do not recollect that they are recorded as found in southern ones, but, if so, it would, probably, not be of much importance.

SHORT NOTES ON RECENT DISCOVERIES.

Read before the Geological Section, April 22nd, 1895.

BY COL. C. C. GRANT.

The beautiful collection of Algæ (sea) and land plants presented to the Hamilton Association by our late lamented friend, Professor Wright, finds a fitting and honored place in the Botanical Case. Such specimens, however, as come under the head "Sertularia" *(Halcyonoid Polyps)* are of animal, not vegetable, nature, and are undoubtedly out of place there. Admitting that we cannot recognize them as fossils, yet they are considered by many Palæontologists here and in Europe to be so nearly allied to the extinct Graptolites of former ages that doubts have been expressed whether these modern forms may not actually prove to be merely modified by surrounding circumstances, at least in some instances. To restrict this section merely to fossilized organic remains would place it at a great disadvantage, since we are compelled to investigate the past life from the still existing. If the Council were in a position to provide a case open to public examination, it would prove an additional attraction to the visitors.

AN ANCIENT FOSSIL CORAL FROM THE CLINTON ROCKS, HAMILTON.

In a collection of fossils brought from the Arctic regions some years ago, the late Dr. Salter recognized a coral (Syringopora) supposed to be characteristic of the Devonian formation. As it was associated, however, with other fossils of undoubted Upper Silurian (lower Helderberg type), he claimed it as the oldest discovered. The specimen submitted for the inspection of the Geological Section takes it back to another stage, viz., to the time when the Clinton beds were deposited. It occurs a little above the Medina grey-band in the lower shales. As far as I can learn no Syringopora as old as this has hitherto been discovered. For a reef-building coral it seems singular to find it in muddy sediment.

Since the foregoing was written Mr. A. Walker placed in one of the cases a Syringopora he discovered in the Niagara limestones at Thorold, Ont., some years ago.

PALÆOZOIC SPONGES.

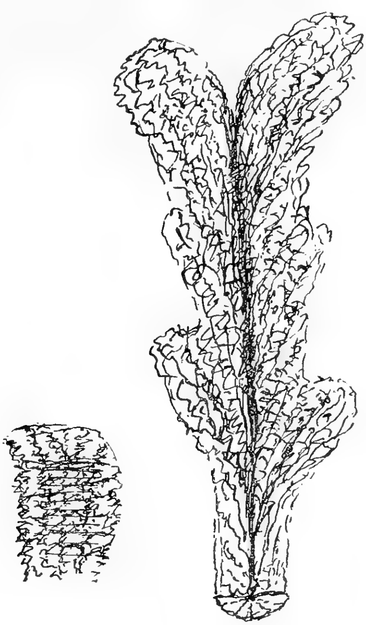
I have just received from Dr. Head, Chicago, the author's catalogue, "Palæozoic Sponges." Hamilton is credited in it with three new Genera and seven new species of Upper Silurian sponges; so we cannot complain that the Niagara ones have been neglected. The majority of the Tennessee sponges were, I believe, from the Doctor's personal collection, which was so greatly admired at the World's Fair, Chicago. Unaided by the States or its universities my old friend, at a very considerable expense, prepared for microscopical examination a great number of our Hamilton specimens, independent of others he discovered in Tennessee. Strictly he may be right in rejecting detached Spicules; but if Salter had not figured and described the Cambrian sponge from these fragments *(Protospongia Fenestrata)*, which he erroneously ascribes to Walcott, we may never have carried the Hexactineloid sponges back to the Cambrian age.

In a paper read before the Geological Section, published in No. 10 of the Proceedings of the Hamilton Association, you may remark your chairman expressed his belief that *Phyllograptus Dubius* (Spencer) belonged to new distinct genera. From Dr. Gurley's letter, he evidently arrives, independently, at this conclusion also. Your chairman was unacquainted with the European Graptolite it resembles, not having seen it figured or described. The Retiolites of the Clintons is Hall's Graptolite, but is figured so imperfectly that I am not at all surprised at the Doctor failing to recognize it. The ranching cellules are too far apart or separated.

HAMILTON SPONGES.

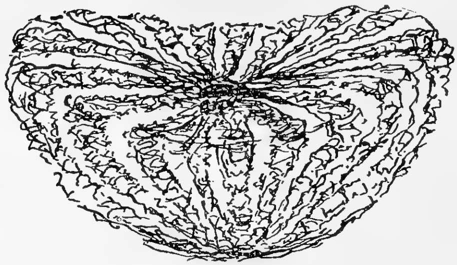
BY A. E. WALKER.

During the winter I have had a number of our Silicious sponges cut and polished in order to get a more perfect understanding of their skeletal structure, and to work out the form of the spicules. They have been sent to Professors Zittle and Rauff, of Bonn, Germany, who are writing a special work on these forms, which will be beautifully illustrated. All the Niagara sponges will be classified, and those not named will be described and named. The plates following illustrate a few of the pronounced forms.



NO. I.

No. I.—This plate gives a vertical section of one of the *Aulocopina*, showing the osculum from the upper opening to where it is broken at the base.

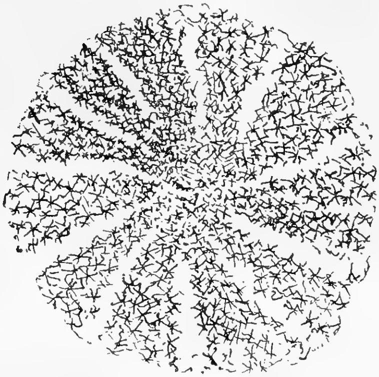


NO. 2.

No. 2.—This plate gives a general idea of the *Aulocopina Granti* (discovered by Col. Grant and named by Dr. Billings) as it would appear divested of its flinty filling.

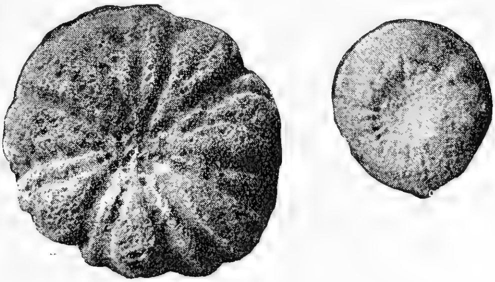
NO. 3.

No. 3.—Some time ago I drew attention towards a branching form of the *Aulocopina* that I had discovered. The cut gives you an illustration of a specimen found by Col. Grant. My specimens have been sent to Germany.



NO. 4.

No. 4.—This plate gives a good idea of the spicular structure of the *Astylo Spongia*. The varied forms have all the same spicular arrangement. As these forms are in the hands of Dr. Herman Rauff, of Bonn, I will not presume to do more.



NO. 5.

No. 5.—This plate shows two forms of *Astylo Spongia Piaemassa*, both of which I found at Hamilton.

REPORT OF THE PHOTOGRAPHIC SECTION.

Read at the Annual Meeting, May 9th, 1895.

Your Photographic Section beg leave to present the following Report for the year ending 9th May, 1895.

During the summer months not much was done in the way of business, although the Section still held their meetings—one per month.

A number of outings were held by the Section. A joint outing of the Toronto Camera Club and our own Section was held on the 24th May to Fisher's Glen and Webster's Falls. The day was pleasantly spent, some good views were obtained, and all went home tired but delighted with the scenery.

On Tuesday, June 26th, Mr. Lake, Secretary of the Toronto Camera Club, was present and addressed the Section. He spoke especially of the kindly feeling that the Toronto Club held towards the Photographic Section of the Hamilton Association.

A discussion took place on the advisability of joining the Lantern Slide Exchange (International). After some discussion it was decided to leave the matter in abeyance, and form a Canadian Slide Exchange, the result of which you have had the pleasure of seeing during the last month or two.

At the last annual meeting of the Section, Mr. B. E. Charlton donated a gold medal for the best panoramic view of the city from the mountain top. He also added a silver medal at a later meeting. The first prize was won by Mr. A. H. Baker, and the second by J. R. Moodie. A great deal of interest was taken in the contest. Mr. Hugh C. Baker and A. M. Cunningham acted as judges. The medals were presented by Mr. Charlton at the opening meeting of the Association, when the Section made a large display of work and also exhibited the contesting pictures.

In January the collection of prints and slides of the Canadian Photographic Journal were on view and created a favorable impression, as they were a decided improvement on the set of the previous year.

During the month of April a very interesting exhibition of work by members of the Section was made, and a great deal of interest was taken in the exhibit by the Association and friends.

During the past season a question box was placed on the table and proved a step in the right direction, as it was the means of making known points that otherwise would not have been brought out.

During the year several improvements have been made in the dark room and apparatus added. Gas has been introduced into the lamp and an Alladin lamp and a table purchased, which are found very convenient. The Section had an enlarging apparatus placed, and members can now do their own enlarging.

An Anthony Portrait Lens has also been introduced by the Section for use in enlarging.

All of which is respectfully submitted.

J. R. Moodie, *Chairman.*

William White, *Sec.-Treas.*

REPORT OF THE BIOLOGICAL SECTION.

Read at the Annual Meeting, May 9th, 1895.

Six regular monthly meetings have been held during the year, and although no original papers have been read at our meetings, we have always found enough to make them interesting and instructive.

During the session large and valuable additions have been made to the Herbarium.

Of Canadian wild flowers found within the twelve-mile limit, 37 species, representing 16 Genera, have been added.

The collection of Jamaica ferns, donated by Mr. Adam Brown, together with a catalogue of the same, has been placed in the Herbarium. These have been mounted and labelled in regulation style, for which work we can thank Mr. Alexander. There are 102 species, representing 22 Genera.

The Herbarium now also contains Prof. Wright's beautiful and unique collection of California, Arizona and Mexican ferns.

By the opening up of the Hamilton, Grimsby & Beamsville Electric Railway, new botanizing grounds have been made more accessible, and we hope to avail ourselves of the opportunity to work along the mountain eastward.

We have greatly missed contributions from Mr. Yates, of Hatchley, during the session.

We have enjoyed the use of microscopes belonging to the members of the Section at some of our meetings.

We are pleased to see the interest awakened in our flora through the publication by the Montreal *Star* of the WILD FLOWERS OF CANADA, although some of the cuts will not stand much criticism, and we do not quite agree with the order of arrangement.

We hope during the coming summer season to do considerable work in the interests of Botany, which seems to be our only live point at present.

All of which is respectfully submitted,

J. M. DICKSON, *Chairman.* H. S. MOORE, *Secretary.*

REPORT OF THE CURATOR.

Donations to the Hamilton Association during the year 1894-5.

Indian Relics—Stone arrow points and bone implements, found and presented by R. Batlers, of Tecumseh, Co. Simcoe.

A number of fine shells—By Mrs. Beasley.

Two Indian Arrows from Arizona, one with very small obsidian stone point fastened by its original texture; the other has its points made apparently from a piece of iron hooping, but fastened after the Indian fashion; also a fine obsidian stone arrow point—By Dr. E. A. Gaviller.

A fine specimen of Horned Lizards from Mexico, also a specimen of Asbestos—By Mrs. Carry.

A collection of Indian flint flakes—By Col. Grant.

A Japanese Lady's Pipe—By A. Gaviller.

Some Japanese money, viz.: 1 Rinpiece, 2 Rinpiece and 1 Tempo—By George Duff, of Hamilton.

A Soldier's Badge, belonging to one of the Royal Scot Regiments. This was found in the entrenchments occupied by the troops during the war of 1812, when the battle of Stony Creek was fought on the 6th June of that year. The relic was found by Mr. D. Blachford, of Hamilton. The entrenchments now form a part of the Hamilton cemetery—By Mr. D. Blachford.

Indian Stone Chisel—By Mr. Blachford.

Model of the Hull of an English Frigate, made of bone, by one of the French prisoners in England of the war of 1812—By Alex. Gaviller.

The Cap, Belts, Badges, Cartouche Box, etc., of a private soldier of the —— Regiment, from the battlefield of Chrysler's Farm—By Mr. Somerville.

Specimen of a Spotted Salamander Lizard, found near the City of Hamilton, 1895—By Mr. C. Gardner, Hamilton.

A large valuable collection of Fossils of thirty years' gathering—By Mr. A. E. Walker, Hamilton.

A singular stone found with an engraved figure on it of a man. Two Assegais from the battlefield of Ibeka, in the Gaika Galeaka War, in the Transkei, South Africa, during the years 1877-8-9—By Mr. Geo. W. Richards.

ALEX. GAVILLER, *Curator.*

HAMILTON ASSOCIATION.

Statement of Receipts and Disbursements for the Year ending May 9th, 1895.

RECEIPTS

Cash Balance from 1894	$132 43
Government Grant	400 00
Prof. Garner's Lecture	5 57
Interest on Deposit	11 85
Members' Subscriptions	146 00
	$695 85

DISBURSEMENTS.

Rent, Museum and Dark Room	$174 00
Caretaker's Salary	42 65
Expenses Lectures, Gas Account, Repairs, etc	45 53
Spectator Printing Co., Annual Report	135 05
Printing Notices, Stationery, Postage, etc	70 27
Camera Section, Expenses	22 25
Balance on Hand	206 10
	$695 85

THOMAS MORRIS, JR.,
Treasurer.

We have examined the vouchers and found them correct.

H. P. BONNEY,
J. M. BURNS, } *Auditors.*

July 5th, 1895.

THE

JOURNAL AND PROCEEDINGS

OF

THE HAMILTON ASSOCIATION

IS SENT TO THE FOLLOWING:

I.—AMERICA.

(1) CANADA.

Astronomical and Physical Society	Toronto.
Canadian Institute	"
Natural History Society of Toronto	"
Department of Agriculture	"
Library of the University	"
Geological Survey of Canada	Ottawa.
Ottawa Field Naturalists' Club	"
Ottawa Literary and Scientific Society	"
Royal Society of Canada	"
Department of Agriculture	"
Entomological Society	London.
Kentville Naturalists' Club	Kentville, N. S.
Murchison Scientific Society	Belleville.
Natural History Society	Montreal.
Library of McGill University	"
Nova Scotia Institute of Natural Science	Halifax.
Literary and Historical Society of Quebec	Quebec.
L'Institut Canadien de Quebec	"
Natural History Society of New Brunswick	St. John.
Manitoba Historical and Scientific Society	Winnipeg.
Guelph Scientific Association	Guelph.

(2) UNITED STATES.

Kansas Academy of Science	Topeka, Kan.
Kansas University Quarterly	Lawrence, Kan.
Psyche	Cambridge, Mass.
American Academy of Arts and Sciences	Boston, Mass.
Library of Oberlin College	Oberlin, Ohio.
American Association for Advancement of Science.	Salem, Mass.
National Academy of Sciences	Cambridge, Mass.
Museum of Comparative Zoology	" "
American Dialect Society	" "
United States Department of Agriculture	Washington, D.C.
Biological Society of Washington	" "
Philosophical Society of Washington	" "
Smithsonian Institution	" "
United States Geological Survey	" "
American Society of Microscopists	Buffalo, N. Y.
Buffalo Society of Natural Sciences	" "
California Academy of Sciences	San Francisco, Cal.
California State Geological Society	" "
Santa Barbara Society of Natural History	" "
University of California	Berkley, Cal.
Minnesota Academy of Natural Sciences	Minneapolis, Minn.
Academy of Natural Sciences	Philadelphia, Pa.
Academy of Sciences	St. Louis, Mo.
Missouri Botanical Gardens	" "
American Chemical Society	New York City.
New York Microscopical Society	" "
The Linnean Society	" "
American Astronomical Society	" "
American Geographical Society	" "
New York Academy of Sciences	" "
Torrey Botanical Club	" "
Central Park Menagerie	" "
Cornell Natural History Society	Ithaca, N. Y.
Johns Hopkins University	Baltimore, Md.
Kansas City Scientist	Kansas City, Mo.
Wisconsin Academy of Science, Art and Letters	Madison, Wis.
Society of Alaskan Natural History and Ethnology	Sitka, Alaska.

Agricultural College .... Lansing, Mich.
Colorado Scientific Society .... Denver, Col.
Museum of Natural History .... Albany, N. Y.
Rochester Academy of Sciences .... Rochester, N. Y.

(3) WEST INDIES.

Institute of Jamaica .... Kingston, Jamaica.

(4) SOUTH AMERICA.

The Royal Agricultural and Commercial Society
of British Guiana .... Georgetown.

II.—EUROPE.

(1) GREAT BRITAIN AND IRELAND.

England.

Bristol Naturalists' Club .... Bristol.
Literary and Philosophical Society of Leeds .... Leeds.
Conchological Society .... "
Royal Society .... London.
Royal Colonial Institute .... "
Society of Science, Literature and Art .... "
Geological Society .... "
Manchester Geological Society .... Manchester
Mining As ociation and Institute of Cornwall ... Camborne.

Scotland.

Glasgow Geographical Society .... Glasgow.
Philosophical Society .... "

Ireland.

Royal Irish Academy .... Dublin.
Royal Geological Society of Ireland .... "
Naturalists' Field Club .... Belfast.

(2) AUSTRIA-HUNGARY.

Anthropologische Gesellschaft .... Vienna.
K. K. Geologische Reichsanstalt .... "

(3) BELGIUM.

Société Géologique de Belgique . . . . Liége.

(4) DENMARK.

Société Royal des Antiquaires du Nord . . . . Copenhagen.

(5) FRANCE.

Académie Nationale des Sciences, Belles-Lettres et Arts . . . . Bordeaux.
Académie Nationale des Sciences, Arts et Belles-Lettres . . . . Caen.
Académie Nationale des Sciences, Arts et Belles-Lettres . . . . Dijon.
Société Géologique du Nord . . . . Lille.
Société Géologique de France . . . . Paris.

(6) GERMANY.

Naturwissenschaftlicher Verein . . . . Bremen.
Naturwissenschaftlicher Verein . . . . Carlsruhe.

(7) RUSSIA.

Comité Géologique . . . . St. Petersburg.

III.—ASIA.

(1) INDIA.

Asiatic Societies of Bombay and Ceylon.
Asiatic Society of Bengal . . . . Calcutta.
Geological Survey of India . . . . "

(2) STRAITS SETTLEMENT.

The Straits Branch of the Royal Asiatic Society . . Singapore.

(3) JAPAN.

Asiatic Society of Japan . . . . Tokyo.

IV.—AFRICA.

(1) CAPE COLONY.

South African Philosophical Society . . . . Cape Town.

V.—AUSTRALASIA.

(1) AUSTRALIA.

The Australian Museum	Sydney.
Royal Society of New South Wales	"
Linnean Society of New South Wales	"
Australian Natural History Museum	Melbourne.
Public Library of Victoria	"
Royal Society of Queensland	Brisbane.

(2) NEW ZEALAND.

New Zealand Institute	Wellington.

(3) TASMANIA.

Royal Society of Tasmania	Hobartown.

Obituary.

WALTER S. CHAPMAN.

In the last Journal of Proceedings it was our sad duty to record the loss of two active and well-known members of the Association.

But a more painful duty now awaits us. Even death, when it comes at the sunset of a long and useful life, may justify its approach. To-day we chronicle the loss of one whose life had yet scarce shed the freshness of youth. Mr. Chapman was born at Hamilton on the 16th day of September, 1871, and was thus but 24 years of age at the time of his death, which occurred on the 3rd day of September of the present year.

Early in life Mr. Chapman chose the medical profession as his intended vocation, and applied himself diligently to his preparatory school course. But a higher fate ruled otherwise. When but eleven years of age failing health and a severe affection of the eyes compelled him to abandon all study for a time. A trip to Europe for change and medical treatment so far restored his health as to enable him to complete his public school course and spend two years in collegiate work, when a second loss of strength forced him to relinquish all thought of undergoing the severe strain of university work.

Though compelled to forego the pleasure of school life, Mr. Chapman did not in the least lose his thirst for knowledge. The study of nature, to which he had been early drawn, now became his ruling passion, microscopy and botany being his favorite departments. In the last of these he has left as a memorial of his zeal a collection of Canadian and foreign plants which would do credit to a scientist of far older years. It was at this time that Mr. Chapman became interested in the work of the Association, among whose members he found companions congenial to his quiet and studious disposition. Being of a retired nature he always avoided the very appearance of notoriety. The Association, however, were not slow in discovering his real merit, and soon appointed him to one of its offices, a position which he held at the time of his death.

It was not to the work of the general association alone, however, that the deceased confined his attention. He was a most faithful attendant at the meetings of the Biological Section, and on the formation of the Photographic Section became one of its most active members, devoting much attention to landscape scenery, of which he leaves behind a most excellent collection.

Mr. Chapman was a most painstaking officer, never being absent from his post, with the exception of a few months in the spring of 1894, when failing health compelled him to take a trip South; yet even at this time he was so governed by his love of scientific pursuit as to seek health where nature might best be studied.

Ever a companion of nature, Death overtook him in the midst of his devotions at her sacred shrine, and the moaning of her quiet waters chanted their sad requiem over the corse of her spotless child. As we lament to-day over his open grave, let us ask ourselves whether death can come untimely to that man who, even in youth, hath learned to live in peace with all, and who leaves behind him a memory as pure as those flowers he had learned so much to love.

LIST OF MEMBERS

OF THE

HAMILTON ASSOCIATION.

HONORARY.

1881 Grant, Lt.-Col. C. C., Hamilton.
1882 Macoun, John, M. A., Ottawa.
1885 Dawson, Sir Wm., F. R. S., F. G. S., F. R. C. S., Montreal.
1885 Fleming, Sanford, C. E., C. M. G., Ottawa.
1885 Farmer, William, C. E., New York.
1885 Ormiston, Rev. William, D. D., Gladstone, Los Angeles, Cal.
1886 Small, H. B., Ottawa.
1886 Charlton, Mrs. B. E., Hamilton.
1887 Dee, Robert, M. D., New York.
1887 Keefer, Thomas C., C. E., Ottawa.
1890 Burgess, T. J. W., M. D., F. R. S. C., Montreal.
1891 Moffat, J. Alston, London.

CORRESPONDING.

1871 Seath, John, M. A., Toronto.
1881 Clark, Chas. K., M. D., Kingston.
1881 VanWagner, Lieut.-Col, P. S., Stony Creek.
1881 Spencer, J. W., B. Sc., Ph. D., F. G. S., Savannah, Ga.
1882 Lawson, A. C., M. A., California.
1884 Bull, Rev. Geo. A., M. A., Niagara Falls South.
1885 Frood, T., Sudbury.
1889 Yates, Wm., Hatchley.
1889 Kennedy, Wm., Austin, Texas.
1891 Hanham, A. W., Quebec
1892 Wolverton, L., M. A., Grimsby.
1895 Jones, P. E., M. D., Hagersville.

LIFE.

1885 Proudfoot, Hon. Wm., Q. C., Toronto

ORDINARY.

1892 Adam, Alex. E.
1882 Adam, Jas. R.
1881 Aldous, J. E. P., B. A.
1872 Alexander, A., F. S. Sc.
1892 Alexander, Ernest
1891 Arthur, C. C., M. A.
1892 Baker, C. O.
1892 Baker, Alfred H.
1885 Baker, Hugh C.
1880 Ballard, W. H., M. A.
1895 Beasley, Mrs. Thos.
1880 Black, Geo.
1890 Bonney, H. P.
1881 Boustead, Wm.
1892 Bowman, J. W.
1881 Bowman, Wm.
1880 Briggs, Samuel
1857 Brown, Adam
1891 Brown, O. J., M. A.
1885 Buchanan, W. W.
1892 Buckley, Miss M. A.
1892 Burkholder, J. G. Y.
1880 Burns, Rev. A., D. D., LL. D.
1894 Burns, Miss B.
1891 Burns, J. M.
1889 Campbell, D. J.
1894 Campbell, Robt.
1892 Cameron, Chas. E.
1890 Cape, John.
1891 Carpenter, H., B. A.
1895 Carry, Mrs.
1891 Chapman, J. R.
1891 Chapman, W.
1880 Charlton, B. E.
1891 Cheyne, John P., Commander R. N.
1884 Childs, W. A., M. A.
1890 Clark, D., D. D. S.
1890 Cloke, J. G.
1895 Coburn, H. P.
1887 Colquhoun, E. A.
1894 Crawford, G.
1891 Crawford, J. T., B. A.
1892 Crisp, Alf. C.
1880 Cummings, James
1892 Cuttriss, Geo. H.
1892 Davidson, Mrs. M.
1872 Dickson, George, M. A.
1880 Dillabough, E. H., M. D.
1892 Devine, A. L.
1892 Dow, R. C.
1891 Eastwood, John M.
1892 Edgar, Robt. L.
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1891 Evans, W. Sanford
1891 Fearman, F. W.
1882 Ferres, James
1890 Finch, C. S.
1880 Findlay, W. F.
1880 Fletcher, Rev. D. H., DD.
1880 Forbes, A. F.
1891 Foster, F. G.
1880 Foster, W. C.
1892 Garrett, A. D.
1880 Gaviller, Alex.
1882 Gaviller, E. A., M. D.
1883 Gibson, Hon. J. M., M.A., LL. B.
1888 Grant, A. R.
1892 Grant, W. J.
1887 Greene, Joseph
1883 Grossman, Julius

1888 Galbraith, W. S.
1894 Hansel, F., D. D. S.
1882 Harris, W. J.
1892 Heming, A. H. H., O.S.A.
1887 Hobson, Thos.
1890 Holden, Mrs. J. Rose
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1884 Lee, Lyman, B. A.
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1890 Lees, Thomas
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1890 Leslie, Geo. M.
1880 Leslie, James, M. D.
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1891 Lochead, L. T., M. A.
1887 Logie, W. A., B. A., LL. B.
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1894 McConnell, Miss L.
1891 McCullough, C. R.
1857 McIlwraith, Thos.
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1890 McLaughlin, J. F., B. A.
1895 McLagan, Alex.
1880 Macdonald, J. D., M. D.
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1887 Mills, Geo. H.
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1891 Witton, J. G., B. A.

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JOURNAL AND PROCEEDINGS

OF THE

Hamilton Association

FOR SESSION OF 1895-96.

NUMBER XII.

CONTENTS:

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1895—J. E. P. Aldous, B. A.; Thomas Morris, Jr.; W. H. Elliott, B. A., Ph. B; P. L. Scriven; Major McLaren.

ABSTRACT OF MINUTES

OF THE PROCEEDINGS OF THE

Hamilton Association

DURING THE

SESSION OF 1895-96.

THURSDAY, NOVEMBER 7th, 1895.

OPENING MEETING.

The meeting was called to order by the late President, Mr. Briggs, who at once introduced to the members the newly elected President, Mr. A. T. Neill.

The newly elected President then delivered his inaugural address, in which he outlined the sphere and duties of the Association.

At the conclusion of the President's address, Mr. Geo. Black explained and illustrated the properties of the newly discovered ascetylene gas.

Following the custom of previous years, the President then gave over the meeting to the chairmen of the various sections for the purpose of displaying the work of each.

Through the kindness of Prof. Aldous a short programme of music was rendered.

THURSDAY, DECEMBER, 5th, 1895.

The President, A. T. Neill, in the chair.

Minutes of the last regular meeting were read and confirmed.

Applications for membership were received from George McGorman, M. D., F. F. MacPherson, B. A., and Wm. C. Herriman, M. D.

The Recording Secretary, S. A. Morgan, B. A., was then introduced to read the paper of the evening, entitled "China, Past and Future."

In his paper the lecturer endeavored to set forth the great national ideals which give solidarity to the Chinese nation and from these to draw some conclusions as to the probable future of these remarkable people.

An interesting discussion followed the reading of the paper

THURSDAY, JANUARY 16th, 1896.

President A. T. Neill in the chair.

The minutes of the last regular meeting were read and confirmed

George McGorman, M. D., F. F. MacPherson, B. A., and Wm. C. Herriman, M. D., were elected ordinary members of the Association.

Applications for membership were received from Messrs. A. Mullin, T. O. Baldwin, W. C. Thompson, W. Kerruish and W. H. Johnson.

The President then introduced to the Association Mr. Archibald Blue, of the Bureau of Mines, who read a paper entitled "The New Ontario."

The paper treated in a clear and exhaustive manner of the geography, history and natural resources of this portion of our vast Dominion.

The lecturer closed his paper with an earnest wish that men and means would soon be forthcoming for the development of this portion of our heritage.

The thanks of the Association were tendered Mr Blue for his instructive paper.

THURSDAY, FEBRUARY 6th, 1896.

President Neill in the chair.

Minutes of the former meeting were read and confirmed.

The Corresponding Secretary reported the receipt of a number of exchanges.

The Curator reported the receipt from Washington of a number of fossils of the Miocene period.

Messrs. A. Mullin, T. O. Baldwin, W. C. Thompson, W. Kerruish and W. H. Johnson were elected ordinary members of the Association.

The Corresponding Secretary then read the two papers of the evening.

The first was from the pen of Mr. Wm. Yates, of Hatchley, and contained a series of notes on Biological matters.

The second, which was written by Mr. H. B. Small, of Ottawa, treated of nature study as a means of relieving the strain imposed by the conditions of modern civilization.

The papers were much enjoyed by the members and a spirited discussion followed.

THURSDAY, MARCH 5th, 1896.

The President in the chair.

Minutes of former meeting were read and confirmed.

The Corresponding Secretary reported the receipt of a number of exchanges.

The First Vice-President, T. W. Reynolds, M.D., was then introduced to read the paper of the evening, entitled "Neglected Methods of Education."

Defects in both home and school education were indicated by the lecturer and practical remedies suggested. The lecture was listened to with great attention, and an interesting discussion followed.

THURSDAY, APRIL 2nd, 1896.

The President, A. T. Neill, in the chair.

The minutes of the previous meeting were read and approved.

The Corresponding Secretary reported the receipt of a number of exchanges, and the Curator a number of contributions to the Museum.

Mr. A. Alexander, F. S. S., then read a valuable paper on "Local Museums."

The paper outlined the original purpose of a local museum, next giving the modern conception of such an institution as an integral part of the national educational system, and closed by suggesting a number of necessary reforms in our own Museum to bring it up to this modern conception.

An animated discussion followed.

THURSDAY, MAY 7th, 1896.

The President, A.T. Neill, in the chair.

Minutes of the previous meeting were read and confirmed.

Mr. H. B. Small, of Ottawa, was appointed to represent the Association at the approaching meeting of the Royal Society.

Papers were read as follows:

"Biological Notes," by Mr. Wm. Yates, Hatchley, and "Our Educational System," by Inspector J. H. Smith.

Both papers contained much valuable and interesting information.

The annual meeting was then held, and the following reports read:

Report of the Council, by the Secretary.
" " " Corresponding Secretary, by Rev. J. H. Long, M. A., LL. B.
" " " Treasurer, by J. M. Burns.
" " " Curator, by Alex. Gaviller.
" " " Geological Section, by A. T. Neill.
" " " Biological Section, by A. Alexander.
" " " Photographic Section, by J. M. Eastwood.

The following officers were elected for the ensuing year:

President, - - - -	A. T. Neill.
First Vice-President, -	T. W. Reynolds, M. D.
Second Vice-President, -	A. E. Walker.
Corresponding Secretary, -	Rev. J. H. Long, M.A., LL. B.
Recording Secretary, - -	S. A. Morgan, B. A.
Treasurer, - - -	P. L. Scriven.
Curator, - - - -	Alex. Gaviller.
Asst. Curator, - - -	H. S. Moore.
Auditors, - - - -	H. P. Bonney and F. Hansel.

Council: J. E. P. Aldous, B. A.; W. H. Elliott, B. A., Ph. B; Thomas Morris, Jr., George Black and J. M. Burns.

REPORT OF THE COUNCIL.

Read at the Annual Meeting, May, 7th, 1896.

Your Council take pleasure in submitting the following report for the season of 1895-6.

The Council has held seven meetings since its last annual report, the proceedings of which have been duly recorded.

Seven meetings of the General Association have been held, at which the following papers were read and discussed :

1895.

Nov. 7th.—" Inaugural Address," President A. T. Neill.

Nov. 7th.—" Acetylene Gas," George Black.

Dec. 5th.—" China, Past and Future," S. A. Morgan, B. A.

1896.

Jan. 16th.—" The New Ontario," Archibald Blue.

Feb. 6th.—" Biological Notes," William Yates.

Feb. 6th.—" Opposing Forces," H. B. Small.

March 5th.—" Neglected Methods of Education," T. W. Reynolds, M. D.

April 2nd.—" Our Local Museum," A. Alexander, F. S. S.

May 7th.—" Biological Notes," William Yates.

May 7th.—" Our Educational System," Inspector J. H. Smith.

Our membership has been increased by the addition of eight new members and one has withdrawn.

Mr. H. B. Small, of Ottawa, who has represented us so ably during the past few years at the annual meetings of the Royal Society of Canada, has again been appointed our representative at the approaching meeting.

The desirability of effecting some change in the general conduct of our Museum, whereby it might the better meet the modern requirements from such an institution, has received much attention from your Council. As yet, however, through financial considerations, we can suggest no solution of the difficulty.

All of which is respectfully submitted.

A. T. NEILL,
President.

S. A. MORGAN, B. A.,
Secretary.

INAUGURAL ADDRESS.

Read before the Hamilton Association, November 7th, 1895.

BY PRESIDENT A. T. NEILL.

The influence of an association such as the Hamilton Association should be in the highest and best sense educational. The goal towards which its members are constantly striving is the attainment of scientific truth.

The operation of this association does not come in conflict with the teachings of our schools and colleges, but becomes an auxiliary in the dissemination of scientific knowledge, a field of labor wherein the student who has acquired a theoretic knowledge may pursue practically that particular branch of natural science which best suits his taste and inclination. We are all given faculties possessing apprehensive as well as appreciative powers, and it is our privilege, nay, it is our duty, to assiduously and studiously cultivate those faculties, so that we may be the better able to fulfil the intended object of our mission in this life, and I do not know of a study more elevating, and at the same time more humbling, than the study of natural science ; while it teaches the wonders of creation it also teaches the insignificance of man, who presumes to measure his finite mind with the infinite. When once the desire to know is awakened in an individual, and he feels the cravings of a hungry mind, there and then only will his efforts be directed into that particular channel of scientific research which commands his special attention. There will be no insurmountable obstacles to impede his progress, no weakening of purpose, but every energy, mental and physical, will conserve to the accomplishment of the end in view. The apparent difficulty which first meets the student of science is the nomenclature. The adoption of Latin names in describing the genera, species, etc., in parts of a plant, is justifiable where you consider that the field of science is as extensive as the surface of the globe which we inhabit, and consequently embraces many countries peopled by races speaking different languages. Latin being the basis of many languages, and natural science being considered a branch of higher education, therefore the adoption of Latin to express the names and parts of scientific objects is considered more universal in its application to the different languages of the world, insuring thereby greater uniformity ; hence its use.

Consider what confusion would naturally arise if each different speaking nation or people insisted upon calling a particular object by the name expressed in their native language ; the sciences would be divided into as many sections as there were different languages, and its general adaptation would be impossible, and although the nomenclature may be and is difficult, yet it is possible to acquire an intimate knowledge of any one of the branches of science by religiously devoting one hour only per day for one year to the study. The man or woman who is an ardent student, as well as an admirer of nature, will not be over-concerned about the foibles, gilt, tinsel or conventionalities of society, because he or she can find more substantial pleasure in the contemplation of the pages of the book of nature.

I would recommend all who hear me to take up some branch of scientific research and make it your special hobby or favorite pursuit, in the exercise of which you develop the body, cultivate and liberalize the mind, thereby rising to a higher and fuller realization of what we are capable mentally of accomplishing. The study of any one of the branches of science to him or her who has passed beyond the rudimentary stage experiences an inexpressible pleasure in the discovery of a single fact, which discovery but opens the door to a further and extended mental view in that particular avenue of thought or research, and although in the next forward step the mental atmosphere may not appear to be so clear, yet, by persistent and faithful application, the apparent cloud of mystery will vanish, and with new light will come fresh knowledge, which is so gratifying to the earnest student. Which of you can go out in the bright and balmy morning of spring and not feel touched by the sense of gratitude when you see around you evidence of returning and renewed life, and when by a little mental reflection you recall to mind the little plant that grew in this quiet nook as if retiring in its nature it sought some secluded spot where it might fulfil its mission undisturbed by the rude hand of man, or on yon prominent bluff that o'erhangs the rocky steep as if it too was seeking to evade the exterminating hand, and we look expectantly from day to day to see the same varieties occupy the self same places that they did in the year that has gone, and we are not disappointed. The faculty of observation is thus cultivated by such studies so that we can with almost certainty tell where is to be found this or that object of natural history. The more we study natural history the more deeply we are impressed with the innumerable phases it presents to our view.

Here in this museum we are surrounded by objects collected by the different sections—Geological, Biological, Photographical, etc., and as you will have an opportunity to examine the specimens for yourselves, which I have no doubt will prove to be of interest to you, and will engage your attention more fully and satisfactorily than I can in the few minutes left at my disposal, I shall, however, briefly allude to the Geological section of the Association carried on under the direction of the able chairman, Col. C. C. Grant.

This branch of scientific study claims to be one of the most important of all the sections. The effectual work of the members of the Geological section is quite apparent in this museum. See the large number of specimens in the cases, besides a large number of duplicates which are stored away under the side cases, as well as the hundreds which have been sent to different parts of the world by our chairman. Let me say here that the large collection of fossils does not represent the whole work of the members of the section. The term Geology comprises, strictly, a knowledge of the physical history of the earth, as revealed to us by the study of the rock-masses which lie around and beneath us, and by a comparison of the results of ancient phenomena, with the forces and agencies still at work in modifying the surface of the globe. As Geology is thus essentially based on the study of rocks and their contents, and as rocks are made up of a certain number of simple minerals, it is necessary, or at least advisable, to obtain a knowledge of these latter, so as to be able to recognize them where met with, so that the student can assign each fragment of rock, because of its mineral composition, to its proper place in the formation or the system which marks the different geological periods of time in the formation of the rocky crust of the earth. Practical Geology may be arranged under the following general heads: Lithology, Stratigraphy, Palaeontology and Historical Geology. First, Lithology is the study of the rocks as mineral aggregates and as material composing the earth's crust. Second, Stratigraphy is the consideration of the arrangements of the rocky masses of the earth on a large scale. Third, Palaeontology is the study of fossil remains of plants and animals imbedded in the earth's crust, in connection with the succession of deposits ascertained by Stratigraphical investigation. Fourth, Historical Geology is the application of all the above to the geological history of the earth, and connects the elements of practical geology with the theory and application of the subject.

For the greater convenience of the study of Geology the scientists have divided and sub-divided the rocky structure of the earth into as many divisions as the differences in composition will warrant. In Canada the rocky crust has been divided by the geologist into twelve systems, these again are divided into many formations or groups, representing a particular epoch in geologic time. Those formations in which we in and around the City of Hamilton are more directly interested are called the Medina, Clinton and Niagara formation forming part of the silurian system. In order to be able to distinguish fragments of one from the other we note the well marked deposits composed of clay, sand and lime in such proportions and having imbedded in them certain fossils peculiarly characteristic to them as to be almost certain of their place in the geological chain. They are in some, and particularly in Niagara formation, clearly marked. The bed dividing the above formation from the Clinton is composed of light grey magnesian limestone, weathering yellowish, holding the fossil known as Pentamuous Oblongus in great abundance, to the uninitiated they are mistaken for hickory nuts fossilized. The division between the Clinton and Medina formation is also clearly defined by the deep band of grey sandstone, no doubt well known to many of you. To become a geologist in the proper sense of the word entails much study as well as physical labor. He must be able to pronounce with certainty upon any specimen submitted for his investigation, because of his familiarity with the composition of the different strata in the different formations. I do not think that it would be drawing too largely upon the imagination to suppose for the present that the different strata are but leaves in the book of nature, and that the fossil remains are but the illustration of the book, which make more lasting impression upon the mind of the geologist, who sees already in his mind the circumstance that placed these remains in their present position. He looks back through the vista of years or eons of time when these animals which lie entombed in their rocky grave glided about in their natural element as the various forms of marine life disport themselves in the lakes, seas and oceans of the present time. In conclusion let me ask, do we, surrounded as we are with rare opportunities to become acquainted with the natural history of this particularly favored district, make the most of our opportunities? I will leave you to answer. But our great business with this life is to read the book of its teaching, and we shall find that life is not the doing of drudgeries, but the hearing of oracles. The ancient mythology was but a leaf in the book, for it peopled the world with spiritual nature, and science, many-leaved, still spreads before up the same tale of wonder.

ACETYLENE GAS.

Read before the Hamilton Association, Nov. 7th, 1895. Enlarged before the Physical Section, May 21st, 1896.

BY MR. GEO. BLACK.

Great inventions and discoveries are often apparently the result of accident, but the seizure of the occasion and turning it to account marks the true scientist. Such was the case when our countryman, Thos. L. Willson, discovered his method of producing calcium carbide, for it was known to chemists as a rare product, as shown by the following references :

Sir Humphrey Davey observed that when Carbon and Potassium were heated sufficiently to vaporize the potassium, a substance was formed which has been recognized as the first reference to a group of carbides.

In 1836 Brezelius announced that the black substance formed in small quantities as a by-product in producing potassium from potassic carbonate and carbon was carbide of potassium.

Wöhler, in 1862, announced that he had made the carbide of calcium by fusing an alloy of zinc and calcium with carbon. He ascertained that it decomposed in contact with water, forming calcic hyrate and acetylene.

Berthelot, in 1866, described sodium carbide or acetylene sodium. He discovered that the high temperature of the electric arc within an atmosphere of hydrogen would unite with carbon of the charcoal terminals and form acetylene gas.

In 1888, Willson, in experimenting with his electric furnace trying to form an alloy of calcium from some of its compounds, noticed that a mixture containing lime and powdered anthracite acted on by the arc fused down to a heavy semi metallic mass, which having been examined and found not to be the substance sought for was thrown into a bucket containing water near at hand with the result that violent effervescing of the water marked the rapid evolution of a gas, the overwhelming odor of which enforced attention to its presence, and which on the application of a match burned with a smoky but luminous flame and numerous explosions. It was acetylene gas.

To Willson is due the credit of discovering how to make calcium carbide at the price of about one cent a pound in unlimited quantities instead of the rare laboratory product obtained in grains at the rate of about $10.000 per pound, thus producing not only a new light, but for manufacturing and commercial purposes opened up a vast range of new combinations of hydro-carbons at a much cheaper rate than ever existed before. The dream of the chemist has been realized, and synthetic chemistry took several strides forward. The possibilities of cheap carbide for light or chemical combinations places Willson in the front rank of the scientific men of the age.

Calcium carbide $Ca\ C_2$ is described as a dark brown, dense substance, having a crystalline metallic fracture of blue or brown appearance, with a specific gravity of 2.262. In a dry atmosphere it is odorless, but in a moist atmosphere it emits a peculiar smell, resembling garlic or phosphorus. When exposed to air in lumps it absorbs moisture and the surface becomes coated with a layer of hydrate of lime, which to a certain extent protects the rest of the substance from further deterioration. It is not inflammable and may be exposed to the temperature of a blast furnace without taking fire, the exterior only being converted into lime. When brought into contact with water or its vapors at ordinary temperatures it rapidly decomposes, one pound when pure generating 5,892 cubic feet of acetylene gas at a temperature of 64^0 F.

Calcium carbide is manufactured from powdered lime and carbon in the shape of ground coal, coke, peat or charcoal, these two substances being fused together in an electric furnace. The process is very simple, and may be described, thus :

The lime and carbon, having been ground to a fine powder, is intimately mixed in a certain proportion and fed into a crucible or furnace, the lower part of which has a carbon plate which is attached to one of the dynamo terminals ; the other terminal is connected to an upright carbon resembling the upper carbon of an arc lamp, but much larger, being about three feet long and twelve by eight inches in cross section. An alternating current is delivered by means of transformers to the carbons at about 100 volts and 1000 amperes. A small portion of the mixture is fed into the furnace, the upper carbon is raised about three inches, to form an arc, and the mixture is fused by the intense heat, which ranges from 3,500 to 4,000 degrees C., while that of the ordinary smelting furnace is only 1,200 to 1,500 degrees C. The carbon is gradually raised and fresh mixture fed in till a mass of molten carbide about three feet high is made, when the current is turned off and the carbide allowed to cool. The noise of the arc is said to be very peculiar, especially when the supply of mixture begins to fail.

COST OF CALCIUM CARBIDE.

To positively ascertain the cost of this product the "Progressive Age" of New York sent three commissioners to Mr. Willson's Alluminum factory at Spray, N. C., in March last, to investigate thoroughly, and their report is published in that journal under date of 16th April, 1896. The commission consisted of Messrs. Houston and Kennelly, well-known electricians, and Dr. Leonard P. Kinnicutt, director of the department of chemistry at Worcester Polytechnic Institute, who investigated thoroughly and took full charge of the factory during two separate days, making two runs of the substance and taking samples with them for testing in their own laboratories. Notwithstanding that the factory at Spray was only an experimental one, and the greatest possible output only one ton per 24 hours, and the fact that transportation of material was excessive, costing $3.05 per ton for coke and $4.55 per ton for lime, and estimating $11 per day for labor, including a superintendent at $4 per day, they figure the cost at $32.76 per ton.

Messrs. Houston and Kennelly add a separate estimate for the production of five tons daily under more favorable circumstances, but with water power at $5 per year, as at Spray, and figure the cost at $20.04 per ton. They add: "The cost of producing calcium carb: "electrically, is evidently limited by the cost of lime, coke and elec- "tric power, no matter what the scale upon which the process is "conducted.

"If we assume a perfect electric furnace in which neither ma "terial nor energy is wasted, that is, a furnace which ensures the "complete union of calcium and carbon without loss and with no "escape of heat in the process, we know that one ton of carbide "would require for its production 1,750 lbs. of lime and 1,125 "pounds of pure coke.

"It has also been calculated from thermo-chemical data that "1½ electrical horse-power hours will be almost precisely the right "amount of energy to produce one pound of carbide, or 3,000 "horse-power hours per short ton of carbide.

"Consequently, if L is the cost of lime in dollars per ton, C "the cost of coke per ton, and P the cost of electrical horse-power "hour, a theoretically perfect plant would yield carbide at a cost "per ton, exclusive of labor and fixed charges, of 0.875 L + 0.5625 "C + 3,000 P.

"For example, if lime (assumed pure) costs $2.50 per short ton, "coke (assumed pure) costs $2.75 per short ton, and an electrical "horse-power of 300 working days of 24 hours each cost $12 at fur-"nace terminals, (0.1667 cent per working horse-power hour), the "limiting cost of carbide in a perfect furnace would be $8.73 per "short ton.

"We may therefore summarize as follows: Calcium carbide "by the electric furnace cannot be manufactured cheaper than $8.73 "per short ton for material and power, exclusive of electrode car-"bons, labor, depreciation, interest and other fixed charges.

"Owing to impurity of materials, and departure from theoreti-"cal perfection in the electric furnaces, we found at Spray the ac-"tual cost of material and power, irrespective of electrode carbons, "labor, etc., is 1.335 L + 1.125, C + 5122 P.

"Under favorable conditions such as we believe can be real-"ized in particular localities, the total cost per short gross ton on a "plant whose output is five tons daily might be $20. Under the "actual conditions existing at Spray during our tests, we find the "total cost to be $32.76 per short gross ton if the plant were worked "continuously."

In the above lowest estimate of Messrs. Houston and Kennelly, they place horse-power at $12, whereas Mr. Willson has secured water power at Spray, and also in Canada, at a cost not exceeding $5 per horse-power.

On this basis, and assuming L at 2.50, C at 2.75 and P 5.00, the figure would amount to 2.18 + 1.55 + 2.00, or a total of $5.81 ; the cost of lime and coke however is placed at a very low figure, but it is evident that the true theoretical minimum price is between $5.80 and $8.73.

I have also the following estimates of cost at the Niagara Falls establishment, as follows :

To produce one ton of carbide, at the rate of 10 tons per day, it requires—

200 electrical H. P. 24 hours at $20 per year....	$10.95
1,440 lbs. coke at $3.50 per ton..................	2.52
1,800 " lime at $4.50 " "	4 05
Labor, depreciation, etc., &c.	6.18
	$23 70

It is noticeable that this estimate is somewhat in excess of the theoretical values as laid down by Messrs. Houston and Kennelly, and may be improved on as experience is gained.

I was informed that the first run of carbide manufactured at Niagara Falls early in May gave about 25% better results than their estimate, and that they hoped to improve still more as they gained experience and the men got used to their work.

Mr. Willson commenced to erect a factory at Merritton in April on the old Welland Canal, where he has secured 1,500 horse power at Locks 8, 9 and 10, and expects to turn out carbide at the rate of 7½ tons daily at the lowest possible cost. He has also secured a very large amount of power in the Province of Quebec, where he intends to manufacture not only for Canada, but for export to foreign countries.

It is quite evident from the report of the "Progressive Age" Commissioners, and from the experience of the Niagara Falls Company, that calcium carbide can be made and sold at a price to compete with ordinary gas and electric light.

It takes to produce 100 pounds Ca C2, as shown theoretically, 87½ pounds lime and 56¼ pounds of carbon, of the latter 37½ pounds combine with the calcium and 18¾ pounds combine with the 25 pounds of oxygen of the lime and escapes from the furnace as carbon monoxide, in accordance with the following formulæ ;

$$\begin{aligned} Ca\,O + 3C &= Ca\,C_2 + C\,O \\ 87\tfrac{1}{2} \text{ lbs} + 56\tfrac{1}{4} &= 100 + 43\tfrac{3}{4} \text{ lbs.} \\ Ca\,C_2 &= Ca + C_2 \\ 100 \text{ lbs} &= 62\tfrac{1}{2} + 37\tfrac{1}{2} \text{ lbs.} \\ C\,O &= C + O \\ 43\tfrac{3}{4} \text{ lbs} &= 18\tfrac{3}{4} + 25 \text{ lbs.} \end{aligned}$$

Calcium carbide contains 62.5 parts of calcium and 37.5 parts of carbon in 100, and when brought into contact with water, acetyline is generated to the extent of 5.89 cubic feet of gas to each pound of carbide used ; or by weight 100 lbs. of carbide and $56\frac{1}{4}$ lbs. of water evolve 40.65 pounds of acetylene gas, and form 115.62 lbs. of calcic hydrate (slacked lime) in accordance with the following formula :

$$Ca\,C_2 + 2H_2O = Ca\,O\,H_2O + C_2\,H_2$$
$$100 + 56.25 = 115\ 62 + 40.626.$$

The acetylene gas so generated contains in 100 parts 92.3 parts of carbon and 7.7 parts of hydrogen, or in the 40,625 pounds generated from 100 lbs. of carbide we have $37\frac{1}{2}$ lbs. of carbon and $3\frac{1}{8}$ lbs. of hydrogen.

Acetylene can be produced from carbide by the addition of water and distributed and stored in a gasometer, or the gas may be compressed into a liquid and kept in a suitable cylinder and drawn off as required for consumption, a reducing valve being adjusted to give the necessary pressure for burning, one cubic foot of liquid expands into 400 cubic feet of illuminating gas, so that a large supply may be stored in a very small space ; but for experimental purposes, and for a limited supply, it is preferable to make the gas direct from carbide and store it in a gasometer.

The pressure necessary to liquify acetylene depends upon the temperature. At 65° it requires a pressure of nearly 600 lbs., at 32° 323 lbs., at 28.6° below zero 135 lbs., and at 1,160° below zero 15 lbs. We see that there is no danger of freezing it at any habitable place.

As an illuminant acetylene surpasses in brilliancy all other illuminants known. When burned at the rate of five cubic feet per hour it gives 240 to 250 C. P., whereas the best coal or water gas rarely exceeds 22 candles for each five cubic feet burned per hour. Acetylene gas thus gives 10 to $12\frac{1}{2}$ times the light of ordinary gas, or 1000 feet is equivalent to 10,000 to 12,500 of ordinary gas. Acetylene is a commercially pure gas, containing 98 per cent acetyelne and 2 per cent of air; the latter having slight traces of other substances, it is clear and colorless, with specific gravity of 0.91.

When a light is applied to acetylene in open air it burns with a bright yellow but very smoky flame on account of its extreme richness in carbon, but when confined and delivered under suitable pressure it gives an extremely white light, resembling the oxy-hydrogen light and is the nearest in color and purity to sunlight of any known artificial light.

ITS POISONOUS NATURE.

Acetylene when made from expensive chemicals was know to be very poisonous, but as made from lime and carbon it is proved to be less injurious than ordinary gases; its strong pungent smell is a safeguard, as no one can remain in an atmosphere of it a sufficiently long time to be harmed. Handy for hotels where the guests blow out the lights. In such an event the "Blowhard" could not get asleep before he or some one else would be compelled to investigate. The effect on the human system is rather to intoxicate than stupify, and while it is absorbed by the blood it does not form combinations with it, it asphyxiates less rapidly than ordinary gas. Moissan, of France, and others made exhaustive experiments with the greatest care with acetylene and coal gas on animals, and proved conclusively that coal gas was very much more poisonous than acetylene.

EXPLOSIBILITY.

Acetylene, when mixed with one and a quarter times its volume of atmospheric air becomes slightly explosive, and reaches its maxim explosibility with five volumes of air, so that ordinary gas is more explosive than acetylene. Accidents and explosions reported recently have given the impression that the gas it very dangerous. Let us examine this feature. Take the case of the accident in Quebec last winter. An ingenious mechanic made his own dynamo, furnace and carbide; he was experimenting with the gas under pressure to liquify it so as to get it into the smallest possible space, he had an iron pipe eight inches long and four inches in diameter with cast iron ends, a pressure guage at one end and a valve at the other;

he had reached a pressure of 360 lbs. to the inch, and observing that the gas was escaping around the valve he used a hammer to stop the leak when a portion of the metal broke away and the gas escaping struck him in the eye penetrating his brain and killing him instantly. Ordinary air under similar conditions would have been as fatal. It was afterwards found that the iron ends were thin and porous and the wonder was that they stood the pressure ; there was no explosion ; the coroner's verdict was "accidental death."

The explosion at New Haven, Conn., 21st January last, was caused by men experimenting with liquid acetylene, under a pressure of 600 pounds to the inch ; and I presume all accidents reported might be traced to unauthorized parties experimenting with crude apparatus and ignorant of the necessary conditions for safety. We know that air, water, gas, or electricity, are dangerous under certain conditions, but harmless when properly controlled, and it is no argument against acetylene that it is also dangerous when improperly handled.

EFFECT ON ELECTRIC LIGHTING.

When I first saw acetylene gas in September, 1894, I felt sorry for the electric companies, because I thought the gas companies would readily adopt the new gas and regain their former monopoly of lighting. But I do not feel quite so downcast now ; I realize that the margin of cost of production is not so great and believe that gas companies will feel the competition equally with electric unless they adopt the new gas for use pure, or as an enricher to their present output ; it is said to be useful as an enricher for coal gas but not so suitable for water gas.

Prof. Lewes of England, one of the best gas authorities there, suggests that gas companies should distribute a low illuminating coal gas of about 12 C. P. through their mains for heating, cooking, etc, and that each place using illuminating gas be supplied with a cylinder of acetylene to be fed into the illuminating pipes in a certain determined proportion ; by some such process as this there remains a large field for coal gas, otherwise coal and water gas must go.

The incandescent light has held first place for interior illumination on account of its steadiness, purity, coolness, and not withdrawing oxygen from the air nor adding noxious elements to it. Acetylene will divide this field with the incandescent bulb ; it is a pure white steady light, of low heating power, withdraws very little oxygen from the air, and does not add impurities to any great extent; its flame has a temperature of 900 to 1,000 degree C, while ordinary gas has 1,400 degree C, but as only one-tenth to one-fifteenth of the quantity is used for equal light, its heating effect is slightly in excess of the incandescent bulb.

Taking the theoretical E. H. P. necessary to produce one ton of carbide as 3,000 horse-power hours, and using the same for a supply of electric light by incandescent 4 Watt lamps, we have the following:—3,000 x 746 = 2,238,000 Watts ÷ 64 gives 34,970 16 C. P. lamps for one hour, or 1,453 burning 24 hours continuously.

The same power equals one ton carbide, which burned in $\frac{1}{3}$ foot burners gives 31,500 16$\frac{2}{3}$ C. P. lights or 1,213, burning twenty-four hours. This gives a margin apparently in favor of electric lighting; but you cannot use all your electric lights at the source of cheapest production, nor run a continuous even load for twenty-four hours, but have in addition to sustain losses in distribution more than proportionate to the distance conveyed; also lamp renewals. With the carbide it is different, it can be made at the place of cheapest production on a constant load night and day, and a small sum transports the carbide to any place desired, where it can be used to its full power without loss. Figure out for yourselves the problem of transmitting electric current for use 10 to 100 miles from source of production and transporting carbide by freight the same distance, and the comparison will be largely in favor of carbide. Hence for use in close proximity to the power house on a steady even load day and night, the cost will be about the same if power cost the same, but as that is not practicable in electric lighting the margin is in favor of carbide, but not to such an extent as to seriously hurt the electric companies employing the best apparatus under the most approved conditions, as may be found in large cities, but it is possible in small towns where the best and most economical conditions cannot be obtained, and a thorough manager secured, well up in the scientific as well as the practical conditions, electric lighting may suffer.

The ease of distributing acetylene is remarkable; owing to its high illuminating power very small main pipes may be used, and as frost does not effect it the pipes need only be laid below the surface, so that little or no expense need be incurred in piping a town. If the cost of mains equal cost of poles and wires the central station or gas house only requires a small tank for a generator, and a gasometer of suitable size; as compared with engines, boilers and dynamos running when only one light is required.

We may then conclude that in the race for supremacy closer economy will be practised, better service given, the public will be benefitted, all will let their light shine to the best of their ability, and the one best deserving of patronage will survive.

THE NEW ONTARIO.

A Paper read before the Hamilton Association, January 16th, 1896.

BY ARCHIBALD BLUE, ESQ.

The New Ontario is a title which in the common use describes all that part of the Province lying beyond the Mattawan and French rivers and the Nipissing, Huron and Superior lakes, to the north and west boundaries. These boundaries, now clearly defined and established by an Imperial statute, were for nearly twenty years a subject of keenly waged dispute between the Governments of Ontario and the Dominion ; and at one time, after Manitoba had been projected into the quarrel, feeling ran so high that recourse to arms was imminent. The extent of country involved in this dispute, while very much larger, is perhaps not less valuable in its resources of timber and minerals than the region in dispute between Guiana and Venezuela, over which the two great Anglo-Saxon nations were just now talking of war. In one important particular, too, there is a close parallel in the conduct of the negotiations. The President of the United States has named commissioners to determine what is the true divisional line between British Guiana and Venezuela ; and this work being done, he declares it will be "the duty of the United States to resist by every means in its power, as a wilful aggression upon its rights and interests, the appropriation by Great Britain of any lands or the exercise of governmental jurisdiction over any territory which, after investigation, we have determined of right belong to Venezuela." The Government of Canada also, at an early stage in the negotiations with Ontario, and before any limits were proposed or discussed, appointed a commissioner and authorized him to proceed and trace out, survey and mark the boundaries on the west and north of the Province according to the specific and definite instructions given to him. The same arbitrariness appears in both cases ; but in the action of the Government of Canada in 1872 there was a tangible interest at stake, and in the action of the Government of the United States in 1896 there is nothing but a sentiment. Had the Government of Ontario tamely acquiesced in the instructions issued from Ottawa, instead of vigorously contesting their claim to the final award, it would have meant to this Province the loss of 100,000 square miles of territory.

The New Ontario lies within boundaries declared by the Imperial Parliament in 1889, in an Act passed in accordance with the terms of an address from the Senate and Commons of Canada presented to the Queen in that year. These boundaries are substantially the same as those agreed upon in 1878, in the award of the arbitrators appointed by the Dominion and Ontario Governments, but subsequently repudiated by the Dominion Government; and, as far as they go, they are identical with the boundaries found by the Judicial Committee of the Privy Council in 1884. In the schedule to the Imperial Act they are described as follows:

"Commencing at the point where the international boundary between the United States of America and Canada strikes the western shores of lake Superior, thence westerly along the said boundary to the northwest angle of the Lake of the Woods, thence along a line drawn due north until it strikes the middle line of the course of the river discharging the waters of the lake called lake Seul, or the Lonely lake, whether above or below its confluence with the stream flowing from the Lake of the Woods towards lake Winnipeg, and thence proceeding eastward from the point at which the before mentioned line strikes the middle line of the course of the river last aforesaid, along the middle line of the course of the same river (whether called by the name of English river, or as to the part below the confluence, by the name of the river Winnipeg) up to lake Seul, or the Lonely lake, and thence along the middle line of lake Seul or Lonely lake to the head of that lake, and thence by a straight line to the nearest point of the middle line of the waters of lake St. Joseph, and thence along that middle line until it reaches the foot or outlet of that lake, and thence along the middle line of the river by which the waters of lake St. Joseph discharge themselves to the shore of the part of Hudson bay commonly known as James bay, and thence southeasterly, following up the said shore to a point where a line drawn due north from the head of lake Temiscaming would strike it, and thence due south along the said line to the head of the said lake, and thence through the middle channel of the said lake into the Ottawa river, and thence descending along middle of the main channel of the said river," etc., to a stone boundary on the north bank of lake St. Francis in the St. Lawrence river.

The eastern boundary of the Province was first determined in 1791 by the Imperial Order in Council establishing the Provinces of Upper and Lower Canada, including the section of it from the head of lake Temiscaming defined by "a line drawn due north until it strikes the boundry line of the Hudson bay." The exact starting point of this line was finally fixed in 1872, by agreement between the Governments of Ontario and Quebec, in 1873 and 1874 it was surveyed as far north as the height of land by joint commissioners appointed for the purpose, and in 1874 the line was ratified by the Legislatures of the two Provinces. As laid down on the maps, it starts from the parallel of 47° 33′ 48″ 37‴ and is as nearly as may be along the meridian of 79° 30′ west from Greenwich. The western boundary is only the meridian of the northwest angle of Lake of the Woods, and the joint commissioners under the Treaty of Ghent ascertained this point to be in latitude 49° 23′ 55″ north, and in longitude 95° 14′ 38″ west from Greenwich.* The New Ontario therefore extends across 15° 44′ 38″ of longitude, which on the latitude of 50° measures 701 statute miles.†

The greatest breadth from north to south, measured from the mouth of the Spanish river in Georgian bay to the mouth of the Albany river in James bay (or say from 46° 15′ to 52° 30′ north latitude) is about 430 miles, and the least is along the western boundary, where it is about 80 miles. From the mouth of Pigeon river on the Minnesota boundary to the foot of lake St. Joseph, near the meridian of 90°, it is about 215 miles; from Fort Michipicoten on the east shore of lake Superior to Henley House on the Albany river, along the meridian of 85°, it is about 240 miles; and the average breadth is probably 250 miles. The area has been variously estimated; it is not less than 150,000 square miles, and it may be

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* Report of the Commissioners under the Treaty of Ghent made 23rd October, 1826. Hertslet's Treaties, vol. xiii, pp. 898-9.

† The length of a degree of longitude on the parallel of 50° is 235,171 feet, or about 44.44 English statute miles.

175,000 square miles. Even at the lower of these estimates it is larger than Minnesota and Wisconsin by 16,000 square miles, larger than Wisconsin and Michigan by 44,000 square miles, larger by 7,000 square miles than three States the size of New York, and larger than our part of Ontario south of the French and Mattawan rivers by about 100,000 square miles. The passenger train on the Canadian Pacific Railway which leaves Mattawa at the mouth of the Mattawan river at 8.11 o'clock Monday evening, and goes at a speed, including all stops, of 25¼ miles per hour—through North Bay and Sudbury, coasting the north shore of lake Superior 195 miles from Heron Bay to Fort William, and on through Rat Portage at the foot of Lake of the Woods—does not reach Ingolf station near the Ontario and Manitoba line until 11.57 a. m. on Wednesday. But the length of the run is 1,004 miles.

From these figures and comparisons it is seen that the New Ontario is a large country—doubtless much larger than most of us down here have ever conceived or suspected, for I think it must be confessed that even the best informed among us have a great deal yet to learn of its lengths and breadths, as well as of its physical aspects and varied resources.

GEOLOGICAL HISTORY OF THE REGION.

But is not the title of the New Ontario something of a misnomer? May we not say that it is really the Old Ontario? Is it not the very oldest part of our continent, and has it not furnished the materials out of which not alone this lower Ontario but many States across the great lakes have been built up? Almost the whole extent of it, all excepting a portion of the Hudson Bay slope and a small area around lake Temiscaming, is a mountain built country. Through long cycles of time the most conspicuous physical feature in North America was the high range of Archæn rocks which swept in a magnificent curve through what is known in our time as the regions of Labrador, Quebec, Ontario and the Northwest Territories, around the head of Hudson bay, from the Atlantic ocean in the east to the Arctic in the north. These rocks covered an area of over 2,000,000 square miles, and we can hardly guess the height to which they were raised by the forces that heaved them into mountain masses long, it may be, before there was any sea. The average elevation is from 1,500 to 1,600 feet above the present sea level according to Logan, and probably less than 1,000 feet according to Selwyn. There are many points of 2,500 to 3,000 feet; in the Adirondacks are mountains more than 5,000 feet above the sea; and along the eastern and northern coasts of Labrador are chains estimated at heights from 5,000 to 10,000 feet. It is supposed that the denuding forces were not so great or so active in Labrador as farther west; and having in view the immense extent of the sedimentary formations, from at least the base of the Huronian upwards through the Cambrian, Silurian and Devonian systems to the relatively recent glacial drift which cover the region of the lakes and beyond them south and west to a depth in places of many thousands of feet, and the fact that the materials of all these excepting part of the limestones were derived from the ancient rocks of the north, the conclusion appears to be irresistible that the range or ranges, for probably there were several parallel ones, must have reached a lofty height throughout their whole extent. Logan, about forty years ago, gave to this primitive nucleus of the continent the name Laurentian, from the rocks which compose it forming the high mountainous country known as the Laurentides, which extend for nearly a thousand miles north of the river St. Lawrence from Quebec into Labrador. He maintained that the rocks of the Laurentian system are almost without exception old sedimentary beds which by action of heat have become highly crystalline, composed of schists, felspars, quartzites and limestones, with intrusive masses of granites, syenites and diorites, and that their aggregate thickness is not less than 30,000 feet. It seems probable however that a number of the rocks which Logan has described as stratified are of purely igneous origin, and that their foliated structure is a result of folding and shearing when under great pressure they were being raised into mountain forms. The fine-grained hornblende-gneisses, the mica-gneisses and the chlorite-gneisses are of this class, and are often traced into massive granites and granitoid gneisses, which are clearly igneous. "All of these rocks," Van Hise says, "are completely crystalline. None of them show any unmistakeable evidence of having been derived from the sedimentaries, but many can be traced with gradations into massive rocks, and therefore the greater proportion of them are igneous, if a completely massive granular structure be proof of such an origin."* So also Dr. Adams affirms that the indistinct foliation of the fundamental gneiss—a term used to designate the lower portion of Logan's Lower Laurentian,—is not in many cases "a survival of original bedding, but is clearly due to movements in a plastic mass." Of the upper portion of the Lower Laurentian, known as Logan's Grenville series, Dr. Adams appears to think that the crystalline limestones and gneisses, while showing great dynamic action, are in all probability made up in part if not wholly of sedimentary material, often occurring in well defined bands or layers like the strata of later formations. But as regards the so-called Upper Laurentian, which embraces the Anorthosite or Norian series of Logan, his view is that their igneous and intrusive character is well established; and that while they frequently show a distinct and often a perfect foliation, they are but eruptive masses which have found their way upward by cutting the rocks of the fundamental gneiss and the Grenville series, in many cases being thrust between the bands or strata of the latter in directions of least resistance and having foliation induced in them under pressure while deeply buried and very hot.† The fact is however that there are many points upon which the authorities are not yet agreed, either as regards the origin, age, classification or nomenclature of the older rocks.

For the present purpose it is enough to be assured that while there are large areas in which eruptive masses of granite and gneiss have penetrated the Huronian rocks and thrown them into folds, proving thus their later age, in general the reverse is the case—the Huronian resting unconformably on the Laurentian and being therefore of later origin; that the Cambrian, Silurian and Devonian systems are in regular order more recent than the Huronian; and that these successive systems of rocks have been built out of the ruins of the underlying ones.

In the course of secular cooling, it may safely be assumed, the crust of the earth became folded by contraction to form high mountains and deep valleys, and when after the lapse of long ages the temperature had fallen to the point at which water might form and accumulate the processes of degradation and upbuilding must have

* Journal of Geology, vol. I., p. 115.
† Journal of Geology, vol. I., pp. 328-334.

gone forward rapidly. The atmosphere, the rains and the hot waters became effective agencies in altering the physical features of the earth by erosion, and the fundamental rocks began to be covered by the sedimentaries. But the internal forces were active yet and for ages after ; the mountain-making folding continued, and great masses of igneous rocks were intruded into the cooling crust or extruded upon it. The waters of the sea grew in volume, the Archæan highlands subsided, and once or twice in their history, if not oftener, they were over a very large extent submerged. In that sea the Huronian rocks—possibly a portion of the Laurentian also, and the foliated members of it certainly if they are sedimentary—were laid down, but we have no data for calculating their mass. The Huronians extended over large areas to the north and south, much of which is hidden by overlying deposits ; in the typical region north of lake Huron their thickness was computed by Murray to be 18,000 feet, and their aggregate thickness as originally laid down may have been not less than 40,000 or 50,000 feet. At two successive periods in their history the rocks of this great system were folded and tilted into mountain forms, followed by two long periods of active erosion during which the denudation was deep enough to remove the entire series in places, and wear the mountains down to stumps. How far if at all, glacial agencies operated in this cutting down and carrying away of Huronian material to construct new systems, there is no means of determining ; but there is nothing improbable in the supposition that they were as active in those early ages of the earth as they have been in the later period, the record of which the ice has so left written upon the face of the rocks that we may read it.

Following the Huronian system by the classification of the Canadian geologists, there come next in order the formations of the Cambrian system, embracing the Animikie, Nipigon and Potsdam, with an aggregate thickness of 54,000 feet according to some measurements, and of 63,000 feet according to others. The Nipigon alone has a thicknees computed at 50,000 feet, composed almost wholly of gabbros, diabases, amygdaloids and lavas ejected through fissure and crater during a long period of volcanic activity, and resulting in the great east and west synclinal which forms the basin of lake Superior.

After the Cambrian rocks came those of the Silurian system with a thickness in lower Ontario of over 4,000 feet, and after these we have a few formations of the Devonian with a thickness of 600 feet, the most recent of which are probably older than lake Huron, lake Erie or lake Ontario.

Now from the close of the Laurentian system considerable areas of our so-called New Ontario have been dry land ; and what length of time elapsed in the interval between the end of the Laurentian age and the deposition of the Chemung and Portage beds, which are the most recent of the lower Ontario formations, we may possibly conceive when it is ascertained that the aggregate thickness of the rocks is 18 to 22 miles. Or if we take only the period from the close of the Nipigon formation, during which fully three-fourths of the New Ontario was dry land, and all except the pre-Cambrian portion of lower Ontario was under the sea, we find that enough time had elapsed for the deposition of strata more than a mile in thickness. And that time must have been relatively long, as none of the rocks are of igneous origin ; all are sedimentary.

Obviously therefore, when looked at from the geological point of view, the title of the New Ontario is something of a misnomer.

How does it appear when looked at in the light of modern history, of written documents and annals ?

ITS HUMAN HISTORY.

There are few places in southern Ontario whose beginnings cannot be found within the limits of a century. Fort Frontenac, on the site of Kingston, was built in 1673, and Fort Rouille, on the site of Toronto, about 1750, and these were the only important posts in our part of the country during the French occupation. There were no settlements worthy of mention excepting those on the Detroit river until after Canada had been acquired by the British ; and then the earliest were those formed by the loyalists at the close of the American war for independence. Kingston and Niagara were the first towns, and they date their origin from 1783. The first houses in Toronto were built in 1794, and the town plot of Hamilton was not laid out until 1813.

But in the New Ontario of the north the fur traders, both French and English, began active business more than two centuries ago, and many forts and posts were established throughout the region. The Hudson's Bay Company obtained its charter from Charles II in 1670, and throughout the territory known as Rupert's land it was active and dominant for a period of two hundred years, or until the surrender of the territory to the Queen in 1869, at which time it occupied about twenty-five forts and trading posts within Ontario limits. Fort Albany, at the mouth of Albany river, was built by this company in 1683 or 1684, Henley House on the same river in 1744, and in 1730 a fort upon the Moose at or near where Moose Factory now stands. But the French traders were earlier on the field than the English, and for nearly a century they occupied a much larger extent of it. In 1673, the same year in which Fort Frontenac was built, they established two trading posts near the parallel of 50°, one on the Abitibi river and the other on the Missinaibi. The intrepid explorer, Daniel Dulhut, whose name is preserved in Duluth, built a fort at the mouth of the Kaministiquia river in 1678, and called it Caministoygan; and before 1684 he built another far inland, the sight of which is supposed to be at the foot of lake St. Joseph, on the northern boundary. The French also built a fort at the mouth of the Moose river in 1686, and a post at the foot of Abitibi lake before 1688. Their post at Sault Ste. Marie was established in 1670, three years before Fort Frontenac was built; and in 1731 they had reached the head of Rainy river, where La Verandrye built Fort St. Pierre, the ruins of which are yet visible under the shadow of stately trees, which have grown from seed to maturity since the time it was deserted.* The site of Fort St. Pierre, as well as that of Fort Frances, two or three miles below it, is one of the most beautiful in the New Ontario.

But with the loss of Canada the activity and enterprise of the French traders passed away, the blithe and hardy coureurs des bois were scattered, and for the next twenty years the Hudson's Bay Company enjoyed a monopoly of the trade in peltries with the Indians, saving the extent to which a few individual merchants and small companies in Montreal were able to send their agents and goods into the country.

*"At the entrance of the river there is a rapid," Sir Alexander Mackenzie wrote in 1801, "below which is a fine bay, where there had been an extensive picketed fort and building when possessed by the French; the site of it is at present a beautiful meadow, surrounded with groves of oaks." Voyages from Montreal, p. lvi.

In 1783 however, a new competitor arose when the Northwest Company was organized, and until the two companies united in 1821 their rivalry was a strife that broke out once or twice into war. The new company was composed largely of Highland Scotch merchants, and most of their officers and clerks and many of their employees were of the same nationality; but they also recruited into their service large numbers of the forest runners trained up in the palmy days of the old French traders. The enterprise of the company was shown by the construction of a canal at Sault Ste. Marie, which was open to navigation in the summer of 1800, being fifty-five years before the completion of the canal on the American side. It had also a shipyard at the beautiful sandy point a few miles above the falls, known as Pointe aux Pins, once covered with red and white pine, the best of which were cut down and used for building the company's vessels for navigating the waters of Lake Superior before the close of last century.*

Such instances of active enterprise no doubt go far to justify the belief expressed by Masson that had it not been for the quarrel of the Northwest Company with Lord Selkirk and the amalgamation with the Hudson's Bay Company in 1821, "the opening up of a line of communication between Canada and the Northwest Territories, and consequently the settlement of that country from Canada, would have been advanced by a quarterr of a century." The interests of the Northwest Company, Mr. Masson says, were intimately bound up with those of Canada, while those of the Hudson's Bay Company were in an entirely opposite direction.† So bright indeed

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*In the winter of 1770 Alexander Henry and his associates in a mining enterprise on the north and south shores of Lake Superior, built a barge fit for the navigation of the lake, at their shipyard at Point aux Pins, and laid the keel of a sloop of forty tons; but it was not until August of 1772 that the sloop was launched.—Henry's Travels, pp. 226 and 234.

† In Cauchon's memorandum it is stated that the Canadian Northwest Company were everywhere in advance of their rivals. "They were the first to spread themselves beyond the limits of the French, over the prairies of the Saskatchewan; they were the first to discover the great river of the north, now bearing the name of Mackenzie, and pursue its course to its discharge in the frozen ocean; they were the first to penetrate the passes of the Northern Cordilleras and plant their posts upon the shores of the Pacific; and with such indomitable energy did they carry on their business that, at the period of Lord Selkirk's interference, they had upwards of 300 Canadians, 'voyageurs,' employed in carrying on their trade to the west of the Rocky Mountains."

seemed the outlook for Sault Ste. Marie at one time that it was pointed out as offering the best market for the farm products of the country around Toronto. "The soil in the neighborhood of York (Toronto) is said to be rich," John Johnston of the Sault wrote in 1809, "and the farmers could raise a vast quantity of provisions, were they encouraged by having a sure market for them. This could easily be accomplished by opening a communication with the Bay of Machedash, from whence to the Island of St. Joseph the distance is only ninety leagues. From the bay, a chain of islands extends to the northwest, of which St. Joseph is the last; these render the navigation perfectly safe, as you may either keep outside of them or between them and the shore, with safe anchorage everywhere. By this channel, provisions may be brought to St. Joseph, St. Mary and Michilimackinac in half the time and for half the expense they are procured from Sandwich, Detroit, etc., and the returns from the above places would arrive much sooner and safer at Montreal." Concerning the fortunes of Matchedash itself under this scheme, Johnston had not a doubt on his mind "but that it would soon become the most thriving place in Upper Canada, and the centre of provisions and transport trade for the fur countries."*

But the chief seat of the Northwest Company's enterprise was on the north shore of lake Superior. Fort Charlotte, the place first selected, was at Grand Portage, at the mouth of Pigeon river. Fearing however that it might be within the United States boundary, a new location for business headquarters was chosen at the mouth of the Kaministiquia river and named Fort William, after William McGillivray, one of the partners of the company.† It soon became the

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* John Johnston's Account of Lake Superior in Les Bourgeois de la Campagnie du Nord-Ouest, by L. R. Masson, vol. II.

† The first fort on this river was built by Dulhut in 1678, and it was re-built by LaNoue under instructions from the French Government in 1717. The name Kaministiquia (which has undergone many modifications of orthography) is said by John Johnston to mean the "river of difficult entrance," and by Sir John Richardson the "river that runs far about," while Dr. Bigsby translates it "the river of the isles."

A further interesting narrative of how the seat of the fur trade on lake Superior came to be transferred from Fort Charlotte to Fort William is given by Dr. Bigsby: "During great part of the eighteenth century," Dr. B. writes, "before the union of the Indian traders into one company, the Northwest, the Lake Superior end of the Grand Portage was a pent-up hornet's nest of conflicting factions intrenched in rival forts. The traders first coalesced into two companies, one called the 'X. Y. Company,' from a most important post north of the great lakes, and at some seasons of the year the number of traders assembled there was not less than 3,000, gathered from all quarters of the Northwest to which the operations of the company had extended.

But Fort William was something more than the central depot for the exchange of furs and goods. It was the meeting place where the affairs of the company were planned every year between a few of the leading partners at Montreal and partners from the various trading stations in the wilderness. "Here, in an immense wooden building," to quote Washington Irving, "was the great council hall, as also the banqueting chamber, decorated with Indian arms and accoutrements, and the trophies of the fur trade. The house swarmed at this time with traders and voyageurs, some from Montreal, bound to the interior posts, some from the interior posts bound to Montreal. The councils were held in great state, for every member felt as if sitting in parliament, and every retainer and dependent looked up to the assemblage with awe, as to the house of lords. There was a vast deal of solemn deliberation, and hard Scottish reasoning, with an occasional swell of pompous declamation. These grave and weighty councils," Irving goes on to say, "were alternated by huge feasts and revels, like some of the old feasts described in Highland castles. The tables in the great ban-

mark placed on their pack, and consisted of Sir Alexander McKenzie and Messrs. Ogilvy, Richardson and Forsyth; and of the Northwest Company, at whose head were Messrs. W. and S. McGillivray, McTavish and others. Latterly both these firms united to contend with the old Hudson's Bay Company, acting under the charter of Charles the Second and later parliamentary sanction. The American Government, properly conceiving that the Grand Portage, the centre of so much commercial activity, was within their territory, signified about the year 1802, to the amalgamated company, now called the Northwest Company, their intention of imposing a duty of from twenty to twenty-five per cent. on all goods landed there. After having in vain offered a composition of five per cent., the Northwest Company abandoned the place, but not before they had well examined the Pigeon river from the north end of the Grand Portage down to lake Superior. Sir Alexander McKenzie occupied a long time in this task, accompanied by two Indians, but they found that high falls, rapids and shelving precipices rendered the river utterly impracticable for commercial purposes. The company then built their Fort William, and made the Dog river and other streams and lakes their road into the Northwest fur countries, although this is inferior in every respect to the old route, so much so, that the voyageurs had to be coaxed and bribed into the use of it. I am obliged to Mr. Astronomer Thompson for this information."—The Shoe and Canoe, or Pictures of Travel in the Canadas, by John J. Bigsby, M. D., vol. II, pp. 240-1.

queting room groaned under the weight of game of all kinds; of venison from the woods, and fish from the lakes, and hunters' delicacies, such as buffaloes' tongues and beavers' tails; and various luxuries from Montreal, all served up by experienced cooks brought for the purpose. There was no stint of generous wine, for it was a hard-drinking period, a time of loyal toasts, and bacchanalian songs, and brimming bumpers."*

Neither Toronto, nor Niagara, nor Kingston could approach the commercial greatness of Fort William ninety years ago; and in no part of the interior of the lower peninsula were such scenes of activity to be witnessed as along the highways of trade in the interior of the northern country, from the Ottawa river to Lake of the Woods.

From lake Superior there were two routes to the Northwest: one from Grand Portage through the boundary waters to Rainy lake, and the other up the Kaministiquia river and Dog lake, across the long portage to Savanne river, and thence through Lac de Mille Lacs and a succession of smaller lakes, down the Maligne and Meccan or Namakan rivers into Rainy lake. The latter was the route usually

* Irving's Astoria, p. 8 (Bohn's edition). The X. Y. Company, which was a section of the Northwest Company, detached from it in 1796, but reunited with it in 1804, and had its headquarters at Grand Portage. The mode of living there is described as follows by Sir Alexander Mackenzie, (Voyages from Montreal, p. xlvi): "The proprietors, clerks, guides and interpreters mess together, to the number of sometimes an hundred, at several tables, in one large hall, the provision consisting of bread, salt pork, beef, hams, fish and venison, butter, peas, Indian corn, potatoes, tea, spirits, wine, etc., and plenty of milk, for which purpose several milch cows are constantly kept. The mechanics have rations of such provisions, but the canoe-men, both from the north and Montreal, have no other allowance here, or in the voyage, than Indian corn and melted fat. The corn for this purpose is prepared before it leaves Detroit, by boiling it in a strong alkali, which takes off the outer husk; it is then well washed, and carefully dried upon stages, when it is fit for use. One quart of this is boiled for two hours, over a moderate fire, in a gallon of water; to which, when it has boiled a small time, are added two ounces of melted suet; this causes the corn to split, and in the time mentioned makes a pretty thick pudding. If to this is added a little salt (but not before it is boiled, as it would interrupt the operation), it makes a wholesome, palatable food, and easy of digestion. This quantity is fully sufficient for a man's subsistence during twenty-four hours, though it is not sufficiently heartening to sustain the strength necessary for a state of active labor. The Americans call this dish hominee." In a foot note Sir Alexander adds that corn is "the cheapest provision that can be procured, though from the expense of transport the bushel costs about twenty stirling at the Grand Portage. A man's daily allowance does not exceed tenpence."

taken by the Northwest Company's traders; and from the pen of R. M. Ballantyne, who came over it on his way from Norway House to Montreal in 1845, we have a graphic picture of the scenes that must have been witnessed along those waterways for well nigh forty years, covering the close of the eighteenth and the beginning of the nineteenth century. "Many years ago, in the time of the North-west Company," Ballantyne writes, "the echoes among these wild solitudes were far oftener and more loudly awakened than they are now. The reason of it was this: The Northwest Company, having their headquarters at Montreal and being composed chiefly of Canadian adventurers, imported their whole supplies into the country and exported all their furs out of it in north canoes by the same route over which we now travelled. As they carried on business on a large scale, it may be supposed that the traffic was correspondingly great. No less than ten brigades, each numbering twenty canoes, used to pass through these scenes during the summer months. No one who has not experienced it can form an adequate idea of the thrilling effect the passing of these brigades must have had upon a stranger. I have seen four canoes sweep round a promontory suddenly and burst upon my view, while at the same moment the wild, romantic song of the voyageurs, as they plied their brisk paddle, struck upon my ear; and I have felt thrilling enthusiasm on witnessing such a scene. What then must have been the feelings of those who had spent a long dreary winter in the wild northwest, far removed from the bustle and excitement of the civilized world, when thirty or forty of these picturesque canoes burst unexpectedly upon them, half shrouded in the spray that flew from the bright vermilion paddles, while the men, who had overcome difficulties and dangers innumerable during a long voyage through the wilderness, urged their light craft over the troubled waters with the speed of the raindeer, and with hearts joyful over the happy termination of their trials and privations, sang with all the force of three hundred manly voices one of their lively airs, which rising and falling faintly in the distance as it was borne. first lightly upon the breeze, and then more steadily as they approached, swelled out in the rich tones of many a mellow voice, and burst at last into a long, enthnsiastic shout of joy. Alas!" Mr. Ballantyne exclaims, "the forests no longer echo to such sounds. The passage of three or four canoes once or twice a year is all that breaks the stillness of the scene ; and nought save narrow pathways over the portages, and rough wooden crosses over the graves of the travellers who perished by the way, remains to mark that such things were."*

Such was our New Ontario under the regime of the trading companies ; it had an early beginning as compared with the Ontario of the south ; but the stronger of the companies absorbed or devoured the weaker, and while large profits were earned the country was not in the faintest degree bettered in the end by their operations. It had always indeed been the policy of the Hudson's Bay Company to keep up the primeval state of the forest, as the founding of settlements was incompatible with the life of the fur trade. Moreover, history teaches the lesson that a company organized with powers of government and exclusive rights to carry on trade in a country has for its first consideration the commercial idea, and everything else is subordinate. The Hudson's Bay Company had no other thought for the two centuries during which it held sway in northern Canada than how the largest dividends could be earned for the shareholders. So it was with the English East India Company, whose over-ruling hand was felt in India for more than two and a half centuries, down to the close of the mutiny. And so we have just seen it to be with the British South Africa Company, whose filibustering raid into the Transvaal came perilously near to plunging Europe into war. The Hudson's Bay Company relinquished its authority overy the territory of northern Ontario—the portion of it beyond the height of land—in 1869 ; but it took twenty years to settle the disputes which arose afterwards between the Dominion and Provincial Governments as to the true boundaries and the ownership of

*R. M. Ballantyne's Hudson's Bay, pp. 279-80. As descriptive of the kinds of canoes used by the fur traders, Mr. Ballantyne says: "A number of canôtes de maitre, or very large canoes, are always kept in store here (Fort William) for the use of the Company's travellers. These canoes are of the largest size, exceeding the north canoe in length by several feet, besides being much broader and deeper. They are used solely for the purpose of travelling on lake Superior, being much too large and cumbersome for travelling with through the interior. They are carried by four men instead of two like the north canoe; and besides being capable of carrying twice as much cargo, are paddled by fourteen or sixteen men. Travellers from Canada to the interior generally change their canôtes de maitre for north canoes at Fort William before entering upon the intricate navigation throught which we had already passed ; while those going from the interior to Canada change the small for the large canoe." pp. 287-8.

the land, timber and minerals. Therefore it is only since 1889, when the limits on the north and west were determined by Imperial Act, that settlers, lumbermen and mining prospectors have been sure of titles over a large extent of the region. And this is why it is called the New Ontario.

PHYSICAL ASPECTS OF THE COUNTRY.

The physical features of the country cannot be accurately described yet, because they are not sufficiently known. There is a height of land extending westward from the Quebec boundary as far as the 90th meridian, which forms the watershed between Hudson bay and the great lakes. There is another, running northward near the 90th meridian from the American boundary to the 50th parallel, and then turning north-westward between lake St. Joseph and lake Seul, enters Keewatin territory and reaches Hudson bay near the mouth of Nelson river.

The first of these watersheds to the north includes the basin of the Moose river, with its three large tributaries, the Abitibi, the Metagami and the Missinaibi; and a portion of the basin of the Albany river, with the Kenogami as its chief tributary from the Ontario side.

South of the watershed are numerous rivers flowing into the St. Lawrence system of waters, including the Montreal, which joins the Ottawa; the French, which drains lake Nipissing and its tributaries, and lake Wahnapitae through a river of the same name, into Georgian bay; the Whitefish, Spanish, Mississaga and Thessalon, into lake Huron; and a number of rivers into lake Superior, the largest of which are the Goulais, Michipicoten, White, Pic, Nipigon, and Kaministiquia.

The headquarters of those streams flowing north to Hudson bay and south to the great lakes often interlace each other, and there are a number of lakes on the tableland which discharge their waters both north and south. Shoal lake, northeast of lake Nipigon, is one of these. It is 300 feet above the level of lake Nipigon, to which it sends a contribution of its waters down the Ombabika river, and 1,200 feet above the level of the sea, to which an equal contribution is made through the channels of the Powitic and Albany rivers. "No portage occurs on the Ombabika for about nine miles before reaching Shoal lake," Dr. Bell reports, "nor for nearly five miles beyond its northern outlet; so that we passed the height of land with the greatest possible ease, having had about seventeen miles of uninterrupted canoe navigation from the time we made the last portage on the southern side till we came to the first in going down on the northern."* Lake Temagami, which lies about thirty miles north of the west end of Lake Nipissing, is remarkable for having had at one time four outlets; but since its level has fallen the number is reduced to two—the Metabechawan river to the Ottawa, and the Sturgeon to lake Nipissing By these lakes along the northern divide and the streams which discharge their waters, Ontario is found to be cut up into a number of islands, the largest of which is the one we occupy.

The portion of the Province west of the north and south watershed, near the 90th meridian, lies within the basin of the Nelson river, which, next to that of the Mississippi, is the largest river basin on the continent. Lake Seul in the north, Rainy lake in the south, and Lake of the Woods in the west collect the Ontario waters of this basin to discharge them through Winnipeg river into the lake of that name, there to mingle with the waters of Red river from the highlands of Minnesota and of the Saskatchewan from the Rocky mountains, and be borne by the mighty Nelson into Hudson bay.

In the closing period of the glacial age, as the ice field slowly retreated towards the arctic circle, the region towards which those streams from the eastern, southern and western slopes converge became the bed of what was no doubt the largest fresh water lake ever formed upon this earth. Lake Agassiz, for that is the name by which it is now known, is traced as to its shore lines by well defined gravel and sand beaches from the height of land in Minnesota northward to the 55th parallel, and at least from Rainy lake, if not from lake Seul, west to the Souris river. The area of this lake is computed to have been 110,000 square miles, or about 15,000 square miles larger than the combined areas of the lakes Superior, Michigan, Huron, Erie and Ontario.† The valley of Rainy river, as well as the plains of Minnesota, Dakota and Manitoba, owe their fertility to the silt deposited in this ancient lake; and it is not unlikely that we owe to

* Geol. Sur. Can., 1871-2, p. 107.

† Warren Upham in Can. Geol. Sur., 1888-9, p. 11E.

its action also, to some extent, the deeply indented shore lines of Rainy lake and Lake of the Woods, which promise to aid in the development of the resources of the country bordering upon them by the facilities they offer to an extended navigation.

But like every country over which the glaciers moved, the whole north is a land of lakes, and so thoroughly is it threaded by streams running into and out of the labyrinth of lakes that the skilled woodsman with his canoe may steer his way in any course at his will. Many of the lakes, too, are of rare beauty, with clear blue waters and studded with lovely islands, of which Temagami, Crow, Shebandowan, Greenwater and Baril are fair types. Temagami lake, 600 feet, and Crow lake, 800 feet deep, are among the most picturesque in the world. Of rivers also there is an infinite variety, of all breadths and lengths and colors; and even in the same stream one may discover every shade of change. For miles together it may be level and placid as a stretch of canal. Then the rocky banks are seen to contract, the current becomes a rapid, and presently expands into a lake. Or there are shallows, a maze of channels through islets clothed with spruce or cedar, a terraced fall, a swirl of eddies, a rush of the foam-flecked flood between walls of rock, with the almost constant lakelet or lagoon in a setting of dark woods beyond, where in a margin of grass or reeds.

> The lotus lolls on the water,
> And opens its heart of gold,
> And over its broad leaf-pavement
> Never a ripple is rolled.*

And so the rounds of change go on through shifting scenes of quiet and turbulence. Such a river is the Seine, which, flowing out of Lac des Mille Lacs, carries down in its tortuous way to Rainy lake the overflow of a thousand other lakes besides. A canoe trip starting from Savanne on the Canadian Pacific Railway, traversing Lac des Mille Lacs, Baril, Brule, Windigoostigwan, Elbow and Crooked Pine Lakes, and thence down current on the Atik-okan and Seine rivers to Rainy lake, and on, if one is in the mood, across this lake to Fort Frances, down the Rainy river to Hungry Hall, and over Lake of the Woods to Rat Portage, where the Canadian Pacific Railway is

* From Cleopatra, by W. W. Story.

reached again,—this is an outing as replete with interest and exhilaration, and offers as much in the way of adventure as the heart of any lover of nature can desire. Especially so if it is taken late in the summer or early in the autumn, when the poplar woods are beginning to golden, and the mountain ash is laden with red-ripe clusters of berries, and the career of the pestilent black fly is over and gone for the season.

The information we possess of the Hudson Bay slope is practically limited to what has been seen along the rivers, for it is doubtful if any white man has yet crossed that country from east to west north of the 49th parallel. The general impression is that a large portion of the basin of Moose river is a treeless waste, covered with peat bogs, and not likely to have any agricultural value. But until more is known of it than any traveller or explorer has yet learned by canoeing up and down the chief rivers, with here and there an excursion of one or two miles into the timber out from their banks, it is useless to speculate on the future of this region.

The discovery of what appears to be a most valuable tract of country, on the Quebec side, east of the Moose river basin, has only been made known to us during the past year. By the explorations of Henry O'Sullivan, of the Crown Lands Department, Quebec, and of Dr. Robert Bell, of the Geological Survey, it has been ascertained that in the basin of the Nottaway river and its tributaries, the Waswanipi and the Mekiskan or Bell, there is a tract of rich and finely-timbered land as large in extent as the whole of England, of which nothing whatever was known two years ago. The description given of it in Mr. O'Sullivan's report, recently published, is intensely interesting to every Canadian, as well as to students of physical geography, and inspires us with the hope that regions of perhaps equal extent and value may be found in Ontario also, beyond the height of land. We shall only know by exploring for it, as has been done in Quebec. The Hudson's Bay Company, whose only interest is in the fur trade, we can depend will never tell us any good thing of the country which might have the effect of inviting the settler, the miner or the lumberman to disturb the haunts of the Indian trapper and hunter."*

* In the report of his explorations, dated 15th May, 1895, Mr. O'Sullivan says: "The general impression, formed no doubt from the experience

PHYSICAL CHARACTERISTICS AND NATURAL RESOURCES.

After the account already given of the Archæen rocks of the New Ontario, it is not necessary to write more than a few words on its geology. Belts of the Huronian system of rocks, running generally in a northeast and southwest direction overlie the Laurentians all the way from Lake of the Woods to the Ottawa river, and extend to the southern limits of the territory along the international boundary and the shores of lake Superior and lake Huron. What is known as the "great belt" of this system stretches from lake Superior north of lake Huron to lake Mistassini in Quebec, a length of about 700 miles. Around lake Superior there are Cambrian rocks (of the Animikie and Nipigon series) over the Huronian, and it is thought also that there is an area of Lower Cambrian north of lake Huron, in the basin of the Vermilion river, the length of which is thirty-six miles and the greatest breadth 8 miles. Around Sault Ste. Marie is a formation of red sandstone which is believed to be of Potsdam age; west and northwest of lake Temiscaming is an important area of Niagara limestones; while on the Hudson Bay slope, lying up over the Laurentian and Huronian rocks and extending from the eastern boundary of the Province westward beyond the Kenogami river, are several formations of the Silurian and Devonian systems, including the Niagara, Onondaga and Corniferous rocks. In the region southwest of James bay, Dr. Bell says, the Corniferous forma-

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of surveyors and explorers in this Province, was that all that northern region was a cold rocky waste, and certainly any one who would visit the head waters of any of our large rivers flowing into the St. Lawrence from the north would naturally be impressed with the feeling that there was little use in searching for anything worth having, excepting perhaps fish, game and minerals, any farther north, and I must confess that this was my own impression until last summer. On St. Jean Baptiste day, 24th June last (1894), the Reverend Father Gueguin said mass in my tent at the foot of lake Dumoine. That reverend gentleman has been missionary among the upper Ottawa and Hudson bay slope Indians for nearly thirty years. After mass, as we were descending the Dumoine river in company with Mr. L. A. Christopherson, Father Gueguin, in relating some of his experience among the Indians, told me of having seen some good land and large timber in the neighborhood of lake Waswanipi, and strongly advised me to try and explore that country. Mr. Christopherson, guardian of the Hudson Bay Company's post at Grand Lake Victoria for the last twenty years, was of a different opinion. He said that he did not think there was anything worth having beyond the height of land. To use his own words: "The interior Indians who visited the post could not get an axe-handle there.'" This is in keeping with the traditional policy of the Hudson's Bay Company.

tion occupies an area larger than all the western peninsula of Ontario.

Of all the natural resources of the New Ontario the forest is the one of most obvious value, for there is nothing to hide or obscure it. There are yet wide tracts of pine land, although many square miles have been cut over by the lumberman and more have been swept and destroyed by fire. It seems likely that most of the country now covered with poplar was one time under pine. West of Port Arthur the pine forest was burnt over within the memory of men yet living. In his Narrative of the Red River Expedition of 1857 Prof. Hind says he found extensive areas covered with burnt forest trees, chiefly of pine, in the valley of the Kaministiquia river as far as Little Dog lake, where the formidable barrier of Great Dog lake comes into view. On Dog river he observed wide areas strewed with the blackened trunks of trees; and in the young forest which seemed fresh and green at a distance, "the ground was found to sustain the charred remains of what had once been a far more vigorous vegetation."*

And of the country beyond Lac des Mille Lacs he writes: At Brulé portage [between Baril and Brulé lakes] I ascended a steep hill bordering a small rapid stream called Brulé river, and from an altitude of fully 200 feet had a fine view of the surrounding country. The vegetation upon the hillside and summit was truly astonishing, and the term Brulé portage received an unexpected interpretation on finding hidden by a rich profusion of brushwood the dead trunks of many noble pines. Throughout the day the tall trunks of white pine, branchless and dead, rising in clumps or in single loneliness far above the forest, had attracted attention, and on the side of the Brulé hill we observed many prostrate half-burnt trees of the largest size. One dead trunk was measured and found to be twelve feet in circumference five feet from the ground. A living tree, tall, clean and apparently quite sound, measured nearly ten feet in circumference, and many of the prostrate pines were of equal dimensions. There can be little doubt that these were the remains of a magnificent white pine forest, which formerly extended over a vast area in this region, since from the summit of the hill the forms of scattered

* Vol. I., p. 49.

living trees, or tall branchless and scathed trunks met the eye in every direction. The young second growth indicated a soil not incapable of sustaining pine trees of the largest proportions; black cherry, birch (both white and black), alder, small clumps of sugar maple, and a thick undergrowth of hazelnut now occupies the domain of the ancient forest. The southwest side of this hill formed a precipitous escarpment 150 feet above the waters of a long, clear lake. All around the eye rested upon low dome-shaped hills dipping towards the northeast and covered with a rich profusion of second growth. The vast wilderness of green was studded with black islands of burnt pine, and a few isolated living trees, serving by their surprising dimensions to tell of the splendid forests which must have once covered the country. . . . The uniform size of second growth timber on the Brulé hill seemed to prove that the great fire which devastated this region may have occurred about thirty years since.* That would be about seventy years ago. Another fire which destroyed a valuable pine forest occurred about twenty-five years ago in what is now known as the Sudbury country, north of lake Huron. It is said that in one day this fire ravaged a tract seventy miles long by thirty wide, or in all about 2,000 square miles.†

* Vol. 1, pp. 63-64.

† The first fire in this region occurred in 1864, and extended from lake Nipissing to Bruce Mines along the shores of Georgian bay and lake Huron. The fire of 1871 followed in the wake of the previous one, but covered a much larger area in the interior. Mr. D. F. Macdonald of Parry Sound, who knows the region intimately, writes me: "The hardwood ridges and dense swamps seemed to be the only effective barriers of the conflagration. Lakes and rivers made no break in the fiery torrent as it rushed along the pine-clad and moss-covered ridges of rock and sandy or gravelled plains. The fire of 1871 was doubtless the fiercest, as it destroyed every tree and plant in its course, as well as animals, I found the charred bones of an Indian on the Wahnapitæ river in the autumn of 1872, and no doubt he had been smothered in the smoke and flames. The burnt barrel of his gun, his hatchet, knife and kettle, with the metallic buttons of his clothes and a few wrought iron nails from the canoe, were all commingled with his charred bones. This shows that the fire was heavy and hot when an Indian would become a victim to its ferocity. Had he followed the river he would have been swept over the falls; he ran the fiery gauntlet about half way across the portage with the canoe on his shoulders, when he fell smothered with smoke and heat and was cremated on the spot. Both fires originated in the neighborhood of lake Nipissing, and in 1871 there were no persons on that lake except John Beatty at the mouth of South river, and Norman McLeod, the Hudson's Bay trader, near the mouth of the Sturgeon, and a few Indians on the Beaucage reserve, on Goulas point, and at Chaudierre falls." The fire in 1864 took place in the first week in May, Mr. Samuel A. Marks of Bruce Mines informs me. Only five houses were saved in the Copper Bay section of the village, and about 1,500 people were left homeless.

The same region, Indian tradition says, was burnt over about one hundred and thirty years ago. Indeed it is very probable that successive forests have grown up and have perished in the flames in past milleniums, since the land became fitted for the sustaining of tree life upon it. Hitherto little use has been made of timber other than pine, of which there are immense areas in the New Ontario; but it is certain to find a market, and the Province will yet derive a large revenue from it. Even now there is an active demand for poplar and spruce for the manufacture of pulp, and this is fast becoming an industry of great magnitude. As for the future, one hardly dares trust himself to forecast what our needs may be a century or a quarter of a century hence, for the wit of man is seeking out many inventions. But in all human probability we shall never be able to find a complete substitute for wood in the arts; and it is not too early now for adopting schemes to conserve our forests. There are many parts of the north so rough and rocky as not to possess any prospective value for agriculture, but suitable enough for forest growth. What better policy can be chosen as regards such tracts than to set them apart in perpetuity as Crown forests? This is a simple plan, and it possesses the merit of being well started already, in the sense that Nature has planted the trees and prospered their growth under its own conditions.

As an agricultural country, there is much to be said for the north. It is true, as just stated, that many parts are too rough and rocky for tillage; but other parts are as full of promise as any of our older counties. This is especially true of the river valleys north of lake Huron, where the soil is wonderfully productive. And there are many other areas of equal excellence, such for example as the regions around lake Tamiscaming (where twenty-five townships embracing 575,000 acres are surveyed), to the north and west of lake Nipissing, and in the valley of the Vermillion river. For the growth of peas and oats, timothy and clover. and root crops of all kinds, there is no more suitable land anywhere than in those districts; and they are equally well adapted for the dairy industry and the production of beef and mutton, as the pastures are nourishing and water abounds everywhere. Beyond Port Arthur and Fort William there are many good farms, and on the Wabigoon river, 200 miles from Fort William, there is a tract of land now being opened for settlement, where the Ontario Government has already established a dairy farm, which promises remarkably well. No doubt many other regions of fertile land exist throughout our northern domain ; but of those that are well known it may be safe to say that the largest and best is the country on the Rainy river lying between Rainy lake and the Lake of the Woods. Writing of this district and the river itself in his Narrative of a Journey round the World, Governor Simpson of the Hudson's Bay Company said : "From Fort Francis downwards a stretch of nearly a hundred miles, it is not interrupted by a single impediment, while yet the current is not strong enough naturally to retard an ascending traveller. Nor are the banks less favorable to agriculture than the waters themselves to navigation, resembling in some measure those of the Thames near Richmond. From the very brink of the river there rises a gentle slope of green sward, crowned in many places with a plentiful growth of birch, poplar, beech, elm and oak. Is it too much for the eye of philanthrophy to discover, through the vista of futurity, this noble stream, connecting as it does the fertile shores of two spacious lakes, with crowded steamboats on its bosom, and populuous towns on its borders.* This is a glowing description for a Hudson's Bay officer to give ; but Governor Simpson recanted it with ingenuity when the claims of his company seemed to be in jeopardy before a committee of the Imperial House of Commons a few years afterwards. When the passage from his book was read to him, first by Mr. Gordon and subsequently by Mr. Roebuck, Governor Simpson said he only meant the description to apply to the bank, "the lip of the river" as he phrased it. "The back country is a deep morass, and never can be drained in my opinion." And again : "I confine myself to the banks ; the back country is one deep morass extending for miles." The Governor's explanation was ingenious in a little sense, but it had the demerit of being untrue. The fertile land along the Rainy river on the Ontario side extends nearly from one lake to the other, a distance of about eighty miles, and its breadth is said to range from five to twenty-five miles. The land also rises steadily towards the north, so that drainage is easy ; indeed the swampy ground a mile back from the river is found by levels to be seventy feet above it. The soil is deep and

*Narrative of a Journey Round the World during the years 1841 and 1842, vol. I., pp. 45-6.

rich, and the climate is favorable for the maturing of almost every kind of cereal grown in lower Ontario. Ballantyne, who ascended the river on his way from Norway House to Montreal, as previously noted, has given us his impressions of it in a book published long after he had left the service of the Hudson's Bay Company. "Next morning (September 11, 1845) we commenced," he writes, "the ascent of Lac la Pluie river. This is decidedly the most beautiful river we have yet traversed—not only on account of the luxuriant foliage of every hue with which its noble banks are covered, but chiefly from the resemblance it bears in many places to the scenery of England, recalling to mind the grassy lawns and verdant banks of Britain's streams, and transporting the beholder from the wild scenes of the western world to his native home. The trees along its banks were larger and more varied than any we had hitherto seen—ash, poplar, cedar, red and white pines, oak and birch being abundant, whilst flowers of gaudy hues enhanced the beauty of the scene."* This is almost a true picture, but settlement now extends along many miles of the river on the Ontario side, and to some extent at least the forms of natural beauty have been changed and marred. The description however is remarkably faithful of the Minnesota side, where, except for glades with wide-branching elms and a few gaps cut by squatters, the banks are yet clothed with the primeval forest."†

* B. M. Ballantyne's Hudson's Bay, p. 272.

† In his Voyages from Montreal, p. lvi, Sir Alexander Mackenzie says of the Rainy river and the country along its banks: "This is one of the finest rivers in the Northwest, and runs a course west and east one hundred and twenty computed miles; but in taking its course and distance minutely I make it only eighty. Its banks are covered with a rich soil, particularly to the north, which, in many parts, are clothed with fine open groves of oak, the maple, the pine, and the cedar. The southern bank is not so elevated, and displays the maple, the white birch and the cedar, with the spruce, the alder, and various underwood. Its waters abound in fish, particularly the sturgeon, which the natives both spear and take with drag-nets. But notwithstanding the promise of this soil, the Indians do not attend to its cultivation, though they are not ignorant of the common process, and are fond of the Indian corn, when they get it from us. Though the soil at the foot is a stiff clay, there is a garden, which, unassisted as it is by manure, or any particular attention, is tolerably productive." Dr. Bigsby, who went down the Rainy river in 1823, makes this reference to it in his book—Shoe and Canoe: "A thousand years ago, while yet our England was a wolfish den, the silver Trent of the midland counties must have greatly resembled the Lapluie of the present day. I am not sure that the fur trader, an Italian perhaps, had not a hut on its banks; but certainly at the time we are speaking of both these streams flowed smoothly and freely in a successions of lovely and sequestered reaches, and through terraced meadows, alternating with rich woods and reedy marshes. The Lapluie seems made for a pleasure excursion; all is serenity and beauty." Vol. II., p. 270.

But the best hopes for the New Ontario are no doubt built upon its mineral wealth, the extent and value of which we are only beginning to realize. The rocks of the Huronian and Cambrian systems are found to be mineral-bearing over a wide extent; and from the number of discoveries made every year in new and unexpected localities, we have an assurance that as yet only a little of this hidden treasure has come to be known. In the Animikie slates of the Cambrian system silver mines have been worked at points far apart, some of which have proved to be very rich. Silver Islet alone has yielded upwards of $3,000,000. In the Nipigon rocks of the same system native copper and copper sulphide have been discovered at many places, but notably on Michipicoten island and point Mamanise, where the occurrences are the same as on Keweenaw point on the south shore. But too much of the exploratory work hitherto has been extravagantly done, both on the island and the mainland. As an illustration, it may be stated that the Quebec Mining Company in 1848-50 expended at Point of Mines $232,256, chiefly above ground, before any quantity of ore was raised on the lodes were proved to be valuable. A village of fifty or sixty houses was built for miners and other employes, besides offices, stores, magazines and a sawmill. Inspector William Gibbard, who visited the location in 1860, reported that he found smelting works, crushing mills, jigging works, stamp forges, railroads, hundreds of yards of iron chain, ladders, furnaces, scows, etc., in a dilapidated state, thousands of fire brick, and an expensive conduit about one mile long made to convey water to the stamps.* This was an expenditure preparatory to mining, before it had been proven that there was more than a surface show of ore; and the capital being thus wasted the company was left without means to carry on the actual work of mining or establish the value of their property by sinking deep shafts upon the veins.† It is however in

* Report of the Commissioner of Crown Lands of Canada for 1860, p. 90.

† In 1767 and 1768 the east shore of lake Superior was explored by Alexander Henry and copper was discovered at a number of points from Mamainse headland to Michipicoten harbor, which was called by the Indians the coast of Nanibojou. In the spring of 1768 Mr. Henry met Alexander Baxter, his partner, to whom he communicated the information of his discoveries, and measures were taken for working the mines. In 1770 Mr. Baxter returned from England, bringing with him papers by which, with Mr. Bostwick and himself, Mr. Henry was constituted a joint agent and partner

the Huronian system of rocks that the greatest variety of minerals is to be found. Ores of copper, nickle, iron, gold and other metals have been discovered, and operations are carried on which promise to establish a large industry. At the Bruce and Wellington mines, north of Lake Huron, copper mining was carried on for about 27 years, ending with 1875, and the value of the output in that time is reported to have been as much as $7,000,000. At the Sudbury mines, the ores of which yield nickle, copper and some cobalt, the total ore output of the mines for the six years 1890-95 was 539,936 tons, of which there was smelted and reduced to matte in the furnaces 430,539 tons. For five years 1891-95 this industry paid for labor at the mines and works the large sum of $1,436,216 ; and the value of the products of nickel, copper and cobalt for the four years 1892-5, computed at the selling price at the furnaces, was $2,781,800, or an average of $695,450

for working the mines. They passed the winter together at Sault Ste. Marie and built a barge fit for the navigation of the lake, besides laying the keel of a sloop of forty tons. In May, 1771, they went to explore the island of Yellow Sands (Caribou island) where they hoped to find gold, but a stay of three days did not enable them "to find gold nor even yellow sands." On the fourth day they sailed to the east shore, examined the coast of Nanibojou where they found several veins of copper and lead, and returned to Point aux Pins, where they erected an air furnace. The assayer made a report on the ores, stating that the lead ore contained silver in the proportion of forty ounces to the ton, and the copper ore only in very small proportion. The rest of the season and the following winter and spring were passed in exploring and mining at Ontonagon on the south shore ; but in June the whole establishment of miners returned to Sault Ste. Marie. "In the following month of August," Henry records, "we launched our sloop, and carried the miners to the vein of copper ore on the north side of the lake. Little was done during the winter ; but, by dint of labor performed between the commencement of the spring of 1773 and the ensuing month of September, they penetrated thirty feet into the solid rock. The rock was blasted with great difficulty; and the vein, which at the beginning, was of the breadth of four feet had in the progress contracted into four inches. Under these circumstances we desisted and carried the miners back to the Sault. What copper ore we had collected, we sent to England ; but the next season we were informed that the partners there declined entering into further expenses. In the interim, we had carried the miners along the north shore as far as the river Pic, making, however, no discovery of importance. This year therefore, 1774, Mr. Baxter disposed of the sloop and other effects of the company, and paid its debts. The partners in England were his Royal Highness the Duke of Gloucester, Mr. Secretary Townshend, Sir Samuel Tutchet, baronet, Mr. Baxter, counsel of the Empress of Russia, and Mr. Cruickshank ; in America, Sir William Johnson, baronet, Mr. Bostwick, Mr. Baxter and myself. A charter had been petitioned for and obtained ; but, owing to our ill success it was never taken from the seal office." Travels and Adventures in Canada, by Alexander Henry, pp. 234-5. This was no doubt the earliest attempt at mining made on the Canadian shore of lake Superior.

a year. Iron ore has been found in many localities in the Huronian formations, but the largest and most valuable deposits are believed to be the hematites of the Mattawan river range and the magnetites of the Atik-okan. Both these are of immense extent; in fact the ore is in mountainous bodies, and millions of tons could be mined as in an open quarry. But for the present they lie far from railways, and the home market is only opening. Gold however is found more generally than any of the other metals. It has been discovered in the Sudbury district, in the townships along the valley of the Thessalon river, on the north shore of lake Superior, and in many places throughout that part of the Province which lies within the basin of Nelson river. This latter district embraces Lake of the Woods and Rainy lake and the territory drained by their tributary rivers, as well as a portion of the slope drained by the English river, and is 200 miles long by 100 broad. The discoveries made here within the last three years have raised great expectations, and some of the properties upon which development work has been done are confidently asserted to be rich and valuable. There are now six stamp mills in that country for treating gold ore, with an aggregate capacity of sixty stamps, and more are likely to go up this year if the needed capital is got. Those northern gold fields are certainly as well deserving of the attention of miners and capitalists as many in the United States, in Russia, or in Australia. But the production of bullion in large and paying quantities seems to be needed to establish confidence in them, and this work remains to be done.

GENERAL CONCLUSIONS.

Enough has been said of the New Ontario as regards its extent, its physical characteristics and natural resoures to prove that it is an important possession; and it is humbling to our pride as men of an enterprising and progressive race to confess that so little has been done to occupy and utilize it. Fifteen years ago (in 1881) it had seven organized municipalities, with a population as taken by the assessors of 4,765. In 1895 it had forty-eight municipalities, and a population of 36,000. This is some progress, but it ought to be far more. There are more men leaving our Province every year than is represented by the increase of these fourteen years, and it may well be doubted if they have gone to a better country for improving their circumstances. The two things most needed to open up the New Ontario are population and capital. British capital and emigration are turned towards the United States, in many parts of which a British citizen cannot hold a foot of ground in his own name; and towards the Transvaal, where he has no civil rights, and pays the great bulk of the taxes without even the privilege of educating his children in the schools in his own tongue. He could depend on getting fair treatment and the security and all the rights of citizenship if he came to the New Ontario instead, and he might find there scope for all his energies.

But it is an old saying that the gods help those who help themselves. If we take a proper interest in the north country ourselves we may do much to turn it to a good account. We do not lack for men or capital. Our men in far too large numbers cross over to the United States to swell the population of that country. Much of our capital is in the banks. The official statement for the month ending 31st December last shows that there was deposited by the public in the chartered banks of Canada the very large sum of $187,119,573, whereof $119,667,176 is presumably drawing a low rate of interest, it may be 3 or possibly 3½ per cent, while $67,452,397 is at call, drawing none. There must be openings in the New Ontario for investing a portion of this capital with a chance of realizing good profits; and every investment of this nature THERE is patriotism, as well as enterprise and pluck; by which I mean a real investment, where there is some risk of loss as well as of gain, not a loan upon a gilt-edged mortgage. Ought not the policy to be, That we ourselves possess the land and win its wealth?

CHINA, PAST AND FUTURE.

Read before the Hamilton Association, Nov. 7th, 1895.

BY S. A. MORGAN, B. A.

It has been said that the family precedes the nation, as the individual does the family. While this may be physically true, as regards the first stages of national life, we find the very opposite to hold good in the relationship existing between the individual and the nation in the more advanced stages of civilization. Like the individual, the nation which is truly national is a living and unified organism. It lives not to itself alone, but moves ever on, guided by some spiritual impulse to the realization of its mission to humanity. To partake, therefore, of national life it is not sufficient simply to set our dwelling place within certain geographical limits or to trace our lineage through certain ancestral lines. That man is truly a citizen who finds fixed in his own breast these impulses which give character and permanence to the nation, and who in his own life gives expression and development to the same. Instead, then, of the individual being above the nation, the individual will ever be found to inherit from the nation whatever he possesses of intellectual and moral permanence in his character.

In what, then, may national life be said to consist? National life finds its source in the establishment of certain civic ideals as universal motives among any number of individuals. To develop the nation is to develop the individual in and through these national traditions; to unify and solidify the nation is to give these ideals such an environment as will enable them to develop in every direction.

This being true, how are we to pursue our investigations into the nature and progress of individual nations? Not by devoting our whole attention to the idiosyncrasies of particular individuals, but by establishing the sources and relative values of the living forces, physical, intellectual, and moral, by which the nation is inspired in its onward progress ; by perceiving what in them is of universal truth and beauty, what partakes of falsehood and decay.

In our conceptions of the relative importance of nations as in those of individuals we are too prone to be swayed by utilitarian considerations, and to attribute to physical conditions phenomena which often carry a far more spiritual signification. In the nation, no less than in the individual, heroic actions will ever be found to proceed from nobility of thought, while thought itself must draw inspiration from lofty ideas and sentiments. To rightly understand the main springs of national life it is not alone nor chiefly necessary to investigate is external or physical conditions. These, it is true, have their part to play, but a more essential explanation of the spiritual force of a nation is to be found in her prevailing sentiments of beauty and goodness, as found crystalized in the nation's religion, literature, art, philosophy, and social life.

This fact can be established by numerous illustrations. It is the ancient classical world, whose religion pictured gods in the form of heroes and made virtue synonymous with valour, that has given the world its greatest examples of heroic action. In the case of our own land, we know that our national life really dates from the time when that heroic band of men, sacrificing the labors of the past, began life anew amid the forests of Upper Canada for the sake of Britain and British institutions. To-day the guiding star of our national life is to repeat in the new world the glory of the motherland, to establish here a second fountain head of British faith, enterprise, valour and piety. Such is the well-spring of our national life and we may be assured that all dreams of Americanization and French republics will prove as visionary as the political success of those who propagate them. Again, at our very door, we have a nation whose birth throes were the expression of a demand for individual liberty, and to such an extent has this ideal insinuated itself into the fibre of the nation, that in this short time it has more than once threatened by its intensity the solidarity of that which it should cement.

But humanity is broader than the nation. "Her destiny will on the way it takes, cracking ten thousand curbs asunder." For national life, then, to be permanent, it is not alone sufficient that these national impulses should permeate and guide a community of minds. They must also play their part in the wider field of human progress. Here they must hold their own in the clash with other systems, and happy is that nation which finds its own ruling sentiments harmonizing with the onward march of humanity.

Having premised so much in regard to the nature of national life, and the proper method to be pursued in its investigation, I trust it will not be necessary to offer anything by way of excuse, for the point of view from which we are to conduct our investigations this evening. We have before us not only the most ancient, but in many respects the most remarkable example of national life to be found in the pages of human history. A nation compared with whose life the life of surrounding nations has been as the generation of leaves. A nation which three centuries before the great Athenian sages reasoned on life and human destiny, and six centuries before the meek Galilean teacher brought to mankind his message of love, was able to produce a philosopher who, guided (shall I say?) by the light of reason alone, was able to give forth for the direction of his fellow man, "Do not unto others what ye would not that they should do unto you."

Venerable in age, it also presents phenomena unheard of in the history of western nations. Nor is its importance to be measured solely by the interest of the past. Having striven for ages, shut up in the isolation of its own being, to work out its individual mission, it must now yield itself to the influence of a wider destiny. As to the probable results of this movement it is our purpose briefly to speculate this evening.

It has already been laid down that national life study should consist in a study of these subjective or spiritual impulses which find expression in the nation's life and character. In the nation no less than in the individual, mind is above matter. Here only can they develop themselves with a reasonable freedom of movement; from this everything of a more material nature will be found to receive its coloring.

There are always three aspects under which the Philosophy or spirit life of a nation may be viewed: Thought in its relationship to the universal—Religion; thought in its relationship to the individual—Sociology or Ethics; thought in its relationship to nature—

Science and Art. Of these three, the former, thought in its relationship to the universal, may be said to be above, and in a certain sense to direct the course of the other two. In fact so true is this of some nations (e. g. the one before us) that we find it impossible to distinguish clearly between the two, religion and ethics or morality.

Ethical writers distinguish three sources of ground work upon which the social morality of a people may rest : rational ethics, based on the nature of necessary thought ; theological ethics, on the revealed will of God ; emperical ethics, on observation and induction.

While Chinese morality may, in some of its aspects, be said to fall under the third phase, yet to such an extent has their ethical life been influenced by their conception of the nature of the deity that we shall best understand the nature and relationship of the whole by approaching their social and practical life from the religious side.

The religious life of the Chinese, in some of its respects, may be said to be unique. They are credited with being the possessors of three systems of religion which may be termed national, and which for centuries have lived peaceably side by side ; and to-day it is no uncommon thing to find the same person boasting himself an adherent of all three of the national systems. This, at first sight, might seem to argue much for the religious toleration of the people, but its true explanation lies elsewhere. It is to be explained partly by the fact that these systems in a manner supplement one another, partly in the fact that they have each been in a manner identified with the state administration, but more largely by the fact that they all have been made to rest on and harmonize with a more primitive form of nature worship and ancestral idolatry.

Of the three so called religions of China only two, Taouism and Buddhism, are properly religious systems. The third, Confucianism, is rather a system of imperial ethics, but founded in harmony with the religious conceptions of the nation.

The influence which any religious system will exert over the life and actions of its adherents will be found to differ according to the conceptions which it forms of the universal.

In general, all religions may be divided into two classes under this head. Subjective religion, in which the deity as pure spirit and free personality is attributed with unlimited power. Objective religion, where the divinity as an unspiritual nature being is conceived as limited and subordinated to an unchanging and eternal world order.

The general effect of these two opposite phases of religious thought will be readily apparent. The former, with its free personality and high conception of divine power, will equally emphasize the personality and moral activity of the individual, and there will arise a consequent dissatisfaction with the present natural state. The second, with its contradiction of free personality in the divine, will be wanting in moral activity and individuality, and tend rather to a uniform submission to the natural world order, as found in man and the outer world, personality thus becoming passive and obedience the highest virtue.

We stated a few moments ago that the apparent toleration of the various systems of religion in China was explained chiefly by the fact that they all rested on a primitive form of nature worship. In this system heaven and earth are set forth as the Great Father and Mother of the universe. By heaven, however, is meant but the pure physical ether, which first spontaneously organized itself out of chaos; while earth represents the coarser and heavier elements. These two, representing the male and female elements in nature, produced the seasons, and these latter the products of the earth.

The adoration of heaven and earth, as the parents of all things, forms the life centre of the whole of China's religious thought; and to this day the most solemn religious ceremony in the national worship is to be seen when, twice each year, the Emperor, as the high priest of China, enters the Temple of Heaven at Peking to offer up his devotions for a propitious year.

On this conception of nature rests that remarkable ceremony which may be called the real religion of China, ancestral worship. When the ancient worship treats its chief god, heaven, as the male principle, and relates it to earth as the female element, we can see that two opposite conceptions are likely to arise in the national mind. First, the corresponding physical relationship of husband and wife is prone, by its similarity to the national religion, to be to a certain extent deified. Second, religion itself, by its resemblance to the common place of every day life, will tend to become rational and material, the practical will tend to overshadow the spiritual.

The first of these tendencies resulted, in a remote age of Chinese civilization, in that form of worship known as ancestral idolatry. Acting at first as a tendency to elevate the parental relationship, and establish filial piety as the highest duty, the spiritual conception soon found itself overtaken by this child of morality; for looking upon the father and the mother of the family as types of the great father and mother of the universe, they soon carried filial piety into the sphere of religious belief, where it became established as ancestral worship, which is simply piety extended beyond the grave. A further explanation of this custom lies in their conception of the human soul. This is supposed to possess a threefold division, one of which at death enters Hades, one the grave, and the third of which lingers about the ancestral home. The last two of these must be provided for by the descendants, and if neglected are wont to punish their unfilial offspring. The offerings of the living, to be acceptable, must be presented by a male descendant; and, with the exception of food, since they are for the spirits of an invisible world, must be rendered invisible by burning.

To enter into a long description of the minute particulars of ancestral worship would be beyond the scope of the present paper. A few thoughts as to its general effect must suffice. While ancestral worship may seem, in its first conception, to have rested on a foundation of love, there can be no doubt that fear is now the motive power. To make the dead dependent on the living for their happiness, and to endow them with power to inflict punishment when neglected, is to chain hopelessly the living present to a dead past. Two duties are ever present to the devout Chinaman, to provide for the comfort of his ancestors, and to leave behind him a line of male descendants who shall perform a like duty for him. Such a system must tend to root a people perpetually to their existing environment. All progress will be considered a dangerous innovation, and a colonizing spirit the most sacriligious impiety. No wonder that such a people should be remarkable for the absence of a critical and scientific spirit.

But while we note the defects of the system, its advantages should not be overlooked. It renders sacred and secure, internally, the home and the nation. As the Emperor must reign in order to perform the requisite rites for securing the favor of Heaven and earth, so the family must be held together, that no break may occur in the ancestral worship. Whether these benefits are adequate from the broad standpoint of humanity to counterbalance the serious defects of the system, is doubtful indeed.

Let us next notice what additional elements have been introduced into the religious fibre of the nation by the three so-called national religious systems.

CONFUCIANISM.

As has already been mentioned, Confucianism is in no way concerned with the supernatural, and indeed lay no claim to such. We noted above, in describing the conception of the Chinese concerning their nature god as male and female, the likelihood of religion itself becoming humanized. Confucianism is but the realization of this on the practical or ethical side, and represents an attempt to solve the mystery of life by the use of the intellect alone.

To say that China does not owe much to Confucianism would be grossly unjust. A system which rests on a belief in the dignity of human nature cannot but appeal to humanity, and perhaps there is no nation among whom outward politeness, love of peace, and a fixed mode of living are so firmly established. But like every human institution, this one also has its inherent defect. From the days of Confucius to the present intellect has ever failed to control habit, unless resting on some higher spiritual ideal. And to-day there is perhaps no nation where is to be found such remarkable combinations of external politeness and inner dishonesty as may be found among the modern disciples of Confucius.

TAOISM.

If Confucianism is the result of the humanizing of the primitive religion, Taoism may justly be said to represent the same in a materialized form. We have seen how, in the Confucian philosophy, man was made the measure of all things, and social duty the only rule of action. But man, however much you may direct his thoughts to the facts of this life, cannot wholly deny his spiritual nature. The question, "Whence came I?" will make itself felt, and direct the spirit of man to find some object of worship, some superior being to control its destiny. This craving of the human spirit Taoism undertook to satisfy. The very conditions, however, under which the system originated could result in nothing but the elaboration of a vast medley of superstitions.

Starting from the conception that divinity is but an essence of matter, this religion, among a people so little endowed with the scientific spirit, soon found in the invisible agencies of nature the immediate presence of deity. Taoism thus in time developed into an elaborate system of superstitious idolatry, busied only with the evils of the present life. Such a religion could only result in weaving around the daily life of the people a web of superstitious notions, and letting loose upon its unhappy adherents a host of dread spirits until the very breath of the air becomes the voice of a demon. Thus the Chinese are to-day the most superstitious of nations, and it is no uncommon thing to find matters of the utmost importance, public and private, decided by some chance whim.

BUDDHISM.

Buddhism, the third great religion of China, is not a native of that country. Originating in India, where it was almost exterminated by persecution, it then made its way into China; and, after a struggle of a few centuries, found itself holding at least a second position in the religious favor of the people. To give anything like a full account of the circumstances connected with the introduction of the new religion would carry us beyond the scope of the present paper. Our purpose is solely to discover what influence it has exerted, and still is exerting, on Chinese belief and character. For this, a brief outline of the main phases of the system must suffice. Perhaps no better means could be adopted for showing the central thought of Buddhism than the quoting of a few typical thoughts from Indian philosophy which represent the true spirit from which Buddhism arose.

> "One hundred years is the appointed span
> Of human life; one half of this goes by
> In sleep and night; one half the other half
> In childhood and old age; the rest is passed
> In sickness, separation, pain and service,
> How can a human being find delight
> In such a life, vain as a watery bubble?"

Or again:

> "One course alone is proof against alarm,
> Renounce the world and safety shall be won."

From this it may be seen that Buddhism is but another name for pessimism of life and asceticism. Its object is to remove the misery resulting not only from bodily action but also from false knowledge. This view of human life is arrived at by the Buddhist from the following reasoning: As birth is necessarily followed by age, misery, and death, this individual existence can be only an expression of misfortune or punishment. If such, then life must have had some previous existence whose condition was responsible for the misery suffered by the individual in the present life. Thus the Buddhist has a remarkable chain of reasoning by which, from the basis of ignorance, he traces the conscious individuality of this life; from individuality, birth; from birth, decay; and from decay, death.

But, recognizing this life as a life of retribution only, the Buddhist at once must claim for all forms of earthly life a previous existence. This leads to the doctrine of transmigration, the great central principle of the Buddhist faith. Personal life is but the revolution of a wheel, which carries us from the present life into the unseen world, and vice versa. To this wheel all individual existence, whether of this or the unseen world, is bound, and its ceaseless revolutions are but the expression of the various rewards and punishments incident to personal existence. To teach man how to escape from this wheel of life and death is the object of the Buddhist faith. To do this we must lose our personal identity, must enter a state where thought shall cease to be our thought, and where life shall, as it were, cease to live,—a state without condition and without attribute. This state is the Nirvana, or the real heaven of Buddhism. Situated without the revolution of the wheel of personal existence, it contains only what is permanent and enduring. To arrive at this the soul must renounce the world of the flesh and purify itself by constant meditation, the real saviour of the system.

From this it may be seen that the basis of this doctrine is metaphysical and transcendental.

Although the speculative philosophy of the Buddhists, in its introduction into Chinese life, suffered much from its contact with the materialism of Chinese thought, still the benefits which it has conferred on the national character are great and most apparent. Both the native forms of belief had busied themselves only with the physical, the practical and the seen. No account was taken of these obstinate questionings concerning the unseen world, which will arise in the heart of man. Even Taoism, while it affected a form of religious devotion, was tied to the ills of physical existence. Buddhism alone has given to the people whatever they possess of religious speculation. To its Heart of Pity, which sees in every sentient being the manifestation of an immaterial and immortal existence, must be attributed the humility, politeness and charitable disposition for which the Chinese are justly praised.

But, great as have been these benefits, they have not been purchased without cost. To purchase real happiness at the price of individuality, as in the Buddist Nirvana, and to view the present life as a stage of retribution for the sins of a previous existence, is to extinguish all energy and personality from the character of a people already too void of spiritual activity.

Such are the leading phases of thought which for centuries have been solidifying the Chinese national mind, and which have resulted in ingraining the following tendencies in the national character :

1. Fatalism in the practical affairs of life.
2. Impersonality in the intellectual life.
3. Lack of imagination in the emotional life.

Volumes might be written to illustrate how the Chinaman feels himself hemmed in, and his free personality limited by his environment. But a single illustration must suffice, the superstition termed *feng shui*, or wind or water. By these are meant certain spiritual forces which are supposed to belong to and influence every locality relative to its occupants. So fixed is this idea that it is no uncommon thing to find one neighbor taking proceedings against his fellow for having influenced for evil the local spirits. For instance, Mr. Halcombe relates a circumstance in which a certain American official was prevented from erecting chimneys on his residence for fear of disturbing the local genii.

The impersonality of the intellectual life of the Chinese is visible in every department of thought. The very language furnishes a perpetual illustration, by the depreciative terms which are used in speaking of the first person, in fact in many of the dialects there is a lack of any definite term for the ego or first person. Again in their poetry the absence of personification is a marked characteristic. In their fine arts the same feature is perceptible. Chinese painting devotes itself chiefly to landscape, while sculpture busies itself with the production of huge images or grotesque figures.

But in no place, perhaps, is the evil effect of the absence of a high and active spiritual ideal more apparent among the Chinese than in their emotional life. Imagination, that mother of all spiritual beauty and human progress, may be said to be absent from the national character. This is in no place more apparent than in the utter absence of the scientific spirit. Both fine and mechanical arts the Chinese have had from remote antiquity, but in no department do they pass beyond the stage of copyist. To search for general principles, to pass from the particular to the universal is a stretch of imagination too great for the meagre philosophic spirit of the ordinary Chinaman.

Unsatisfactory as these leading national traits of character may seem from the western standpoint, we must not forget that they have not been without their accompanying compensation. It is to this very lack of personality, this dread of change in thought and environment, this bringing down of the divine to the level of every day life, that has enabled the nation to conserve itself throughout the centuries in spite of extortion and injustice in its government, and extreme poverty and wretchedness among its people.

But that such a state can much longer continue seems strongly improbable. We have seen that a time will come in the history of every nation when she must adjust herself to the progressive conditions of humanity. The onward wave of western life and thought is already forcing itself through the shattered wall of Chinese isolation. Can we, from the light of past history, form any conceptions as to the probable results?

First, there is always the possibility of the nation rising to the requirements of its new environment, and working out its own salvation by means of its inherent energy. That such a result will happen in the case of this people seems strongly improbable. The Chinese nation presents in a most intensified form the disadvantages associated with a too close relationship between government and religious belief. Every disturbance, therefore, which takes place on one of these fields is sure to be accompanied with corresponding upheavals in the other sphere. Such a condition could result only in long and bloody internal contentions among a people too prone to the phrensy of religious superstition. Nor are there present in the Chinaman of to-day any elements which could produce that strong form of government which must ever mount guard, when a people are passing through that transition stage which ever precedes intellectual and political advancement.

The second and more probable line of readjustment lies along the path of foreign influence. This may come in either of two ways, military conquest or a political protectorate. Perhaps no greater calamity could overtake such a nation as the Chinese than the former of these. To a nation so peaceable, and so dependent for inspiration on their social and politico-religious environment, military conquest could result only in a reduction of the people to the lowest depths of slavery and barbarism. All things, therefore, point to a political protectorate as the line of least resistance for national readjustment. But even a protectorate to be effective must fulfil certain conditions. It must be exercised by a nation strong and patient; strong to hold in due check all these impulses which are at all times liable to burst forth when a nation is passing through a reorganizing crisis; and patient to allow a less gifted people time to advance themselves to a higher intellectual and moral level. Such a protectorate could be successfully exercised only by a nation which is able to separate political government from religion; for only in this way could the stability of the governing body be proof against the violent upheavals of a reconstruction period.

Among the ruling powers of the earth, one people alone possesses the moral force and judicious administrative aptitude to stand guard over the destinies of a nation during such a period. To the British people has fallen the destiny of conserving and bearing on the torch of civilization, which though flickering at times is yet destined to illuminate the earth. Already by her conduct in India, in Egypt and elsewhere, she has proven herself true to her destiny, nor will she here be found wanting when the hour for action shall have arrived. But, it may be asked, will Europe allow this work to go on? But here let us not forget that a second Britain has arisen beyond the sea, and however much America may delude herself, at present with a supposed non-interference policy in international affairs, and a distrust of the British policy, to me, at least, it seems impossible that, when the days of her national maturity have fully arrived, she can any longer deny the inherited instincts of her nature. That spirit which has made Britain a ruler among the nations is the spirit which gave to America her national being. Nor will that common spirit deny its brotherhood in the hour of decisive action.

In our considerations thus far we have looked upon the Asiatic only as a receiver from western civilization, but it should not be overlooked that western thought, high as it is, may receive something from its humble eastern brother. Modern Aryan thought is now so tinged with scientific doubt, and a belief in the unconditioned liberty of the individual as to threaten the destruction of law and government. It would not, therefore, be altogether unprofitable for the western philosopher to turn once more to the East, and there, under the mystic Heavens, to feel that neither spiritually nor physically can man deny the universal brotherhood, nor his dependence on an all-enveloping environment.

In conclusion let me add that these humble predictions have been evolved from the laboured speculations of the student and not from the revelations of a prophet. But whether any or none of these things come true, of this, I feel, we can be assured, that the relations at present existing between the orient and the occident are not long to continue in their present status. Whether their readjustment is to be marked by a giving and receiving of mutual benefits, or with bloodshed and the social decline of either part is evident to the great Ruler of the universe alone.

OPPOSING FORCES VS. INACTION.

Read before the Hamilton Association, February 6th, 1896,

BY H. B. SMALL, OTTAWA.

To relieve the tension of the perpetual struggle which modern requirements have forced upon mankind, we require something upon which we may fall back—something that will tend to calm the excitement of the whirl of everyday life.

Idleness or inaction will not soothe the mind, or quiet the nerves, but a change of action or of thought will, and there is nothing perhaps that will better meet the case than the pleasure to be derived from books and reading. We hardly appreciate our good fortune in belonging to the 19th century, for, one hundred years ago many of the most delightful books of to-day were unwritten, and we possess infinite opportunities of obtaining what our less fortunate ancestors would have revelled in. Sir John Lubbock, not long ago remarked that he was sometimes disposed to think that the great readers of the next generation will be not our lawyers and doctors, our business men and our manufacturers, but the laborer and mechanic. The former work mainly with their head ; the brain becomes exhausted, and much of their leisure time must be devoted to air and exercise. The laborer and mechanic, on the contrary, have in their working hours taken sufficient bodily exercise and can therefore give any leisure to reading and study. To further this the schools of to-day afford an excellent education, and access to the best books is now easy to those who desire. The school education now equals the college education of fifty years ago. Jeremy Collier, an old writer, well said of books : "They are a guide in youth and an entertain-"ment for age. They help us to forget the crossness of men and "things, compose our cares and passions and lay our disappointments "asleep. Some relate the events of past ages, while others reveal "the secrets of nature. Some teach how to live, others how to die.

"They open the various avenues of all the Arts and Sciences; they "are never troublesome, but answer every question. In return for "all their services, they only ask a convenient chamber in some "corner, where they may repose in peace, and are more pleased "with the tranquility of retirement than with the tumults of so- "ciety."

Many readers miss much of the pleasure of reading, by forcing themselves to dwell too long on one subject continuously. If two, or three, different subjects are kept on hand (one of them of an amusing character) by changing as soon as a sense of weariness supervenes, each can be again taken up with renewed zest; but the wider the field the more important it is that the reader should benefit by the very best works in each class. Not that he should confine himself to them, but he should commence with them, and they will naturally lead on to others. Lord Brougham used to say—"It is "well to read everything of something, and something of every- "thing."

In this way only can we ascertain the bent of our own tastes, and a young man's desultory reading will perhaps be one of the most useful means for finding what his life's career should be. By his own discursive reading he can learn what work for his peculiar abilities is open for him in the world, and he will judge easily what line of study he should first pursue. Then, following out this clue, he can proceed to fulfil the requirements of education and the inclination of his own mental disposition. The main practical question of the selection and proper use of books rests not on what is good in general, or in special literature, but what is best fitted for each individual. The foundation of success in life is physical and mental, nervous and moral aptitude, and from this condition future capabilities may be to some extent foreseen. These capabilities are the indicators of the course of reading required, and by them a youth's career should be selected and decided on. It is not in the means or the reach of all of us to travel, but the next best thing to it, when it cannot be indulged in, is the reading descriptions of voyages and travels, and some of them are so graphic, and so ably depict scenes and places, that if the reader in after days chances to visit them, his ideas are prepared for what he sees, and he readily recognizes, almost like an old frequented spot, some at least of the scenes which the description has already pencilled in his mind.

The fewer well selected books a youth has to begin with the safer he is against loss of time. The most important question at that period of life is not what *shall* I read, but what *need* I read. His care should be to read as *little* and think as *much* as possible; thus he will find what he immediately requires to know, and so make the need the object of his next acquirement in his books. This method tends to education, develops mental power, and makes a cultivated man. A man does not want to be a mere animated book-case, but he wants to have within himself the condensed matter of the book-case. A hurried careless method of reading is one of the chief dangers a student should guard against, and the habit of casting a book aside as soon as read, without pondering over its contents, recalling the argument and refreshing the memory where it failed, is apt to render worthless all the previous effort. Whateley said that writing an analysis or table of contents, or notes, is very important for the study of any one subject. A fact or subject sought out fixes itself more firmly in the memory than most of those passed in the ordinary course of reading. The ever increasing mass of periodical literature tends more and more to the habit of a snatchy mode of perusal, but to a certain extent this has its advantage. A busy man who has not time to turn aside from his own work to the thorough investigation of the topic of the hour may sometimes, in the pages of a magazine, find the case tersely stated by distinguished advocates on both sides, and he may thus discern the main positions of assailant and assailed. A good review of a new work is occasionally afforded by periodical literature. But, to have any real value a review should be read only after the work to which it relates. Distinct from the discriminating reader and progressive student, there is a very large class who are mere devotees of books of any kind, reading, however, chiefly the lighter literature of the day. These become feeble minded, intellectually dissipated and incapable of serious study. This class exists chiefly amongst women, girls and boys, and they become so absorbed in light reading that many of them are ignorant even of the existence of works of standard merit. Men are not so much given to this, but that may be accounted for by their more continuous use of the newspaper, which is to their taste what cheap literature is to the others.

I do not, however, by any means wish to condemn the entire use of this style of reading, for, if I remember right, Gladstone calms his nerves and quiets his brain by reading for half an hour nightly, before retiring, a portion of some new publication which a student or a reviewer would be apt to class as trash. It is the change which refreshes the mind. Literature exists to please, to lighten the burden of men's lives, to make them for a short time forget their sorrows and their sins, their disappointed hopes, their grim futures, and those men of letters are the best loved who have best performed literature's truest office. The truth or falsehood of a novel is immaterial, but to soothe sorrow, to bring tears to the eyes or smiles to the cheeks of humanity is no mean ministry.

> "Oh for a book and a shady nook, where I may read all at
> my ease of the new and the old,
> For a jolly good book, whereon to look, is better to me than
> gold."

Before leaving this subject—reading—I wish to impress upon every reader, and especially the young and those with a prospect of many years before them, the great utility of keeping a scrap book for clippings and extracts. Items that appear from day to day may prove exceedingly valuable in the future, and the only time to secure these is whilst they are before you. Anyone who has tried to locate a paragraph or an article he thinks he saw at some indefinite time can testify to the difficulty there is in finding it again. There is not a fact or a fugitive paragraph that you see in your paper, which will not come up again at some future time. But, in keeping a scrap-book never fail to index it, and to keep up the index, or its usefulness is gone. Of course every one can be his own judge as to the subjects, but a literary man will be astonished at the end of a year at what a mass of information he has stored up for future use. State in it also the source from which the scrap is obtained, as well as the date of publication. Speaking from personal experience, when I was a boy at school, I obtained at a London book stall, an odd volume of Robert Southey's "Commonplace Book," as the reprint of his scrap book was called, and its utility was so apparent to me after persual, that I followed out his plans, and the benefits I have gained from my scrap books at various times are incalculable. I have recently read an account of a similar plan on a more extended scale, now adopted in the Brooklyn Library, and which is assuming such proportions that the space assigned to it is called the "Reference Department," and all its subjects are classified.

Drawing is another opponent to inaction, a recreation too lightly regarded, but which is really a most important adjunct, not only to the pleasures of the leisure hour, but which may be turned to advantage in after life. From an industrial point of view there is hardly any trade or occupation in which drawing is not of daily and hourly utility. For technical purposes it is constantly in requisition, by architects, engineers, military and naval men, designers, and others, and its usefulness to geographers, astronomers, artists, and scientific men generally, is justly acknowledged. Hitherto drawing has been the property of the few, and its acquirement in schools has been classed with comportment and calisthenics. Through its power of representing the phenomena of Nature as they appear to the eye, it appeals in the most direct way to every human being. It enables the artist to stir the emotions of all those who can appreciate beauty in form, whatever may be their nationality. Those who aspire to take a leading and active part in the doings of this and the next generation must look to the requirements of the future, since the world's drama is being played on conditions which rapidly change. They will need the fullest developments of the resources of the body, of the senses, of the mind. Without a knowledge of drawing this complete efficiency cannot be attained. Drawing is an admirable training for both eye and hand, and although artists, like poets, are born, not made, yet everyone can learn to draw elevations, plans, and sections. It is astonishing how many go through the world without the aid of that marvellous descriptive power which drawing affords. The capacities of youth are a mine of wealth, and it is galling to think in after years that we neglected to work a vein of precious metal until all chance of working it successfully has passed away, and nothing is more depressing than to point to one's wasted hours, and the lost opportunities of by-gone life.

Making collections of various objects is a most interesting recreation—whether the specimens be shells, or stones, or plants, or perhaps, stamps, or coins, it matters not, each whilst tending to amuse at the same time instructs. The collection of stamps has often been ridiculed, but there is much knowledge obtained in such a pursuit. The geographical distribution of countries with a certain amount of their history very quickly impresses itself on the mind of the collector, much in the same way as the numismatist gathers from his ancient coins and medals, a memory of great actions, chronology and heathen mythology, whilst from those of more modern times he becomes cognisant of many points of history, which without these reminders he might never have given heed to. To collect objects of interest in our daily walks, no matter whether leaves or stones, or fungi, or anything whatever, will start a train of thought and lead off the mind with a pleasant strain of reasoning that very quickly dispels the tension in which weightier matters had kept the brain. Kingsley based one of his finest popular lectures on a stone that he picked up by the wayside on his way to the lecture hall, it affording him all the subject matter he needed for the evening. It is astonishing how quickly the idea of arrangement follows collection, and what pleasure is gained in showing to others specimens collected by oneself. Then comes in the idea of rivalry with other collectors, aud of supremacy where the struggle alluded to already evinces itself. But it is a pleasant and an honorable struggle and one to be urged on all who wish to make life pleasant, and to step off once in a way from the beaten path of hard brain toil and the dry details of a business life.

Botany, probably because of the names or terms used in it, is regarded by many as a dry and difficult study. But without a knowledge of it, however much you may admire flowers or trees, they are like a beautiful woman in a crowd—a stranger to you. With a knowledge of it they become at once friends—you know something of them. You go out into the fields, or the forests, or along the riverside, and the familiar families of plant life all have an interest in your eyes.

Again, take Natural History. Its study equals in the pleasure it affords the sportsman's pleasure in the chase, and whilst his sport is confined to the comparatively few species of game left in its natural state, the naturalist has open to him the insect world, birds and infusoria—a countless number, the pursuit and study of which are equally as fascinating as the hunters' trophies of his gun.

Take Geology, where the untrained eye sees nothing but dirt and mud, science will reveal wonderful possibilities. The mud is a mixture of sand and clay, and dirt; separate it and see what a history its component parts have; strain out the water, and its study alone is a history. Ruskin well describes this when in speaking of a street gutter he says, "At your own will you may see in it either "the refuse of the street or the image of the sky."

Take electricity. No branch of science rivals in interest that of electric force, and at no time in the history of research has any branch of science made so great or so rapid progress during the years since 1881. With its now acknowledged usefulness for lighting comes its introduction for the production of power, and many trades requiring the application of a motor for driving light machinery will have an ever ready source of it at their command in their own quarters. Its power for lighting mines and at the same time affording motive power in them is now being utilized in the mining districts of the west. Late English papers describe its application for lighting purposes at the new St. Catharines lighthouse at the southern extremity of the Isle of Wight, to the extent of 700,000 candle illuminating power, replacing the former oil light at the same point of 730 candle power, thus being 1000 times more brilliant. The *Spectator* calls it the "legitimate descendant of the beacon on the hill-top, developed "through the different stages of the tallow candle and the flat and "concentric wick oil lamp." The same page says, "We wonder "to-day at such achievement, but perhaps our descendants will "illuminate the more frequented sea routes as we light our streets, "with buoys bearing powerful electric lights upon them, the light "gendered by the action of the tides, and will marvel that we could "have been content to let our great ships blunder on the rocks or "fall foul of one another for lack of so simple a precaution." For driving street cars electricity is demonstrated already. For a motive power in steamships, experiments are now going on to develope it, and the result when attained will be of incalculable advantage, as the space hitherto occupied by coal will become available for cargo. Electricity again is applied to surgery and is used in the fine arts; there is no saying what it may not yet be made to do, and the old remark holds good, that "Magnetism is in its infancy, and electricity "is as yet unborn."

Take again Astronomy. Within the last quarter of a century a remarkable advance has marked the methods and aims of astronomy.

A younger and more vigorous science has sprung up, walking with hurried or halting footsteps along paths far removed from the staid courses of its predecessor. The new science concerns itself with the nature of the heavenly bodies, the old one regarded exclusively their movements. This younger science enquires what sun, moon, stars and nebulæ are made of, what stores of heat they possess, what changes are in progress, what vicissitudes they have undergone, or are likely to undergo. The elder study attained its object when the theory of celestial motions showed no discrepancy with fact, when the courses of the heavens came directly up to time, and their observed places agreed to a finitesimal point with their predicted places. Very different modes of observation must now be employed to further such different objects; in fact the invention of novel modes of investigation has had a prime share in bringing about the change in question, and investigations carried out at higher altitudes than have hitherto been more than temporarily available are now going on in permanent observatories. The great Lick Observatory, of California, founded through the princely generosity of one man, whose name will live in the annals of liberality forever, James Lick, will soon add to the marvels of knowledge most astounding facts, if we are to give credence to what the observers have already unofficially announced. Located on one of the peaks of the coast range, 4440 feet above the sea, the atmosphere in summer is cloudless, and even during the winter there are many nights favorable for observation. Out of sixty nights tested, prior to the site being fixed upon as to the quality of telescopic vision there, Professor Newcomb found fourty-two as nearly perfect as possible, seven of a medium quality, and only eleven cloudy or misty, and his season of observation extended over the first half of October. With the ordinary telescope he then used he discovered forty-two new double stars, many of them not having been seen before clearly enough for the discernment of their composite character. But the present needs of science are by no means filled by an altitude of of 4000 and odd feet. Already observing stations are recommended at four times that altitude, and the ambition of the coming astronomer will be satisfied only when he reaches that altitude where he can no longer find wherewith to inflate his lungs. Such are the growing exigences of celestial observation. Europe has not remained behind America in this significant movement. An observatory was nominally completed on Mount Etna in 1882, from which Professor Langely dlstinguished nine stars forming the pleiades, whilst from ordinary levels only six can be seen with the naked eye, and glimpses of a seventh and an eighth with telescopic aid. Nature seldom volunteers information ; usually it has to be extracted from her by skilful cross-examination. No opportunities of seeing will avail those who know not how to look, and the elevated sites now chosen for the exquisite instruments constructed by modern opticians, give abundant promise of increased astronomical knowledge.

I could cite the various branches of study, all tending to oppose inaction, but I must pass on to a close. Science has done much to ennoble mankind in freeing it from superstition. Before its searching light the belief in witchcraft and ghosts has disappeared, and intolerance of every kind is fast on the wane. The most important secrets of nature are often hidden away in the most unexpected places. The refuse of factories has, by the application of science, yielded many articles now in daily requisition, and things which are familiar parts of our everyday life would still be unknown except for scientific research. That discoveries innumerable await the successful explorer of nature no one can doubt. Sir John Herschell said : " Since it cannot be but that innumerable and most " important uses remain to be discovered among the materials and " objects already known to us, as well as amongst those which the " progress of science must hereafter disclose, we may conceive a " well grounded expectation not only of constant increase in the " physical resources of mankind, and the consequent improvement " in their condition, but of continual accession to our power of " penetrating into the arcana of nature, and becoming acquainted " with her highest laws. And it is not only in a material point of " view that science would thus benefit a nation, but it will raise and " strengthen the national as surely as the individual character. The " field on which the victories of science have already been won, is " teaming with problems of the widest bearing on many questions of " the day—social, philosophical, religious and natural. To the " scientific man belongs the spirit of the great world, brooding upon " things to come. In the truest sense his is the future. The in- " heritance of the part is ours, and in the literature of our own and " other countries we may study the great generalizations of science, "clarified by their passage through great minds, twined to shape, "and incorporated in the consciousness of the race by the pen of "poet and philosopher. Firmly centered in the present we can "reach out a hand both to the past and to the future, and become "the heirs of all the ages. But we must bear in mind that science "is not to be degraded to a machine for grinding general laws out "of large collections of facts. We must guard especially against the "error of assuming scientific arrogance whilst in search of evolving "a true scientific spirit, and of becoming overbearing whilst discuss-"ing with those who differ from our views."

Science is no longer looked upon as dangerous to those who follow it; faith is never weakened by its attainment. The materials of the universe by which we are surrounded are full of the evidences of a Creator; they crowd upon us from every side, wherever we turn our eyes we read them. Their evidences are inscribed on the blue dome of Heaven and on the gorgeous cloud turrets of the western sky, on the rocky cliffs which record the memories of long buried ages and on the green sods which cover the last new made grave. The material with which the Eternal writes His name, and the style of His handiwork, are evermore the same, whether He writes it in the golden characters of the mine or the metallic lustre of the hills, science recognizes its great Author's hand and admires with reverence His matchless autograph.

Science and art are constantly coupled together, but they really move in very different planes and touch different parts of human nature. When science comes in at the door, art flies out at the window, for the former appeals to the intellect, art to the emotions, and man is so constituted that when intellect is in the ascendant the emotions sink out of sight The sympathizing spirit of art is opposed to the critical spirit of science. The artist seeks beauty, finds likenesses and discerns the ideal through the real. The votary of science seeks facts, draws distinctions, strips the real to the skin and bone. Poetry is the art of arts, but what would science do with the finest poem? The revels and play of poetic fancy would wither and shrivel under the hard realism of science. And this is why science needs to be cautiously handled and taught. It must not be roughly thrust on the student, but gradually instilled. Its teaching must be popularized, placed before the people in an easy and familiar way, devoid of long words and classifying terms, and so explained that all may understand. The lectures before such a society as ours should be of this nature, explanatory and pleasing, yet possessing instruction, for pedantic illustrations never carry an audience with them.

Then, there is a difference again between literature and science. The former holds a certain attitude of conservatism, the latter is essentially revolutionary. In a few years hence the theories and writings of scientists of the present day, on many points, will be laid on the shelf, and like coral insects, those who built the science of to-day, will be dead from the moment that their successors have raised over them another inch of the interminable reef. They will have lived their day and done their work in paving the way and laying foundations for fresh lines of thought, for new theories of speculations, and whilst we at times feel a disposition to smile at what we are pleased to term "exploded" ideas and chimerical deductions, we must realize that what we ourselves accept as established facts will in all probability, under the kaleidoscopic revolutions of science, raise in future generations another smile at our want of penetration. The nebula we describe may turn out a star cluster, the aurora may be traced to far other causes than those we now assign to it, whilst the adaptability to navigation and other practical arts of the wild effusions of a Jules Verne may prove not in themselves a wonder, but a wonder why their adaptability lay so long unnoticed nor made use of.

NEGLECTED METHODS OF EDUCATION.

Read before the Hamilton Association, March 5th, 1895.

BY T. W. REYNOLDS, M. D.

In selecting a subject for discussion I am in a measure treading in the footsteps of others, but in view of the fact that our Association's great aim is educational, I feel that no further apology is necessary for the choice that I have made. Certainly no one, in what we so proudly and justly call "this enlightened age of ours," will dispute the value of education, but I think our time can be profitably spent in considering some of the methods of achieving that great desideratum, a good education. Some of our members who are members of the great teaching profession will perhaps feel inclined to say that I am introducing matters which are not only the province of the various teachers associations, which meet from time to time throughout the province, but have been far better dealt with at these meetings. Such I have no doubt is the case as regards the ordinary recognized methods of education, but even as an onlooker is always said to see more of a game and to be a better judge than those actually engaged in it, so in this case I think that a layman like myself may be permitted to at any rate relate his experience in the hope that possibly something of value may be found therein, at least to those of us who are amateurs at the best as far as teaching is concerned; although from my own professional experience I know that the truly eclectic man is ever ready to avail himself of suggestions or experience wherever found, be it among professional men or lay. I feel also that in drawing upon my own experience for ideas, there is a strong possibility of offering something original for your consideration and thus laying before you the equivalent of special investigations made in any of our special departments of work. My title though reminds me that it is, however, not the ordinary methods such as are generally accepted and approved of and have received the sanction of professional educationists that we are to consider, but it is those that are generally neglected.

I have desired to call your attention to these because of my firm belief that there are many valuable aids to education which have either been relegated to the shelves of a cobwebby desuetude or else are still regarded as mere so-called fads, which are only thought fit to be considered as mere pastimes or recreations for individuals contemptuously called cranks by those who alone in the eyes of the world are ordinarily deemed to be truly wise. As on another occasion I had the honour of offering myself as a champion in the cause of fads, I do not intend this evening to more than casually refer to their value from an educational point of view, but I shall endeavor to discuss the other methods that seem to me to be now neglected. At the same time I must admit that I have no doubt that in many branches taken up in the schools the differences between the methods that are now in vogue and those used in my school days are to the credit of modern methods, but as I said I wish to call attention to some that I have good reason for believing are now discredited in great measure.

Before entering upon the consideration of these methods, it would be as well, perhaps, to define what is meant by the comprehensive term, education. Literally it means to lead or draw out, but although the office of the educator can to a certain extent be thus described, still there are other processes at work or that should be such as those of building and strengthening these tender faculties of the intellect which are thus brought to light.

Various similies have been used, and one with which we are particularly familiar was, I can well remember, to be found in one of the school books in use twenty-five years ago. This allegory I think was from Addison's Spectator, which expresses the idea of education thus: "What sculpture is to the block of marble, education is to the human soul." I have not my old school books at hand and am indebted to a more modern work for my quotation, but I can well remember how the simile took my fancy of the statue being concealed in the block of marble until the sculptor by repeated efforts produced the statue and gave it its fine finish and brought to light its various beauties of form and outline.

But though I am a great admirer of the work of the stone mason and feel that many beautiful lessons can be derived from such similes as that above mentioned, there is another simile which I think is more appropriate, and especially on account of its bearing on the subject I have chosen it now.

The simile which I would present is that of the work of a gardener in tending and rearing plants either for the house or garden. This may seem to be a resort to a very ordinary occupation, and yet therein lie some very valuable lessons to which I would like to draw attention.

Let us look then at Horticulture, or perhaps I had better say Floriculture, for it is the care of the tender flowers that calls forth the efforts which seem to me most symbolical of those of the educacator, for we find the skilful gardener will not only sow the seeds from which in time the beautiful plant will grow, but he will also see that the proper soil is provided, that this soil is well watered and manured, and that the proper amount of light and heat are also furnished in order to favor healthy growth. Floriculture is also a valuable example to us, in considering methods of education, because it is so universal an occupation amongst all classes of society, not only as a livelihood, but as a favorite recreation, and one justly popular, while from the three classes of floriculturists that are to be met with we can I think draw types of three classes of educators.

The first class of floriculturists are what I would term the domestic class, those who take the complete charge of their gardens, not by any means as I intimated as a livelihood, but as a most delightful and at the same time profitable recreation. For where can more healthful pleasure be found than in the work attendant upon a garden of one's own, where one does all the work oneself, preparing the ground for the seeds or cuttings, then doing the necessary planting, followed by the interest with which each stage of growth is watched from the time that the first tiny leaf is seen above the ground till the last available flower has been picked, while at the same time the ground is kept carefully weeded and watered, and should occasion require, the plant is shaded from too much sunlight when it is liable to be injurious ; and where can we find such flowers as are to be found in these gardens that have been tilled by these domestic floriculturists, flowers that are often slightingly designed old-fashioned, but which far excel in fragrance and beauty those that are to be found in the gardens of the other two classes to which I will refer.

The second class of floriculturists are those who get outside professional help to do the heavy work, often from want of time to do it themselves, to give them due credit for their efforts, and then look after the easier and more enjoyable parts of the work themselves. Such gardens often have rarer and more showy plants than are to be found in the first class of gardens.

The third class of floriculturists are the purely professional, and while the gardens taken care of by them are often more admired by the ordinary passerby because of the gorgeous and costly plants they contain, the owners of these gardens will not have the satisfaction that they would have experienced if they had taken either complete charge or even the partial amount which fell to the lot of those in my second class.

Let us now return to our text, so to speak, and see where the simile is applicable. To begin with, I think we can divide methods of education into three great classes, viz.: 1st, home teaching; 2nd, part home and part school education; and 3rd, complete school or professional methods.

The first class that I would refer to are the professional class, and of their methods I have but this to say, that having been educated myself in a great measure in the common schools of our beloved Province I have the deepest respect and gratitnde for their methods, but at the same time I would say this that I think they will be most successful when they achieve the utilitarian and not the ornamental only, when to return to our simile, they show in their gardens the good old domestic plants brought to a higher stage of perfection by the more successful methods at the disposal of the professional gardener.

The second or middle class therefore is the one that should be most successful, as it should combine the amateur or domestic class and the professional, but unfortunately it often tends to take only a smattering from both, but not their strong points, which would make such a powerful union.

The last or domestic class is the one to which I would draw particular attention because in a great measure it comprises those methods that seem to me to be neglected, in fact they are mainly to be found in this class.

The domestic class therefore being so important in my estimation, it will be advisable for me perhaps to explain what I mean, and it is this: The class which provides that finish and, at the same time, that good foundation for a first-class education, which are to be only had where the parents are able and willing to not only impart the first rudiments, but when it is deemed advisable to send the children to school, maintain a careful supervision of the lessons taught in school, while at the same time they are constantly imparting information in branches which only can be properly taught at the home fireside. Here I would revert to my garden simile, for as in an old fashioned flower garden there are many sweet flowers such as were to be found in the gardens of our grandparents, such as it is apparently impossible for professional gardeners to rear, so there were many lessons that our parents learnt from their parents and we ourselves may have learned in a measure, but which we do not seem able to have either the time or ability to impart to our children, and it is useless to look to our schools for instruction in them.

However, I am reminded here of an apparent injustice I am doing our good friends, the members of the Y. W. C. A., and moreover, this reminder is made the more forcible because it has the support of my allegory. Within the last few years, amongst flower-loving people, there has been a demand for some of the oldfashioned flowers, such, for instance as sweet peas and cornflowers, and the florists have accordingly attempted with varying success to supply the demand. In the same way there is now also an appeal made for instruction in domestic arts, and the matter has been brought very forcibly to the attention of the Board of Education by the Y. W. C. A., but I have grave doubts whether the training that these ladies are so anxious and willing to give would equal that received in the old school, the home. Many a joke is made about the comparisons made by young husbands between their wives' cooking and that of their mothers, the contrast being in favour of the latter; and certainly our parents and grandparents had much skill in this respect that could never be achieved in our best equipped modern school of manual training, and the same may be said of housekeeping in general.

It will naturally be asked then to what are we to attribute this state of affairs? Are we not, it will be pertinently asked, as clever as our parents, and are not our facilities greater? To which it must be promptly answered that there is no evidence of mental degeneration, nor are we wanting in facilities, but on the contrary we are truly blessed in this respect and are justly proud of our possessions.

But this pride, alas, is a presage of our coming destruction, and to this abundance of riches we must attribute our poverty, for, unfortunately, where we have so many means of achieving what we desire we do not content ourselves with one or two implements but are ever looking for new ones or else too gladly trying the new ones that are advocated.

Another evil arises from the apparent greater activity of our minds. We are so constantly like the Athenians of old, looking for something new, that we forget the injunction of the ancient sage that there is nothing new under the sun.

As a result of this constant looking out for new objects of interest we find there is either a continual neglect of the old reliable interests or else there is a tendency to superficiality. We get only a smattering of knowledge of the various branches of education to which we apply ourselves, and our time is so taken up with our various occupations that we have no time for any of them and are liable to neglect often some of the most important ones. Like a child surfeited with new toys we will ere long have a cupboard full of cast-off occupations and recreations.

This too constant absorption and ill-advised arrangement of our time is, I take it, one of the features of our times which is of rather grave omen, and should require our most serious consideration, for in time, as a result of the anxiety and worry which are often necessary concomitants, there cannot but follow exhaustion of the intellectual faculties with all that that means, in fact at times insanity and even death.

Another evil too that we sometimes see is that by an apparent repulsion we lose heart at the thought of so many expedients lying before us, and we do not exert ourselves to make a proper selection of the materials at hand, but having one or two fairly servicable we content ourselves with them, and so drop into a stereotyped method and soon fall behind in the race of life, not from over use but from an equally deplorable disuse.

On all sides it will be admitted that this age is also in danger from the fact that old fields of labor are fast becoming exhausted, not only from the want of that productiveness which might supply the demands that would have been made by our forefathers, but because there is such a keen competition from so many more occupants being in the field, that they are driven to seek new fields which will soon suffer from exhaustion unless something is done to regulate this competition and make a better adjustment of the time at our disposal.

We must seek for relief therefore, and in our methods of education naturally think that we will find that great assistance can be obtained, but unfortunately not so much as we wish and this I think is due to the fact that too much is now expected from our professional schools of education while we neglect the domestic school.

There is also a tendency on the part of the home authorities to shirk some of the responsibility that rests upon them. I have already endeavored to show some of the reasons for this, noteably the great want of time in this busy age.

Another factor is a peculiarity of human nature that we see illustrated in the dealings of the public in general with other public arrangements for their welfare, for while at one time they would look askance at the proposals of educators to help them, now they expect everything from them, even as in the case of hospitals and asylums; at one time the public could hardly be induced to send their relatives and friends to them for treatment, while now a great difficulty that those in charge of these institutions have to face is how to prevent unsuitable cases being sent to them.

There is also a tendency to shirk responsibility shown in another way on the part of the domestic school. We are constantly being treated to dissertations on the amount of home work that is imposed on scholars. Now I am quite willing to admit that there is considerable foundation for the charge, and it forms in fact one feature of that state of affairs I have referred to, viz., the disposition in these days to multiply occupations and so absorb too much of our time. But there are, as in every case, two sides to this question and I think there is a tendency to misplaced sympathy, too much being given the scholars and not enough shown for their painstaking teacher. I have never taught school myself, as far as day schools are concerned, but I will admit to having had a little experience in Sunday school work, and from what I encountered there I am disposed to sympathize very much with the teacher, and I think that if the different classes of educational methods were put on another footing far better results would be achieved.

I have already expressed my disapproval of the tendency to multiply studies, but I have no objection to a variety if properly managed. In my own experience at the schools I attended, during the acquisition of my elementary education, many subjects were actually crammed into my memory which I have long since forgotten. For instance in the common school we used at one time to memorize long columns of dates without any information as to the events they represented, but these have long been forgotten, never to be recalled, except perhaps when the same figures are presented to notice, as the number of a telephone—my tailor for instance has the same number as the year that one of the English monarchs came to the throne. During my professional course, though, I had an experience that I think might be utilized as a partial solution of the difficult problem of arranging children's lessons. At the medical school we had, as is more or less the case everywhere, a certain number of didactic lectures, and on every subject we had to attend two courses. These lectures we used to take down in our note books more or less fully. When the time came for the second course of lectures we would find that our professors would often repeat the lectures word for word, and accordingly used to adopt the plan of following the lecture with our old notes, making additions when any new matter was introduced. Then, on returning to our boarding houses, instead of reading up our notes as we had to do when first we took them down, we could read up our books of reference or text books on the same subject. Now why could not a similar plan be adopted in our public schools. Let the teachers teach the subjects in the schools and then let there be home work bearing on the work of the schools, with just enough to learn to fit the scholars for long enough examinations next day to show that they have profited by the teaching of the day before.

By no means do away with home work, but on the contrary let the domestic feature be encouraged for several reasons: First of all, the teacher with a large class numbered by the scores cannot individualize and give that particular attention to a scholar which could be given at home of an evening, and so assist in maintaining the degree of progress attained by a brighter companion. Secondly, even as the owner of the garden referred to in my simile, who works it himself, will not only enjoy the recreation of gardening for the sake of the flowers that will grow all the better for the time he devotes to them, but will also feel stronger and brighter in every way, so the parent who looks after his or her child's lessons of an evening will not only feel rewarded by seeing his child's mental growth but he will find that his own mental powers are refreshed by the return to subjects once well known but now long forgotten. Thirdly, the parent can also act the counterpart of the reference books and text books used by the college student, and give information often that will serve to impress more fully the lessons taught in the schools than ordinary school teaching will do, for undoubtedly the lessons taught by a parent have far more lasting impression than those taught by an outsider, who has not the influence that instinctively goes with the instruction imparted by a loving parent who has gained the confidence that the most skilful teacher may take years to win from the scholar.

Another reason that I would advance is that there is too much tendency in these days to desert the home circle of an evening, when there are so many outside attractions and such a tendency to seek amusement from home, on the part of not only the fathers, but even the mothers and children themselves. If, therefore, the parents made more of a practice of looking after their children's lessons of an evening than I am afraid is often the case, while at the same time the teachers arranged their share of the work so that the lessons would not be too extensive, we would find the home circles would have time for profitable recreations as well. Many a parent who now finds his time so all-absorbing would find that as a result of the time so given up of an evening he would be able to turn his attention with far brighter faculties to his business the next day. A series of children's books was much in vogue thirty years ago, some of them if not all by Maria Edgworth, the principal characters being a boy and girl named Harry and Lucy, that in fact being the title of some of the series. These two children were made to take what we would now consider rather an oldfashioned interest in popular science, but nevertheless for my part I have never forgotten some of the information that I derived from them, but what I would particularly call attention to was the method in which these children were taught. Harry used to discuss these subjects with his father while the latter was shaving in the morning. In our days the average father has no time to shave in the morning; he either shaves at odd times when he thinks he most needs it, or else rushes into a barber shop at a spare moment. Now how much better would it be if we could only arrange our business affairs so as to have these spare moments, not only for our children's instruction, but to save ourselves from a premature exhaustion of our faculties and energies.

So much for general teaching. And now there are some especial branches that are either neglected or improperly taught, so far as my observations go and judging from my own personal experience. But first of all, to be candid and at the same time better enforce my remarks, I would like to refer to the well taught ones. To begin with then the three R's, reading is certainly better taught than it used to be, and in fact the same may be said of the other members of the group, for before I left school more prominence was being given to the practical rules in arithmetic, and easier methods were being adopted, while writing also was being given more attention to, though I notice that the business colleges are still inclined to teach fancy writing. Shorthand writing was barely known in my time, and though bookkeeping was taught it was not taught any too well then. Spelling, of course, we used to learn, but I think the great fact was not sufficiently emphasized, that a good speller must ever try to have the word he would spell before his mind's eye. In these days of phonetic spelling there is, I am afraid, a tendency to lose sight of the derivation of words and encourage the cultivation of the ear more than the eye, but it will be none the less needful to picture the word especially until the new characters that have been advocated are fully adopted.

Literature in my day was an almost unknown subject, and even now I think that while it forms a prominent feature of our school curricula, it is one of the branches that would be the better taught if the home influences were called on to assist. In my day the specimens of English literature that were brought to our notice were only produced as reading pieces, or else, what was most uninteresting of all, to be analysed, and nothing could be more likely to make the average scholar detest a selection of poetry than this attempt to find the subject and predicate in a specimen of Milton's blank verse. Having then my own experience in this respect in view I would beg my friends the professional educators to see to it that there is nothing in their methods to create a distaste for the author whose works may furnish the literature for the year's examination, but on the contrary encourage them to make a study of the same author when at home.

The next subject I would refer to is one that I approach with fear and trembling, and that is grammar. During my school days I had at least three different text books on the subject as far as English grammar is concerned, and from what I can gather there have been several since, while it is doubtful to my mind if it is really properly taught yet. And here I think that the best instruction is to be had in the home circle, and that it will be found that the best grammar is spoken by those who have the best ear and have been taught from their earliest years to almost think it a crime to use bad grammar. There are two particular bugbears whose use has probably been a puzzle to us all, those little words "shall" and "will." My mother, who was English, used to proudly tell me that an Englishman never made a mistake in their use, while she would intimate to me that as my father was Irish it was very doubtful whether I would ever learn to use them properly. In one of J. M. Barrie's works he makes one of his characters, a London editor, say to the hero, who is being given a position as a leader writer: "You are Scotch, are you not? How are you on the use of 'shall' and 'will'?" To which he is bound to reply that he is not at all certain as to their proper use.

There are two other branches which are liable to be thought dry and uninteresting, viz: geography and history. These, I think could be made more attractive if the domestic school was more appealed to, and also if in teaching the former we did not simply teach the names of rivers, lakes, and seas, islands, peninsulas and capes, cities, towns and villages, and state the boundaries of the countries, but on the contrary endeavored to point out the historical points of interest connected with them.

Then with regard to history, do not let it be an accumulation of dry dates and enumeration of facts to which they correspond, but let fuller particulars be given of the most important ones.

With regard to geography, in these days of excursions it is within the power of the teacher, whether belonging to the professional or domestic class, to visit some of the points mentioned and thus be better able to describe them.

An especially weak point though, in my experience of the teaching of history, is that not enough attention is given to Canadian history. I was taught very little of it at school because I was allowed to skip a class after a promotion examination, and the class I passed over was the only one in which was taught Canadian history. The other day I picked up the school history now in use and found that it was, according to the title page, both an English and Canadian history, but on investigation discovered that the Canadian section was at the end of the work, and I wondered whether in all probability that part of the book would ever be reached.

There is, I know, rather a tendency to belittle Canadian and American history, and also make out that there is very little of literary and historical interest to be met with when travelling in this country, while we dilate on the points of interest and beauty to be met with in other countries.

I will admit that I have erred in this respect to some extent myself, for many of the places of note in this country that I have visited during my holiday trips were the objects of tours I have made since visiting the European continent. At this present time there are people in the city of Hamilton who have never perhaps visited the Thousand Isles. In 1894, I met a young Hamiltonian who had often visited Muskoka and Georgian Bay, and who was then making his first trip down the St. Lawrence, while I had then just returned from my first visit to Mackinaw, and last summer was the occasion of my first visit to Parry Sound and Muskoka. To come nearer home, how many have visited Lake Medad? I, for one, have not, and if it had not been for field day trips of the biological section I might yet have to make my first trip to Ancaster sulphur springs or the burning spring at Mount Albion. I have also heard of people who had never gone up the incline railway to see the view; some have never been in the public library building or the museum of our

Association, while others have never visited Chedoke or Webster's Falls, and I must confess that I have never yet gone to the top of our City Hall, although in 1890 I went to the top of the Capitol at Washington. These instances alone will show how much of practical geography might be learnt at little or no expense if we would only look about us while at home.

Then to turn to history, how many have visited the scene of the battle of Stony Creek? How many are acquainted with the history of even our own city and can tell where the first Protestant church in Hamilton stood? I had the actual building pointed out to me on the occasion of a visit to Hamilton in 1878, the first visit that I ever made here, and like many visitors I saw things then that I might never see here when a resident. How many have read the history of the first trip made to Hamilton or Burlington bay, of which we have record? Then to turn to the physical geography or history of this neighborhood, how many have read a paper read before our Association which advances the very plausible theory that the Grand river once emptied into Hamilton bay? Considerable interest might be roused also amongst scholars if they were taught the origin of some of the names of our cities or even our very streets. A visit to some of our churchyards and cemeteries might also be made very interesting from the historical suggestions that would arise from some of the inscriptions. I remember one of my friends telling me how impressed he was with the fact that no members were to be found in Hamilton of some families whose names he had seen in Hamilton cemetery, and the same could be said of most old cemeteries.

By thus exciting an interest in the history of our own locality, we will cultivate a taste for investigations of a similar kind when visiting other parts of our own country, and I think it will be found as I have already intimated that we need not bewail the want of historical associations in connection with the different points to be seen when travelling on our own beautiful rivers and lakes.

Quite as stirring scenes have been enacted here if we only had the records, and it is a most favorable sign the interest shown in the proceedings of the several historical clubs that have been formed throughout the Dominion, and the increased patriotic sentiment that is being fostered.

But while I would thus advocate the special study of our own history, we must not forget the history of the land from which our forefathers came, as so much of our own history is involved in it. However if the interest is properly aroused in our own, as a consequence it will soon follow that the scholar will want to extend his studies in the direction of the history of the older countries, and moreover, I think he will find the study less irksome when taken up under those circumstances.

Another branch of study that should be more encouraged is that which we as members of this Association are particularly interested in—the study of the geology, fauna and flora of our own land, and this also is work for the domestic school in particular. On other occasions I have presented my views on the subject, views which I am sure will be echoed, and in fact have been already often dealt with by other members of the Association, but in view of the pertinency of the subject a further reference will be in order now.

The particular point that I would dwell on is that not only is the study of natural history in all its branches of value from the interest attached to the objects of this study, but the fact that they are best studied in the open air, necessitating long walks or drives, is alone of great benefit, especially when it draws those whose occupations are inclined to keep them too closely confined, away from their toil and worry, consequently when these branches are being studied in the domestic school as they should be, the parents who take a proper interest in their children's lessons will reap this benefit, thus carrying out my garden simile in an additional way. Another very important argument in favor of the study of natural science is that it cultivates the child's powers of observation, and thus gives them another great aid to happiness.

I think no better instances of the value of the life devoted to this study could be found than is presented by some of our worthy members. One I know of was failing in health and was ordered to give up business and keep in the open air. This gentleman, who is now residing in another city, when he was ordered to stay out of doors as much as possible, accordingly devoted himself to entomology, and so thoroughly that he was able by his contributions to scientific journals to enhance the happiness of his friends while he now holds an important position in connection with his chosen study.

I would also call attention to the life of the gentleman whose notes have often been contributed to our meetings. A conversation with him is a marvellous treat, and especially if in the open air. There is not a plant that he does not know the botanical name of, and not a bird whose note he does not recognize at once.

In conclusion, I would say that to some of my hearers I may seem to be rather too conservative and inclined to discredit modern advances. Such a charge I would refute, for no one is more willing to admit the value of new systems and methods, but I would like to utter a note of warning as the spirit of competition is so great and there is such a tendency to consider the latest invention and theory the best, that it behooves us to be on our guard, and while we would prove all things and by no means reject them because they are new, yet let us give them a careful test and then only hold fast that which is good. These ideas I am afraid are rather fragmentary and at the best only suggestions, but if they in any way assist in our work as educators I will feel highly rewarded.

LOCAL MUSEUMS.

Read before the Hamilton Association, Nov. 7th, 1895.

BY A. ALEXANDER.

The subject which I have chosen for this night's paper is "The Local Museum as an adjunct to our educational system." A *dry* subject you may say, but not so to me, though very likely you may consider my *treatment* of the subject as dry as the average museum specimen is.

Allow me to preface my remarks on the subject proper with a few reasons for choosing this subject for discussion.

And first of all, I may say that though we have had a museum as you see it to-night for about fifteen years, we have never, as far as I know, once sat down together to decide what our objects were in founding and continuing it. This may appear rather a serious reflection upon our wisdom in this connection. Well, I thought it must surely be time that we as an Association should look our museum and each other straight in the face, and ask each other and ourselves what we propose doing in relation to it, and what we had been doing for the promotion of Literature, Science and Art through the influence of this miscellaneous collection which we call our museum.

In the second place, I may state that ever since 1888, the year when we began, through the Biological Section, the collecting, naming, classifying and preserving, for future reference by the botanical students and general public of the city, of the native flora of the Hamilton district, from a defined area, I have had the idea ever present to my mind which I purpose trying to make clear in this paper, I thought if plants, why not animals and rocks, fresh water and land shells, and insects?

It always appeared to me that not only to the teachers and students of our college and common schools, but also to the ordinary dweller in our city, such a complete collection of the natural objects found in our neighborhood, properly classified, named and clearly labelled and openly exhibited, would not only be interesting beyond conception, but would be a great aid and auxillary to the educational machinery of our city. Not only would such a collection, if formed on the lines which I will indicate, be a valuable adjunct to our school system, but also to our Free Library, for surely the actual specimen of bird, or insect, or flower, must convey a clearer and more perfect conception than the best executed illustration in a book possibly could do.

The third reason that I will name for bringing this matter before my fellow members to-night is, that among the many sights which interested me in 1892, during my visit to Europe, none pleased me more than a visit made to the new Great National Museum of Natural History at Kensington, London, and to a museum in my native county of Perth, Scotland. In the former I saw what appeared to me a *perfect* collection arranged on the lines on which the museum of the future will always be if it is to take its place as an educational factor.

It is not necessary here to give a description of the vast building, or of the seemingly interminable succession of airy, light and spacious galleries and rooms, and the collections from every part of the world of the former named institution. Suffice it to say, that in it is contained all the natural history objects removed from the British Museum, as well as the collections of nearly all the learned societies in London, including those of the Royal Society, the Zoological and Anthropological Societies, and others.

It is in truth a NATIONAL Museum, and worthy of the Great Empire, at the heart and centre of which it stands.

The other museum is a provincial one, and is in the town of Perth, on the beautiful banks of the Tay. This museum has been in existence as an old-time museum, or curiosity shop if you like, for many years, for I remember being taken to it by my father more than half a century ago; but, except a dim memory of an elephant's tusk, an alligator, whose glass eyes were dim with dust, a mummy case said to contain a second cousin to one of the Pharaohs, with numberless rusty swords and claymores, chairs that Scottish kings and nobles had sat on, with many stuffed birds and other natural history objects, all without arrangement, or, as far as I remember, any attempt to convey any definite idea. But now how changed! It seems that about twenty years ago a few enthusiastic naturalists connected with the society having charge of the museum, resolved to make as complete a collection as possible of the flora and fauna of the county of Perth, and only last November the collection which I saw in 1892, with additions since made, was removed to a fine new wing built on purpose to receive this local gathering of the birds, animals, flowers, rocks and minerals of the county. Among these collectors was Colonel Drummond Hay, of Pitfour Castle, a resident of the parish in which I first saw the light, and who has made a life-study of the habits of "The Birds of Tay," and who has contributed nearly the whole of the magnificent ornithological portion of this fine collection. The occasion of this opening was considered so important from a scientific and educational point of view that all the leading educationists and scientific men of neighboring counties were there, and several from Edinburgh and London, as well as the leading citizens and country gentry. When I saw that collection three years ago it seemed to me a realization of the dream I had been indulging in regarding this museum of ours. What they have done we surely can do. If they had a Colonel Hay we have a Colonel Grant, who has shed a lustre over geological science and collecting, and therefore on us just as the former has on ornithology and the Perth museum. And have we not a McIlwraith, who has with a life-long devotion given himself to this study, and whose bird knowledge has been laid at our feet, and who has by the same made us known and respected in many lands besides our own. Need I speak of Mr. A. E. Walker and our worthy President, able coadjutors of Col. Grant in bringing to light the hidden things of the rocks. These, with Mr. Dickson in botany, and the yet undiscovered successor of our good friend Mr. Moffat in entomology, should give us good heart in starting out to found and carry out what I am sure must be the museum of the future in this city.

If we make an effort therefore to so agitate this matter from to-night that we can get the authorities, either national, provincial or municipal, to believe that the district museum on the lines indicated by this paper is a necessary part of the country's educational equipment, we will have done a good work, and helped on the general advancement of human knowledge of the common objects which are lying all around our path.

The only other reason why I chose this subject, which I will name, is that some months ago a sister society in this city was agitating the question of a museum, I presume primarily historical. It occurred to me that it would be a pity if two institutions in the same community should be claiming recognition as desirous of founding a museum when one of them had already a nucleus of a museum in hand, and when by union the objects of both could be realized with greater ease.

Just one word more before I come to the subject proper, and this by way of encouragement, to undertake the collection hinted at. The older members of the Association will remember that, when we took up house of our own, after having lived for many years in tents as it were, our properties available for museum purposes consisted of a few old boxes of fossils and minerals, a moth-eaten emu, a dilapidated flying squirrel, a spiny fish (the ornithorinchus), an old owl, a large wasp nest, a copy of the Breeches bible, and a few sundry curios.

And now we see what has been added, largely without much effort, an indication I think of what might be in a few years hence if we lay down a plan and vigorously carry it out.

It is hardly necessary for me to say anything in such a meeting as this upon the advantages of such a work as I trust our Association desires to encourage by means of a museum. We will, if you please, take that for granted.

The formation of such societies as ours in all the principal centres of population in the country, and not only on this western continent but in all lands in which anything like intellectual culture has a hold upon the people, is a proof that they fulfil a national want in the human mind in its present stage of development. The steady increase in the number of these societies—for they are mostly the offspring of the latter half of the present century—shows that this want is becoming more keenly felt as time goes on. I find out of sixty-three societies affiliated with the British Association, which is to meet in Toronto next year, no less than forty-eight of them had their origin since 1850. I have not been able to get the statistics of kindred societies in the United States and Canada, but it would be found to be as true of them. I may therefore safely say that societies for the study of natural history are the growth of our own age, and I think a sign of its intellectual advance.

I must, however, remember that it is not of our society generally that I have to speak to-night, but of one of the methods by which it proposes to carry on the practical study of natural science by the formation of a museum, or more especially as to the value of *our* museum as a means of education.

Of the *general* value of museums—using the word in its widest sense as collections of works of art and of nature—in the intellectual advance of mankind, there can be no question. How could art make any progress, how could it even exist, if its productions were destroyed as soon as they were created, if there were no museums, public or private, in which they could be preserved and made available to mankind now and hereafter? How could science be studied without ready access to the materials upon which knowledge is built up? In many branches of science, especially those called *natural history*, the progress was mainly commensurate with the abundance and accessibility of such material. Though the first duty of museums was without question to preserve the materials upon which the history of mankind and knowledge was based, I have noticed in the numerous succession of essays, addresses, lectures and papers, constituting what I may be permitted to call the museum literature of the last twenty or thirty years, the gradual development of the conception that the museum of the future is to have for its complete ideal not only the simple preservation of the objects contained in it, but above all, their arrangement in such a manner as to provide for the instruction of those who visit it. In other words, the value of the museum will be tested not only by its contents but by the *treatment* of those contents as MEANS OF ADVANCING KNOWLEDGE.

I suppose the first recorded institution which bore the name museum, meaning a temple or haunt of the muse, was that founded by Ptolemy Soter at Alexandria about 300 B. C., an excellent paper on which was read before this Association several years ago by Mr. Glyndon. But that was not a museum in our sense of the word, but rather in accordance with its etymology, a place appropriated to the cultivation of learning, or which was frequented by a society or academy of learned men, devoting themselves to philosophical studies and the pursuit of knowledge.

Passing over (for time will not permit) the slight indications left of the existence of collections at all resembling our modern museums among the ancients, we find with the revival of learning in the middle ages, the *collecting* instinct inborn in so many persons of various nations and periods, but so long in abeyance, spring into existence with considerable vigor, and a museum, meaning at that time a collection of miscellaneous objects as well as natural curiosities, often associated with a gallery of sculpture and painting, became a fashionable appendage to the establishment of many wealthy persons of superior culture. As far as I can ascertain, all the earliest collections comparable to what *we* call museums were formed by and maintained at the expense of private individuals—sometimes physicians, whose studies led them to a taste for biological science.

I find also that great merchant princes, whose trading connections afforded opportunities for bringing together things that were considered curious from foreign lands, made collections called museums. Sometimes ruling monarchs, in their private capacity, had tastes running in that direction. In every case, however, these collections were maintained mainly for the gratification of the possessor or his personal friends, and rarely, if ever, associated with any systematic teaching or public benefit. In England, the earliest important collectors of miscellaneous objects were the two John Tradescants, father and son, the latter of whom published in 1656 a little work called " Museum Tradescantianum, or, a collection of Rarities preserved at South Lambeth, near London." I once saw a copy of this work, and the wonderful variety, and in many instances incongruous juxta position, of the objects contained in that collection, made it very amusing reading.

Upon the association of individuals together into societies to promote the advancement of knowledge, these bodies, in their corporate capacity, frequently made the formation of a museum part of their function. The earliest instance of this, I suppose, must have been the Royal Society, who had a museum in Crown Court, London, as early as the latter part of the 17th century.

But however interesting it might be to pursue this historical part of the rise of the museum, to keep this paper within due bounds, and have time for discussion at the close, I must content myself with the two instances named.

As far as I am able to find out, the idea that the maintenance of a museum was a portion of the public duty of the State, or of any municipal body, had no where entered into the mind of man at the beginning of the last century, nor indeed to any large degree at the beginning of this century, for that matter. Even the great teaching bodies—the universities (whose museums are now next to the national ones, the most important in the country) were slow in acquiring collections. Of course it must be remembered that the subjects considered most essential to the education they then professed to give, were not those which needed illustrations from the objects which could be brought together in a museum.

It is also worthy of remark, that notwithstanding the multiplication of public museums during the present century, and the greater resources and advantages which many of them possess, which private collectors can not command, the spirit of accummulation in individuals has happily not passed away, although naturally directed into rather different channels than formerly.

The general museums or collections of old time were now for the most part left to governments and institutions, which afforded greater guarantees of their permanence and public utility, while admirable service was done to science by those private persons with leisure and means, who, devoting themselves to some special subject, amassed the materials by which its study could be procured in detail, either by themselves or by those they knew were qualified to do so. These collections, if they fulfilled their most appropriate destiny, ultimately became incorporated by gift or purchase in one or other of the public museums, and then served as permanent factors in the education of the nation, or, I might say, of the world.

The great national State supported museums which now exist in every civilized country had certain definite purposes in view, and methods of management which it is quite unnecessary for me to discuss now, for I want to speak of local museums and not national ones.

No provincial or local institute could endeavor to enter into competition with them, especially in the means they could, or ought to supply, of advancing detailed knowledge by exhaustive collections in every subject. To the extent of such an institution as the British Museum, or those great museums on this continent, such as the

Smithsonian Museum at Washington, or the one at Ottawa, which is but in its infancy, I say to the extent of these there should be no limit but those imposed by nature herself.

In the case, however, of all other museums, large or small, belonging to a town, institution, society or school, the first consideration in its establishment should be, to have some definite and limited object or purpose to fulfil, and the next, that means should be forthcoming not only to establish it but to maintain it in a suitable manner to fulfil that purpose. Some were enthusiastic enough to think that a museum in itself was so good an object that they had but to provide a building and cases, and a certain number of specimens, no matter exactly what, to fill them, and then the thing was done, whereas in truth the work had then only begun.

What a museum really depended on for its success and usefulness, was not its building, not its cases, not even its specimens, but its curator. I look upon it that the local museum, to take its place among the educational forces of the present time, must have a definite object in view. I have already said that the success of such a museum depends chiefly upon its curator and his staff. He is the life and soul of the institution. We might as well build a church and expect it to perform the duties required of it without a minister, or a school without a schoolmaster, or a garden without a gardener, as to build or form a museum and not provide a competent staff to take care of it. I think at this point, and before I more definitely say what I earnestly hope may be done with our museum, I may be permitted to say that even our own little collection, miscellaneous as it is, would not have been in the excellent condition in which we find it to-day if it had not been for the unremitting devotion and painstaking care, I had almost said loving care, manifested by our valued and much esteemed curator, Mr. Gaviller, and with him I would bear testimony to that part of our treasures which is by far the most valuable, viz., the geological specimens that have been brought together and arranged by our honored friends, Colonel Grant, Mr. A. E. Walker and the President.

As I have already hinted, the first consideration in founding a museum is to have a definite object or purpose to fulfil.

What in such a city as Hamilton should be the object? As I have already said, we founded a museum about fifteen years ago, and as far as I know this is the first time that the object and purpose has been discussed, but it is not too late.

Instead of a general miscellaneous collection of all kinds of curiosities thrown indiscriminately together as we find in the old fashioned country or city museums, I suggest that we confine our endeavors to two distinct objects, and two only (well, so that we have not to throw any of our specimens away, say three), resolutely refusing to mix them together or destroy the value of either by introducing into them specimens which however precious or interesting in themselves would detract from or interfere with the special lessons to be derived from either of these two or three series.

The one should be a local collection, in which the natural history, the various animals, comprehending insects, birds, etc., the wild flowers, the fossils, and the minerals of a certain definite area, of which Hamilton would be the centre, would be so exhibited, arranged and named, that any one could identify every creature and plant he might chance to meet with in his walks. We have only to fix our boundary and then the object becomes absolutely definite and limited. Everything not occurring in a state of nature within that boundary should be rigorously excluded. We have already, as I have before stated, made a good beginning with the native plants, and our geological treasures already brought together will furnish a very good representation of our local rocks and fossils. I have no doubt our very good friend, Mr. McIlwraith, would permit us to become his debtor once more for a few duplicate specimens as a nucleus for a local ornithological collection. For entomology we could get a few points from our old and kind friend Mr. Moffatt. The fresh water and land shells of the district would be interesting, and as Mr. Hanham, an old member of our Association once showed, the district is especially rich in these, for he and Mr. George Leslie in a few short seasons actually added several shells not before catalogued as being found in Canada.

Surely among the membership of this Association we have young men with enthusiasm enough and tastes to prompt them to take a hold of this really valuable work, one of the most important we can take up and accomplish.

With painstaking collecting, and the necessary investigating, and a moderate amount of curatorial work continuously applied as new specimens came in—for it would be a long time before the natural history even of this limited region was exhausted in all its aspect would make that collection one of deep interest to all the intelligent dwellers in the district, and a model to be followed in other local museums.

Natural history in its various branches is now becoming a subject of general education. There is a large class of persons who would in all probability, year by year, as time went on, bear a greater proportion to the general population of the country, who, without having the time, the opportuuity, or the ability to make a profound study of any one branch of science, yet took a general interest in its progress, and wished to possess some knowledge of the world around them, and with the principal facts ascertained with regard to it in at least some portions of it. For such persons, our museum, if arranged as I have indicated, and well organized, would be a benefit to a degree that could scarcely be realized at present.

Of course, while I consider that our first, and in some respects our most important, aim should be to make this local collection, I admit, from an educational point of view, it would be quite inadequate to give a general and consistent idea of the richness and variety of the natural productions of the world in which we live, and for that purpose, in a city like Hamilton, with its high educational status, its Collegiate Institute and Normal College in prospect, we should have another collection, requiring another room, the contents of which must be gathered from every available source. It is upon this part of a museum that the skill, the knowledge, the judgment and the capacity of the museum curator would be exercised to the utmost.

Instead of, as in the former series, we would welcome every addition, if originating within the prescribed limits, it would be one of his principal duties sternly to refuse everything that did not distinctly claim a definite place in the system adopted. It would be necessary in this division of the museum to determine on a general plan for the series—nothing being admitted that did not fall in with it, and this plan should be rigidly kept to.

The number of specimens must be strictly limited according to the nature of the subject to be illustrated and the space available. None must be placed too high or too low for ready examination.

There should be no crowding of specimens one behind the other, every one must be perfectly and distinctly seen, and with a clear space around it. Could we imagine a picture gallery with half the walls partially or entirely concealed by others hung in front of them? Though this may appear to you preposterous, yet this seemed to be still the approved arrangement of specimens in most public museums. If an object is worth putting in a museum it was surely worth such a position as would enable it to be seen. Every specimen exhibited should be good of its kind, and all available skill and care should be spent upon its preservation, and rendering it capable of teaching the lesson it was intended to convey. Every specimen should have its definite purpose, and no absolute duplicate should on any account be admitted. Above all, the purpose for which each specimen is exhibited, and the main lesson to be derived from it should be distinctly indicated by the labels affixed both as headings of the various divisions of the series, and to the individual specimens. Mr. Brown Goode, the director of the U. S. National Museum, puts the point better than I can when he says, "An efficient educational museum may be described as a collection of instructive labels, each illustrated by a well selected specimen."

I have already said that the museum required watchful and incessant care, not only must the specimens contained in it, all more or less perishable in their nature (as we have experienced by having to throw away a large part of one of our entomological collections) be continually looked to, and cleaned and renewed when necessary, but fresh ones must be added to make the different series complete, and they must often be re-arranged to keep pace with the continuous advance of scientific knowledge.

An educational museum could not stand still or it ceased to be of any value. It would have to keep abreast of the rapidly flowing stream of knowledge. Now that could not be done without continual expenditure. If we are to have a museum which will fulfil its highest purpose we must face that question.

Our museum, even in its present form, exists because of the voluntary care bestowed upon it by the gentlemen I have already named, whose unremitting watchfulness have alone made it presentable and of interest to the general public altogether apart or largely so from any educational feature. But if founded on the lines which

I have hurriedly and imperfectly laid down, there must be a permanent paid curator. Voluntary assistance was valuable, and we have had splendid examples of what it can do, but we cannot depend on that for any long continuance. A museum would never be what it ought or do all that might legitimately be expected of it until the curator's profession was properly remunerated.

This brings me to the last point I wish to make. How was the permanence of a museum like this to be secured? I have said in the early part of this paper that museums were once all the private property of individuals. Then associations or societies of individuals took them up. Now it was gradually being recognized that it was the duty of government and municipalities to maintain them. Nearly all the London societies formerly possessed museums, but as the collections grew the expense of keeping them became a burden, and they had been gradually transferred to government or other institutions.

The marvellous spread of free libraries, partly state supported and rate supported in our Dominion, especially in this Province, which had taken place during the last few years, appeared to be only the prelude to museums maintained in the same way. The underlying idea of a library and a museum was precisely the same. They were both instruments of intellectual culture, the one as much as the other. That idea has been illustrated on a magnificent scale in the great national Library and Museum in London, and on this side of the ocean at Washington in the great Smithsonian Institute, Library and Museum. I hope that we shall soon find that an orderly well arranged and well-labelled museum would be acknowledged as a necessity in any well considered scheme of educational progress. Then the museum and the library would go hand in hand as necessary complements to each other in the advancement of science and art, and the intelligent development generally. A book without illustrations is of comparatively little value in teaching many of the most important subjects now comprised in general education. A museum should be a book, or rather a library of books, illustrated not by pictures only but by actual specimens of the objects named. The great principle of expending public money upon purposes of education, though comparatively new, is now conceded upon all sides. The cost of supporting a few really efficient museums, of which I hope the Hamilton Association Museum will be one, would be but a trifle compared with the thousands spent upon far less efficient modes of educating and elevating the people.

I have thus, I fear rather imperfectly, indicated what I consider should be our aim in the future management of the museum: 1st. That our first work should be the collecting, naming, classifying and exhibiting of a collection of the objects found in a state of nature in a prescribed area around our city. That adopted by the Biological Section is a circular area, with a radius of twelve miles from the City Hall as a centre. Of course this might be modified so as to make the County of Wentworth the district from which our collections would be made. 2nd. Another series, more general, with a room distinct from the other, as I have indicated, and I would recommend a third room to receive the miscellaneous contributions and donations made to the museum of objects which could not be placed in either of the other two, and of value either as teaching something or having a historical value.

I think I hear you saying how can we do all this when we are crowded now? Well, I answer, we can't do it in our present room, with our present space and present means. I have in the course of this paper, at least by implication, shewn where the means for carrying on the work must or should come from.

And now I must draw this, already too long paper to a close by quoting a few paragraphs from others as corroborative of the opinions I have expressed, to show that if what I have stated as my idea of what our museum should be in its aims be a dream that I am not the only dreamer.

APPENDIX.

In a committee report made to the British Association for the Advancement of Science upon the provincial museums of the united kingdom, it is stated:

"The special objects of a free rate supported museum in a provincial town should be, 1st, To contribute its share to the general scientific statistics of the country by collecting and preserving specimens of the natural and artifi ial productions of the district in which it is situated, 2nd, To procure such other specimens as may be desirable for illustrating the general principles of science, and the relations of the locality to the rest of the world.

3rd, To receive and preserve local collections or single specimens, having any scientific value, which the possessors may desire to devote to public use.

4th, So to arrange and display the specimens collected as to afford the greatest amount of popular instruction consistent with their safe preservation and accessibility as objects of scientific study.

5th, To render special assistance to local students and teachers of science.

Mr. F. T. Mott, a member of the committee whose report I quoted from, in a paper read before the Leicester Literary and Philosophical Society on the "Development of Museums as public instructors." says: "Museums. free libraries and art galleries have this in common, that they are each expected to fulfil two purposes which are somewhat incongruous, and require to be pursued by different methods and very different appliances. Each of these institutions is expected to minister to the wants both of trained students and of the untrained and ignorant public; and the demands of these two classes of persons are so diverse that they must be provided for separately. The free library must have its lending department for the general public, and its reference department for students. The art gallery must have attractive and interesting pictures for ordinary visitors, but it must also have masterly studies for the instruction of young artists. The museum, however, has a still more complex and difficult part to play. It has not only to provide for the diverse wants of students and visitors, but it has also to contribute to the general progress of scientific knowledge. Every museum, at least every provincial rate-supported museum, which is a public and in some sense a national institution has a threefold duty, 1st, to the nation at large; 2nd, to the students of the neighborhood, and 3rd, to the local public. If museums are ever to be more than a confused compound of the curiosity shop and the peep show, which very many of them are at present, this three fold duty must be very clearly recognized and sufficiently carried out."

OUR EDUCATIONAL SYSTEM.

AN HISTORICAL SKETCH.

Read before the Hamilton Association, May 7th, 1896.

BY INSPECTOR J. H. SMITH.

I have taken advantage of the kind invitation of your corresponding secretary to lay before you a brief outline of the evolution of our educational system. We all look with feelings of pride upon its achievements, and although the high altitude of our individual ideals may not be reached, yet taken all in all there can be no reasonable doubt that it has few, if any, rivals for the foremost position. Perhaps I may venture further, and say that it surpasses all in many respects, and seldom falls below their level at any point. This is notably true if we make our comparisons with those on this continent, and measurably so, if made with those of the old world. The circumstances and environment of the people, as well as the forms of government, render it somewhat difficult to make a fair and just comparison, yet the results show that we have a system which when placed side by side with those of other countries (as at the exhibitions in Philadelphia, New Orleans, Paris, London and Chicago), nobly sustained its high reputation, won for itself a permanent position in the van of progressive educational systems, and brought distinguished honors to Canada. A careful study of its development will show that its rise has been wonderful, its progress phenomenal, and its future bright with the signs of a greatly enlarged usefulness. To this phase of the question I therefore purpose directing your attention.

In order to trace this system through the various stages of its growth and development, and to assist us in forming a fairly accurate idea of the sources whence it has sprung, it will be necessary to refer to the early colonial history of this continent. In these references we shall confine ourselves to facts bearing upon educational matters, and which show quite conclusively that some of the principles underlying our present system were, even in these colonial days, recognized and applied. As early as 1633, a school was opened in New Amsterdam, and in 1638 provision was made, "That each householder and inhabitant should bear such tax and public charge as shall hereafter be considered proper for the maintenance of schoolmasters." This is the first recorded instance on this continent of the application of the principle of taxation for the support of schools. In 1635 the first school was opened in Boston, and in 1642 a resolution was passed by the general court or legislative body, enjoining upon the local authorities the necessity of seeing, "That the children and servants of each family be taught to read fluently the English language, and to acquire a knowledge of the penal laws." This resolution or law was enforced by a penalty of twenty shillings for neglect, and so far as my researches have gone, is the first instance of compulsory education. In 1647 the first legislative enactment in favor of schools was made in Massachusetts, and the Governor of Connecticut declared in 1670, "That one-fourth of the revenue of the State was devoted to schools."

The absence of newspapers, the scarcity of books, and the want of means for rapid transit in these early days, caused public opinion to be very slow in making its influence felt. These hindrances, together with the political excitement that steadily increased in fervency until it led to the revolt of the thirteen colonies, threw the cause of education far into the background, and seriously retarded the advancement of learning. When this unfortunate war was brought to a close, large numbers of faithful adherents and loyal upholders of British supremacy, finding the altered state of their relations to the government distasteful to their feelings and repugnant to their sense of honor, left their homes, and began life as pioneers of civilization, on the northern shores of the great lakes. These loyal people brought with them, not only fealty to England's throne, and a love for British institutions, but a deeply seated desire to rear in this, the land of their choice, a nation that should become one of the brightest gems in the British crown. The only means by which such a desirable end could be attained was that of educating the people, for no nation has risen to an honorable position in the world without at least having the governing classes well educated, and no nation has attained a high degree of excellence in commerce, or manufactures, or agriculture, without having the benefits of education widely diffused among the masses.

The ruling principle of government in this Province being more democratic than aristocratic in its tendencies, it follows as a natural sequence that the proper education of the masses is a matter of prime necessity. The reign of the common people has steadily advanced in influence, until now, freedom, education and religious equality are the inalienable rights of all. There was a struggle, long and at times very bitter, before these blessings were secured to us, and nowhere are the effects of this struggle to be seen more clearly than in our early educational history. The leading actors in this drama have passed away, but they have bequeathed to us an educational system, of which it may be truly said, that it is a monument more durable than brass or marble, and more noble than the conquest of nations, or the destruction of armies.

To the early educational history of this Province, we shall now turn our attention and endeavor to trace the growth and development of those principles which underlie our present system. Owing to the sparseness of the population, and the poverty of the majority of the people in these early days, only a few private schools were opened. Kingston has the honor of having had the first school of any kind in Upper Canada. In 1785 the Rev. Dr. Stewart opened a school in Cataraqui, now Kingston, in which the study of classics was a leading feature. This was followed by one at Port Rowan, in 1789, one at Niagara in 1792, one at Ancaster in 1796, and one at York in 1798. About the beginning of the present century, other schools were opened, the principal ones being at Cornwall, Sandwich and St. Catharines. These were entirely supported by fees, and were patronized by the more wealthy people.

The Legislature of Upper Canada in 1797 sent a memorial to His Majesty, George III, asking a grant of land for the endowment of District Grammar Schools, and of a Provincial University. In reply to this memorial the Duke of Portland, then Colonial Minister, sent a despatch to the acting Governor, in which he says:— "His Majesty has expressed his gracious intention to comply with the wishes of the Legislature of his Province of Upper Canada in such manner as shall be judged to be most effectual; first, by the establishment of free Grammar Schools in those districts in which they are called for; and secondly, in due process of time by establishing other seminaries of a larger and more comprehensive nature for the promotion of religious and moral learning and the study of arts and sciences."

In accordance with the terms of this dispatch half a million acres of land were set apart for higher education, but it was soon found that even this large quantity, at the prices then current, was quite insufficient for endowing a number of Grammar Schools. This scheme had therefore to be abandoned, and in 1807 an Act was passed establishing a Public School in each of the eight districts into which this Province was then divided, and giving an annual grant in support of the same. A Board of Trustees, consisting of not less than five members appointed by the Governor, were empowered to make rules and regulations for the guidance of teachers and pupils, to appoint, with the approval of the Governor, suitable persons as teachers, and to have the general oversight of all school matters. The location of these schools was fixed by statute. When this Act was first passed its duration was limited to four years, but in 1808 it was made permanent. In 1819 it was amended, and three additional schools established, provision being made at the same time for the free education of a limited number of poor but worthy children, and for the holding of public examinations annually. On the 12th of July, 1819, an Act was passed establishing a Public School in the District of Gore. This school was opened in 1820 in the village of Hamilton, then seven years old. Stephen Randall was the first teacher, a clever, scholarly man, educated by the Bishop of Quebec. Dr. Rae, John Law, James Cahill and Patrick Thornton also taught, and so far as I can learn, followed in the order named. Two more schools were established in 1823, and in 1837 the school in Vittoria was removed to the present city of London. In 1839 the name was changed from Public to Grammar Schools, the principle of local municipal grants introduced, and a permanent endowment of 250,000 acres of crown lands was made. With these changes and amendments the Act of 1807 remained in force until it was superseded by the Grammar School Act of 1853, which brought these schools more directly under the control of the Education Department. By this Act candidates for the position of head master, other than University graduates, were required to pass an examination to test their fitness for this work, Inspectors were appointed, and in 1858 a Model Grammar School was opened in Toronto for the professional training of teachers. This school was closed in 1863, with the expectation that Upper Canada College would give a good classical and commercial education to its students, and at the same time afford ample facilities for this professional training. This latter hope was never realized, and in 1885 certain Collegiate Institutes were set apart as training schools for instruction in the theory of education and the practice of teaching. Additional legislation, which greatly promoted the efficiency of the Grammar Schools and added to their usefulness, was obtained in 1866, but not without a hard struggle on the part of the promoters. By the Act of 1871 the name was changed to that of High School, and a superior order of classical schools established under the title of Collegiate Institutes. Shortly after these changes had taken place an additional Inspector was appointed, uniform Entrance Examinations instituted, and the principle of "payment by results" adopted. To apply this principle practically some test was necessary. This test was found in the "Intermediate" Examination, which provoked something more than a spirited and generous rivalry among the head masters. The principle of payment by results has wisely been abandoned and the more equitable one based upon the salaries, the equipment, and the average attendance, substituted therefor. The Intermediate has been merged into the non-professional examination of teachers, and more recently into that of matriculation to our Universities. These secondary schools occupy an honorable place in our educational system, and are worthy the most cordial and hearty support of our people. Whether we look at the buildings and equipments provided, the liberal course of study pursued, the quantity and quality of the work done, or the scholarship of those in whose charge they are placed, we feel that they are schools which any people might well be proud to possess, and we honor them accordingly.

In 1816, or nine years after the establishment of District Public Schools, an Act was passed, granting the sum of $24,000 annually, from the revenues of the Province, for the support of Common

Schools. This sum was apportioned among the different Districts into which the Province was divided on the basis of population. The machinery for the management of these schools was of the simplest form and consisted of a Board of Education for each District, composed of five persons appointed by the Governor, and of a Board of three Trustees who were elected annually, on the first day of June, by the supporters of the school. The conditions necessary to establish a Common School were,—that the inhabitants of any town, township, village or place should unite and provide a school-house, furnish twenty scholars, and guarantee a portion of the teacher's salary. These conditions being complied with, a grant not exceeding $100 was paid to the teacher from the money set apart by the Legislature for the support of Common Schools. This Act being an experimental one, was limited to four years' duration. In 1820, the Legislature reduced the annual grant to $10,000, ordered it to be divided equally among the Districts, and repealed the time limit. With these changes this Act formed the basis of the Common School system and remained in force until 1841, when it was superseded by the School Act of that year.

During the interval from 1820 to 1841 a number of special and temporary Acts were passed, some for the purpose of fixing the annual legislative grant, others to convey school sites from individuals to school trustees, while others were for the relief of teachers, who had suffered loss by the defalcations of some of the District treasurers. In all this time little or no progress was made in elementary education, except that the schools had increased in number. According to the testimony of leading public men, and of persons travelling through the Province, the condition of educational matters was simply deplorable. The schools were schools in name only, for to quote from a memorial presented to the Governor in 1835,—" The little instruction given to the children under the name of education has no influence over their morals, does nothing to open or expand their intellectual faculties, much less to direct them on their conduct through life. English reading imperfectly taught, something of writing, and the first five rules of arithmetic, which the teachers we employ are seldom able to explain, make up the meagre sum total of what the rising generation learn at our Common Schools."

Earnest efforts were put forth by a large number of people to advance the cause of popular education; petitions were presented to the Legislative Assembly, on the strength of which committees were appointed to consider the matter, and devise some means of relief, but all these efforts proved futile. The reasons for this failure are so forcibly and clearly stated in a memorial presented to the colonial office in 1832 that I cannot forbear giving you the following extract from it. The memorialists say: "The establishing of places of learning for the children of persons holding situations under the Local Government and a few other wealthy or influential individuals, at great public cost, but placed beyond the control of public opinion, and from which the sons of the yeomanry derive no benefit or advantage, while the exceedingly numerous and very reasonable petitions of that yeomanry for public support to the all important cause of general education throughout the colony are steadily resisted by persons in authority, in and out of the Assembly, and even declared to be unnecessary in the present state of the public finance, has the effect of preventing that steady increase of capable men, fit for jurors, for township and county officers, and for the halls of legislation, whose feelings and interests would be most closely united and identified with the welfare, the happiness, the general prosperity of their native country, and whose minds would (under a better order of things) become fitted for the correct transaction of the public business of the colony by previous observation, study and contemplation." One of the most important of these committees was that composed of Dr. Charles Duncombe and Messrs. T. D. Morrison and T. Bruce, who presented an elaborate report, and a carefully prepared Act in which a comprehensive scheme of popular education was laid before the Legislative Assembly. This met the fate of other reports, and it was not until the Union of 1840 was an accomplished fact that any attempt was made at School Legislation.

In 1841 an Act was passed providing for the establishment and maintenance of Common Schools, and by it an attempt was made to bring these schools under the provisions of the same law both in Upper and Lower Canada. This, however, proved a failure, for in 1843 it was repealed and two separate Acts passed, one for each of the Provinces. This Act, shortlived as it was, is deserving of more than a passing notice, since it indicated the strong current of public opinion that was setting in, favorable to a greatly enlarged measure of popular education. The principal provisions of this Act were the establishment of a permanent fund for the support of Common Schools, the appointment of a Chief Superintendent of Education, the introduction of the Separate School System, the utilizing of certain portions of the municipal machinery (such as it was at that time), for advancing the interests of these schools, and the formation of school districts. When this Act was under discussion in the Legislature, large numbers of petitions asking that the Bible be made a text book in the Common Schools, were presented to the House of Assembly. These had the effect of raising a strong opposition from the Catholic members, and the government of the day took the somewhat unusual course of submitting one of their own measures to a special committee of the House, to devise some means of harmonizing these conflicting interests. The result of this committee's work, was, that power was given in certain cases to establish separate schools. These provisions have been continued in successive Acts, until finally they were confirmed by the Confederation Act of 1867.

The School Act of 1843, in addition to the provisions contained in the Act of 1841, made the Provincial Secretary, ex-officio Chief Superintendent of Education, with power to appoint an assistant. It also gave authority to the District Councils to appoint County and Township Superintendents, and to establish County Model Schools for the gratuitous instruction of teachers.

In 1844 the Rev. Dr. Ryerson was appointed Chief Superintendent of Education, and in 1846 brought before the Legislature his first school bill, which provided for the appointment of a Provincial Board of Education, the establishment of a Normal School, the appointment of District Superintendents, and levying an equivalent to the legislative grant upon the different municipalities. This Act was found defective in regard to the management of schools in cities and towns, and therefore in 1847 a short act was passed remedying these defects. The next school legislation took place in 1849, when an Act was passed which caused Dr. Ryerson to tender his resignation to the government of the day. This, the Attorney General refused to accept, and took the somewhat unusual course of recommending the Governor to suspend the operations of this Act until such time as Dr. Ryerson could draft another, which from his knowledge and experience in these matters, would meet the educational wants of this Province. This was done accordingly and the School Act of 1850 became the law of the land. The provisions of this Act were so much more comprehensive in the matter of detail and so much broader in their scope than those of former Acts, that it was looked upon by not a few of the leading men of the times as being almost revolutionary in its tendencies. Among other things it defined clearly the manner of electing Trustees, and the duties and prerogatives of this office; fixed definitely the powers given to the various Municipal Corporations; provided for the appointment of Township Superintendents, and the formation of County Boards of Public Instruction; prescribed the duties of the Chief Superintendent, and the powers vested in his office; and made provisions for the establishment of the Council of Public Instruction to assist in the management of certain parts of the school system. Supplementary Acts were passed in 1852 and 1853, and the consolidation of these was completed in 1858, after which no important legislation took place until, in 1871, the principles of the Charter Act of 1850 were extended so as to meet the increased educational requirements of the time. By this Act, Township Superintendents were exchanged for County Inspectors, the providing of adequate accommodation was made imperative, a uniform standard of examination for all teachers was established, the right given to every child within certain ages to attend school, and contributions to the Superannuation Fund were made compulsory. When radical changes, similar to these, are made in any law, especially if these changes involve an increased expenditure of money, strong opposition to their enforcement is almost sure to follow. This was the case after the passage of the Acts of 1850 and 1871, but now that the good results of these laws are seen in the greatly improved state of the schools and premises, the people naturally feel proud of the progress made and uphold the laws which made these improvements possible. It required a firm hand and a strong consciousness of being in the right to withstand the pressure brought to bear to modify certain provisions of these laws, but Dr. Ryerson possessed the necessary firmness, and our educational interests were greatly benefited thereby.

Two important changes have been made in our school laws since 1871, the one caused by Dr. Ryerson resigning the office of Chief

Superintendent of Education, which led to the abolition of that office and the appointment of a Minister of Education, the other arose out of the necessity of having none but trained teachers placed in charge of our schools. The Normal Schools were unable to meet the demand thus created, and this led to the establishment of ounty Model Schools for the professional training of Public School Teachers. These changes have been productive of great good to our system, have strengthened its hold on public confidence, and have given us unequalled facilities for the education of the youth of our country.

From the brief sketch that I have been able to give of the various Acts that have been passed by the Legislature, from the earliest times to the present, and of the administration of these laws, it will readily be seen that the following principles are the outcome of that legislation, and form the basis of our present educational system. These, briefly stated, are :

1. That our Public Schools are Free Schools. This forms the chief corner-stone of our school system, and is the result, on the one hand, of an enlightened public opinion demanding that this principle shall be embodied in our statutes, and on the other, of that intelligent legislation that yielded to this reasonable demand, and made it the law of the land.

2. That adequate accommodation and properly qualified teachers are provided for every child. This follows as a natural sequence, for if the schools are free to all, then they should be placed so that they are accessible to all. These two principles embody the idea that the property of the country is responsible for the education of the youth of the country, since the value of the property is greatly enhanced by the diffusion of education among the masses, and conversely, the prevalence of illiteracy depreciates the value of property.

3. That every child has the right to an education such as will fit him for the duties of citizenship. This is a necessary complement of of our system of responsible government, for if the people are to pass judgment upon the acts of their representatives in parliament, or take part in the government of the country through our municipal system, or assist in the administration of justice through our local courts, it follows that they must be educated sufficiently well to exercise the rights of franchise, and discharge the duties of a citizen in an intelligent manner.

4. *That every teacher is specially trained for the duties of his profession* This is simply the natural outcome of the three principles already mentioned, for if the money expended in providing accommodation and furnishing the means necessary for the proper education of the children of the country be wisely spent, it follows that the education received should be of the most suitable kind, and none but trained teachers can do this work satisfactorily and with the best results.

5. *That the general oversight of the Schools is placed in the hands of thoroughly trained and experienced teachers.* Like the preceding principle, this follows as a natural sequence, for the work done, even by trained teachers, requires thorough and systematic revision to ensure the vitality and efficiency of the schools, and to give a guarantee to the public that the work, both in regard to quantity and quality, shall be properly done.

6. *That the examination of teachers, the courses of study pursued, and the general direction of certain portions of the educational machinery is placed in the hands of teachers of distinguished merit and special fitness for the work.* This principle raises our profession to a higher level, and causes it to command the respect of the people at large, for none are so capable of judging of the fitness of men for certain positions, and the discharge of the duties connected therewith, as those who are intimately acquainted with the work. Therefore, it must be apparent that the principle is a sound one, and an additional guarantee that the members of the teaching profession are properly prepared for their work.

7. *That the entire system is placed under the guidance and management of a Minister of Education, who by virtue of his office holds a seat in the Government, and therefore under our Constitution must represent a constituency in this Province* This is the last principle I shall name, and it forms a fitting completion to the series already enunciated. To every well-wisher of our system it must be apparent that the head of the Education Department should have a seat in the Government; because (1) the educational interests of the country are equal, if not greater, in importance than those of any other department; (2) the schools should be managed in the interests of the people, and therefore their representatives should have among them some person competent to give full information con-

cerning all matters pertaining thereto; (3) the large sums of money granted for educational purposes should be under the control of a Minister of the Crown, who, in turn, is responsible to the people's representatives; (4) as the greater part of the management of our educational affairs is in the hands of, or largely influenced by, the teaching profession, and the people furnish large sums of money in support thereof, what is more fitting, and more in accordance with right and justice, than that the connecting link between the two should be at the head of the Education Department, and at the same time occupy a seat in the Government commensurate in importance with the interests he represents.

This may not be an ideal system, but it approaches as nearly to it as any that has come within the range of my knowledge. The principles which underlie it must commend themselves to every well-wisher of popular education, for they are based upon truth and justice. That phase of education embraced in the term "religious instruction" (a vague and indefinite phrase), in my humble judgment, does not come within the limits of legislative enactments, but belongs to the home and to the Church. Christian education is one of the prerogatives of every true teacher; for, by his walk, his conversation and his daily life, he teaches lessons of greater importance and more lasting value than any lessons he teaches in the prescribed course of study. Teachers may do much in this respect, but it must be left in their hands to seize the opportunities as they present themselves, and impress on the minds of their pupils the great truths of the Christian religion.

We have glanced at the rise and progress of an educational system whose cradle was the log school house of the hardy pioneer, whose infancy was spent in the midst of that political and sectarian turmoil which culminated in the Mackenzie rebellion, and whose youth was nurtured and cared for by the judicious and far-seeing intelligence of that thoughtful educational statesman, Dr. Ryerson, until it developed into early manhood and received an honored place in the highest councils of the nation. That place it holds to-day. In the person of a member of our own profession, into whose hands its destinies have been placed, it is opening up wider fields of usefulness, freeing itself from encumbrances that have been left as legacies of the past, and girdling itself to meet the demands of that renewed intellectual life that is advancing upon us with all the force generated by the greatly increased mental vigor of the coming generation, the sound of whose footsteps is already heard along the corridors of our educational institutions. We have this system as a part of our heritage, and a noble one it is, for in its scope it reaches down to the undeveloped intellect of the infant in the kindergarten, leading him by gentle steps along the pathway of knowledge for which his soul thirsts, opening up as he advances in years the secrets that lie hidden at the very threshold of learning, and as he grows stronger feeding him from the vast stores of the past until in the full strength of manhood he goes forth to grapple with the great problems of life.

REPORT OF THE BIOLOGICAL SECTION.

Read at the Annual Meeting, May 7th, 1896.

The Biological Section have held regular monthly meetings during the past winter at which we had a fair attendance and pleasant intercourse on subjects of interest to the section.

Our chairman has undertaken the listing of all wild plants found in this district. Of this we shall hear more later.

At one of our meetings Mr. Alexander read a paper on the subject, "Why should we study Biology."

Although this was the only original paper read during the season, our meetings have been full of interest and instruction.

The opening up of the T. H. and B. Railway will make localities formerly distant easier of approach for botanical research.

We start the summer with good intentions to make large additions to the Herbarium and to the other branches of the Museum.

All of which is respectfully submitted.

J. M. Dickson,
Chairman.

H. S. Moore,
Secretary.

BIOLOGICAL NOTES.

Read before the Hamilton Association, February 6th, 1896.

BY WM. YATES, HATCHLEY, ONT.

The musk-rat seems to be in several respects a diminutive edition of the beaver, though not quite so communistic. In many places they are known to build huts of coarse sedge grass, which are situated at some distance from the banks of shallow streams: but these animals show considerable adaptability in choice of residence; for where the stream is characterized by high loamy shores the musk-rat shows a preference for excavations whose ingress and egress is mainly below the usual water level of the stream, and when a watercourse is of the size and permanence as regards non-liability to dry up in summer season, the rodents often increase in numbers to such an extent as to commit considerable depredations upon such farm crops as grow in the vicinity.

Many of our neighbors have made complaint of the damage to corn fields, both in the stage of early cereal growth and also when the forming ears are in a sweet and succulent state. Field carrots also suffer from their ravages, and full-grown musk-rats are frequently seen swimming the creeks, on the way to their rendezvous, carrying huge mouthfuls of green clover stalks in the succulent state of blossom. They also visit the apple orchards when the ripe fallen fruit abounds, and have been known to visit barns where heaps of sweet apples had been temporarily stored. The hunters declare that the musk-rat burrows are generally too deep and too much ramified for successful raiding by the digging out process, and trapping or shooting are the most general appliances for capture.

In one of our recent abnormally dry autumns, when the water in the channel of our local creek had dried up, except in a very few of the deepest parts of the channels, and near to this limited area of water supply there seemed to be a concentration of musk-rat population in the holes in the bank. Some industrious spade work was therefore resorted to, and this, supplemented by canineefforts, resulted in the capture of eleven musk-rats and one mink—the latter seeming, for the moment at least, not on unfriendly terms with his semi-aquatic associates. Great numbers are annually captured for the sake of the skins, and yet the musk-rat population seems to remain undiminished; and these rodents hold their own status better than most of the original quadrupeds that cultivation and the clearing of forests have thinned off.

The Canadian otter, too, was once a common inhabitant of our creeks and large rivulets, and some of the settlers remember the time when the splash of the otter as he jumped off the edge of the plank bridges into the water at road crossings was a quite common incident, and *otter slides*, or runs, down the steep banks of streams were common phenomena during the deep snows of winter. The last otter capture that we have heard any report of in this locality was made by an acquaintance of the writer in May, 1863. With the drainage progress of the country, and consequent disappearance of the supply of fish, otter existence has become an impossibility.

The musk-rat does not seem to possess the robust burrowing power of the groundhog, but prefers to domicile itself in the loose earth near bridge embankments, and its subterranean operations are frequently the cause of the giving way of mill-dams in flood-time, also the culverts on railways are often rendered insecure by the musk-rat excavations in proximity to the timber or masonwork, and they are hated pests to railway section men and hydrographic engineers.

In the vicinity of a wooden bridge that crosses a stream near this place, it is an entertaining sight to watch the playfulness and gambols in the shallow water of a family group of juvenile musk-rats towards the end of the month of June. Their romping and sport is as rollicking as that of kittens or puppies in warm sunshine, but on the approach of an intruder an instant retreat to their semi-aquatic refuge is accomplished. The roots of the cat-tailed sedge, and also those of the pond lilies are relished by these rodents and are frequently stored in their hybernaculum for winter use. On one occasion last summer a large hawk had noticed the "water polo like" amusements of the rodent family party alluded to above, and made a dash into the edge of the stream to secure a victim, but disturbed perhaps by our sudden approach through an opening among the trees, Mr. Falco was foiled in his aim and darted away in very evident chagrin at his luckless fiasco.

The grace and ease of the musk-rat's underwater movements are admirable! Even in April when the waters are cold from the recently melted ice of winter, we have noticed them rapidly progressing along the bottom of streams containing one or two feet depth of water, and occasionally stopping in their course to take a nibble at the submerged succulent roots of the plants mentioned above. Their semi-webbed feet and scaly-vertically flattened tail and their coat of dense moisture-resisting fur, enables them to find evident enjoyment in the plane of life in which Providence has placed them.

The musk-rat is believed to produce young but once a year, and as many as eight have been known to have been given birth to at one litter. The female frequently has a habit of going away from the family rendezvous just before the time of parturition, and making a new nest near by under a big heap of logs or in a rocky hollow, to give birth to her progeny in as much seclusion as is attainable. This instinct of sequestration is supposed to give security against the non-too-affectionately inclined propensities of the old males of the species towards the younger fry, whom they with farsighted malignity seem to regard as embryo rivals and competitors.

A number of instances are on record in this vicinity where about the beginning of May the female pregnant musk-rat has been met with, in the hour of darkness, on such a quest; and they are very irritable and pugnacious at such a juncture, and bravely attack large quadrupeds, such as colts or young bovines that happen to cross their path, when on this errand of concealment intent.

Like the spaniel dog, the musk-rat on leaving the watery element after a swimming or diving excursion is prone to give itself a thorough and vigorous shaking, and can then enter its cosy resting place in warmth and comfort.

RAPTORES.

As in several previous years large hawks have been seen during the month of December just passed. On last Christmas day (the weather being mild) my son, who, with his small terrier dog, was walking along the highway opposite to a piece of woods, a large hawk was seen on the roadway struggling with a full grown ruffed grouse, which had apparently just been stricken with the hawk's talons when in rapid flight across the clearing. The hawk was soon driven from its prey by the hostile demonstrations of man and dog, and took immediate flight to the high branch of a neighboring tree, but its victim the grouse had received mortal injuries, and died immediately afterwards in the hands of the human interrupters of the fray.

This incident suggested the reading of the old time legends of the art of falconry, and exemplified the wonderful velocity of flight of the hawk species. Although the grouse family are endowed with great muscular power of wing when pursued by the large hawks, they have little or no chance of escape in the clearing; for in a straight unimpeded flight the falcon is sure of his prey, and the only chance of the fugitive is in twists and angular progress among branches or boughs. No accurate idea of the hawk's wing power can be formed from watching the bird's flight when circling aloft in its pride and recreation near the clouds in spring time. Their speed of motion when about to seize their prey must be seen to be realized, the very air hums with vibration when they swoop down in a diabolic curve on the object that they wish to appropriate, and every nerve and sinew, and plume and quill, is strained to the most desperate tension, and failure is almost out of the range of possibility.

These non-migrating hawks prowl about the bush haunts of the ruffed grouse, and live well where the latter are numerous; for they have, when the snow is not deep, to search on the ground for food in the open beech or maple forests, where their capture by the hawk is easily accomplished; but when the snows become deep, and the grouse have to depend for food supply upon the buds of the aromatic birch-shrub, and a precarious assortment of bush-berries, the thickets are a protection from the assaults of their powerful winged enemies. Such is the dread of the ruffed grouse of the falcon tribe that quite a number of instances have been reported of the grouses flying into houses, or into the open doors of barns (where men have been working) in mortal fear when pursued by their fiendish foes.

Not very long ago one of these December or winter-lagging hawks swooped down in the poultry yard of the writer and struck its talons into the body of a fine guinea hen. We, who witnessed the "coup"—cudgel in hand—took part in the fracas, and only after some wild and random striking and pursuing, and sensational shrieking on our part, was the sanguinary aggressor driven away.

It may serve to give an idea of the velocity of the flight of birds of prey, when swooping at an object, to mention an incident that occurred several summers ago, in the garden of one of our neighbors. A number of half grown tame ducks were wandering among the vegetables, among which rank weeds had been growing, but some of which had been mown down with a scythe a day or two before the date of our incident. A large hawk was seen suddenly to strike down at one of the ducklings, but striking its breast against one of the prostrate stems of the big weeds, was firmly impaled thereby, and notwithstanding its violent struggles was soon captured, when the force of the impact was found to have driven the bayonet-like weed stem lengthwise through the abdomen of the bird, and protruding some distance beyond the caudal extremity of the body. The swoop of the shrike is equally impetuous in its less powerful sphere, for a number of instances have occurred within one's ken in this district where cage birds have been struck at, but where the aggressor was killed or stunned in the onset by intervening cage wires, or by window panes. A curious instance of the capture of the cunning crow who formed one of a group of ornithic marauders that lately trespassed in a field of ripening corn two and half miles distant from here. On the crows being suddenly interrupted by the farmer, one bird in his precipitancy got his feet firmly entangled in the meshes of the twine-like stems of the wild bind-weed (convolvulous arvensis), or polygonum sagittalum, and was clubbed to death as the penalty of his freebooting activity, or else of his clumsiness.

The flocks of snow buntings have been more frequent visitors and also more numerous this winter than is usual about here. One individual of this species was shot by an acquaintance a short time ago, and the body of the bird was found to be almost a perfect mass of fat. These birds were reported of about here in the month of November last, and are now seen on the fields around Hatchley almost every day. One flock seen yesterday was estimated to consist of scarcely less than a thousand individual birds. And what a beautiful ornament do these gracefully moving objects lend to the wintry landscape! It is always by their presence "touched off" with magnificence. They seem a perfectly integral part of the appointments of the snowy expanse. Their movements, too, seem rhymically ordered, and at certain bends in their flying evolutions around the fields, twinkling musical "calls" are uttered, seemingly as aids to conformity of the regulations, and to preserve the unity of organization in the vast multitude. There are some very weedy fields about here, and the snow-birds revel from hour to hour among the tall seed-laden dried stems of various species of cheopodiacean and compositæ that human negligence has permitted to intrude in our cultivated areas.

A neighbor, who keeps a large flock of geese, informs me that occasionally, when the latter are swimming on the waters of the large creek which meanders through his farm, a musk-rat will appear near, swimming rapidly on its way to its rendezvous burrow in the adjoining banks, and the geese seem to be aware that the intruder on their demesne is no carnivora, but merely requires "a right of way," and the geese show no terror or alarm, and but little mistrust at the big rodent's proximity; but should that semi-aquatic feline, the mink, invade the precincts, there is much noisy protest and trepidation manifested, for the mink is in bad odor with the whole feathered tribe, both on land and water.

The aroma that accompanies the musk-rat seems to have been intended as a protective influence, and appears to be somewhat under the control of the quadruped as to its diffusion and volatability; for when these rodents are suddenly disturbed or interfered with, when on land, and especially when they are in a combative mood, the scent spreads around with extra vigor, and the rodents are said "to throw their musk" in a defensive way, similar to the ruse of their unnamable cotemporary of the sable and white streakings.

Another observer, whom one could name, states that the musk-rats appropriate quantities of his growing wheat crop when the grain is in the succulent or milky stage of ripening, and he sometimes shoots them as they are retreating from the field and carrying off large mouthfuls of the straw and grain to their subterranean dwelling places in the creek banks. And near to the farm of the individual just alluded to, there is a large barn situated at the edge of an apple orchard, the owner of which made complaints that "rats" were "gnawing" his bins and granary partitions in an unusually destructive manner, and a very energetic terrier dog was procured and placed on the scent of the depredators, with the result that a large musk-rat was dug out from its cosy retreat in the middle of the haymow, and it was supposed that a quantity of apples that had been temporarily stored in the building was the attraction that had tempted the abnormal guest to his destruction.

A number of years ago the pelt and fur of the mink had a much higher trade value than is the case at present, and some of our neighbors devoted much time and effort in the winter time to the trapping business as was avowed with good paying results, and at the same time poultry enemies were gotten rid of. A neighbor, whose flock of ducklings was nightly or daily diminishing, kept close watch one day from an ambush place at the edge of the duck pond, and soon saw the mink enemy swimming rapidly in rear of the retreating and quacking mother-duck and her numerous progeny of two weeks old. As the black enemy had approached almost to within springing distance, the old duck dived, but the little ones exerted all their powers of foot and winglets on the watery surface, and but for a bullet from the poultryman's rifle, which ended the mink's career, the waterfowl's family would soon have been one or two less in number.

With the hero of the above adventure we were well acquainted, and we had entire faith in his truthfulness, and may now transcribe another of his narrations.

One warm spring day, whilst roaming in his own woodland territory, his dog began to bark and gnaw at the partly upturned roots of a tamarac tree in the swamp, under which further search disclosed the cosy nest of a mink containing eight young ones seemingly less than two weeks old. The mother mink was near by, watching the fate of her little ones from a safe recess in a hollow stump. Our acquaintance at once removed most of the nest material and the eight young minks, and placed the same in a large box in an outhouse adjoining the kitchen of his house and which was 200 or 300 paces distant from the spot where the mink nest was first found. Over the box he placed as a cover several loose pieces of board. His intention was to try to rear the young minks in the manner of kittens, which he believed could be accomplished "by hand," as he expressed the idea. But during the first night of their incarceration the parent mink made a visit or visits to the shed and succeeded in pushing one of the pieces of board covering aside and in removing the entire group of her young to a locality more congenial to the original idea of mink destiny. The man was convinced of the truth of this explanation of the vacancy by the tracks visible in the sawdust by which the floor of the woodshed was bestrewn, and also, he said, he had been disturbed in the night by the continual barking and restlessness of his dog, who was confined by a secure chain in a kennel about seven or eight paces from the scene of the mother mink's affectionate operations.

The minks are mostly nocturnal in their movements, and in their mating season, late in February or early in March, have been traced on newly fallen snow four or five miles in a single night. They seem to have the faculty of being able to remain under water for one or two minutes at a time, and when hotly chased will dive under icy surfaces to reappear at almost incredible distances from the point of vanishment. Like the musk-rat, the mink has favorite retreats in rear of the timbers of bridges and culverts, and in such dens and cavities scores of frogs' bodies are sometimes found that the mink family circle had stored for winter supply.

One day last summer, whilst engaged hoeing corn, a fresh mink track made during the night previous was noticed by a friend of the writer of this, and a little scrutiny revealed the fact that Mr. Mink had come from its home in the nearby woods to visit a well that was daily made use of for the purpose of supplying water to farm stock. The well was enclosed by a framework of boards two feet high, and the water level was three or four feet below the surface of the ground. The mink had apparently made this surreptitious visit to capture a good sized batrachian, who for a number of weeks previously had had its contented home in the well, and which after this proven visit of its natural enemy was no more seen of human eyes. The mud puddles about the well, and water splashes on the boards gave indubitable proof of the mink's proceedings, and the missing frog—it would perhaps be a "bull" to term an object lesson.

Once when performing statute labor on a new piece of road through a swamp, we nearly stumbled on the nest of a ruffed grouse containing twelve or thirteen eggs on which the old bird had been incubating. Several days afterward we visited the spot to notice proceedings, when lo! nest and eggs had been destroyed, and we were informed by a bystander, who had been working near, that he had seen and chased a mink running away with a ruffed grouse in its jaws. He said the bird looked so big, and its captor so small, that the incident made him think of a cow carrying a haystack away on its head and horns.

(A line or two by way of addenda to the few remarks about "the Canadian otter" in the last communication.)

Nearly fifty years ago it was a common incident to find the end surface of the planks of the bridges of our roadways every morning besoiled by the dejecta of the otter. These dejecta were mainly composed of the bones of the sunfish and similar small denizens of the inland streams of that period. [We, in common with every traveller at that period, have seen many of those heaps of excrement on the road bridges' edge, and on enquiry were invariably assured that they were the focacal matter of the otter.] The otters seem to have had a habit of sitting on the edge of the bridges, and springing therefrom at fish appearing on the surface of the water. A number of people, on whose word we place full confidence, asserted that they had many times, on moonlight nights, seen the otters plunge in the water on the approach of man or team on these occasions. We, ourselves, remember seeing what were termed "otter slides," down the snow-covered slanting banks of the creeks about the same period. These "slides" resembled tracks that might be made by drawing a small round log through the deep snow, and there were generally spots near where the swiftness of the current had prevented the streams freezing entirely over.

It was a tradition among hunters that there were but few dogs bold enough to attack the otter, who, it was averred, had a double row of grinder teeth, and could use them with murderous power on his canine or other assailants.

NOTE.—The visits of the large flocks of snow buntings have of late been less frequent than was the case a month ago. Last Friday (24th instant), when the thaw and sleet storm was raging, or at its height, a large flock of the birds fluttered and hovered about our fields for an hour or more, occasionally alighting at the edge of some of the flooded depressions in the arable surface, as if for the purpose of drinking, but on closer observation seeds of various* species of grass and weeds were noticeable, floating like a sort of scum on the margin of the little pools. These seeds, which the buntings go in quest of, were undoubtedly the objects that attracted the birds here on the occasion referred to.

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* The seeds of panicum crus galli, setaria glauca, chenopodium album, and of plantago major, are, on dissection, sometimes found in the c·op of these birds.

WAYSIDE NOTES.

Read before the Hamilton Association, May 7th, 1896,

BY WM. YATES HATCHLEY, ONT.

On travelling northward from Toronto, the undulations of the land frequently afford extensive views from the railroad car windows, and the soil is seen to yield good crops, and fruit orchards are a prominent feature of the landscape, and the frequent stoppages of the train at numerous towns and villages, and throngs of well-dressed passengers that get on or off the train indicate a general state of contentment and prosperity.

There is a continually ascending grade until Lake Simcoe becomes visible, and even onwards until the towns of Allandale and Barrie have been passed, then, a few miles northward from the latter place, the small streams that the railway crosses may be seen to have their currents directed towards Georgian Bay, on Lake Huron. Soon after passing New Lowell station, on the Meaford branch line, high and continuous ranges of dark-tinted hills may be seen both to the right hand and to the left looming up at a distance of several miles. On the western side of the right hand acclivity runs meanderingly northward of the Nottawasaga river to its debouchure in Lake Huron, where the coast has a large semi-circular trend and a picturesque beach whose crescent line is margined with a light forest growth of cedar, etc., for a sweep of nine or ten miles.

The above mentioned ranges of hills are continuous through the county of North Simcoe for a number of miles, and enclose the wide valley of the Nottawasaga creek, and other small affluents. And as we travel along the road that leaves the lake beach and go southward towards Barrie, a number of low escarpments are observable, which seems a strong indication that the waters of the Georgian Bay were at some by-gone period at a much higher level than is the case at present. There is a wide extent of flat country forming a large portion of Sunnidale township and a part of the township of Nottawasaga, which seems to have been inundated at some former period, and lofty dark looking hills, which bound the landscape at a distance of several miles on either hand, seem to have once formed the shores of a watery expanse. Sunnidale township has a generally flat appearance, as level in fact as Burford Plains, in the county of Brant, and in the area of two concessions of Sunnidale extensive deposits of shell-marl exist; and in these localities immense numbers of small lacustrine shells may be gathered among the material excavated from the roadside ditches. These shells are longish spiral in form, and are, like the marl in which they are imbedded, of a light grey or whitish color, and seem identical with similar shells which now bestrew the water's edge all along the Nottawasaga beach; and the slowly retreating waters of the Nottawasaga stream have formed vast swamps of some hundreds of acres in extent near the foot of the hills of Vespra township, a few miles from where the said stream debouches into the Georgian Bay.

Some well diggers in Sunnidale township made use of the expression in our hearing, "This is all made land;" and related that in the labors of their vocation trunks of large trees—still very slightly decayed—were very frequently met with at a depth of twelve to fourteen feet from the earth's surface.

The waters of Georgian Bay, when agitated by violent northerly winds, and especially when encumbered by floating ice-masses in spring, during past centuries seem to have made great inroads in the coast line. Bluffs seem to have been battered down, and the soluble material carried out by the roily waters, and deposited at some greater or less distance from the shore, whilst the heterogenous boulders are thickly stranded and in great variety as to size and composition, protrude above the surface of the shallow waters of the gradually shelving shore.

Similar action of the elements has been, and is yet, going on along the northern shore of Lake Erie. (The truth of this observation become very palpable and conspicuous to an observer who lately visited the latter locality after an absence from the well remembered scenes of about forty years.

As we trace the Georgian Bay shore in an easterly or north-easterly direction from the town of Collingwood, low ridges of coarse gravel upon which a scrubby thicket of deciduous trees and shrubs seems struggling to establish itself; said ridges are in some places quarter to half a mile in width intervening between the water's edge and the true lake shore, on which a mixed growth of conifers and of hardwood forest still exists. But as we leisurely passed along seated in the carryall no striking botanical or orinthological novelties were observed. Doubtless, so late in September (17th), a majority of the feathered songsters had migrated southward, but the goldfinch or Canadian yellow-bird was still abundantly in evidence, also the brilliant tinted bluejay and two or three of the commoner species of woodpecker.

As to shrubby vegetation, the stag horn sumach (Rhus. typhina) was very widely diffused among the willow scrub, also the Labrador tea (Ledum latifolium) and two species of Potentilla, to wit., P. Norvegica and P. fruticosum, were seen in a number of spots on swampy margins, also the tall Jerusalem artichoke was occasionally seen still sporting its flowers (but may have escaped from cultivation).

The pest of Canada thistles, from some unexplained cause, seemed much less troublesome, either in cultivated grounds or on the margin of the highways, than is the case in Brant or Oxford counties.

Farm crops in the Collingwood region were at least two weeks later in ripening, but yielded an abundant harvest in 1895. At the time of our visit, a number of fields of oats and peas were uncut and generally presented a luxuriant appearance. And the winter wheat crop, which had been already threshed, was commonly spoken of as an exceptionally heavy yield. Fruit returns were also quite favorably reported of, and apple and plum orchards were said to have been prosperous, at any rate within a few miles of the modifying influence on temperature of the waters of Lake Huron and Simcoe.

Yet, one troublesome weed that was complained of as causing loss and trouble to the oat and barley cultivators was seemingly Amaranthus hybridus. The September asters were in flower in profusion about the bog margins, but neither they or the Solidagos or yet the sedges presented any marked differences to a casual observer. to the species of the same genera that are so common in south-western Ontario.

In travelling from New Lowell towards the west, a rough broken piny region several miles in width, and in many of its features resembling the country around Otterville, in South Oxford, is passed through, but much more fertile land, and also more hilly, is travelled over as you approach the thriving railroad village of Creemore, which village consists mostly of excellent brick stores, churches and dwellings, and in picturesqueness of situation and environment reminded one of the village of Elora, in the County of Wellington. Creemore is situated at the foot of the Blue Nottawasaga hills, which here have a steep rise of several hundred feet, but whose sides are alluvial and fertile. From Creemore to Avening, two or three miles north-eastward, the country is undulating and well cultivated, and at the latter place an individual was interviewed who is of local notoriety as a cultivator of the honey-bee, and who bore the appropriate name of Honeywood. This individual, who seemed in quite comfortable worldly circumstances, informed us that his bees had scarcely come up this season to the average yield of honey, and out of the hundred colonies in his possession not a single successful swarm had come off during the summer of 1895, which was characterized by a number of unusual traits as to temperature and scantiness of rainfall.

During the hour of our evening's detention at Avening we heard several rifle cracks in an adjoining piece of woods, and presently two young men emerged one of whom was carrying the bodies of three ruffed grouse in his left hand.

REPORT OF THE GEOLOGICAL SECTION OF THE HAMILTON ASSOCIATION FOR THE YEAR ENDING MAY 7TH, 1896.

The section, in submitting this their annual report, desire to state that steady progress has been made in advancing the interests of the section.

That the few members who have met from year to year and carried on the work, have reason to be proud of the position to which the section has attained among sister societies who make geological work their aim and study. Last year we referred to the subject of fossil sponges of the Niagara formation, and alluded to it as being the means of drawing the attention of scientific men to the almost inexhaustible stores of this particular fauna, and that the section was credited with three new genera and seven new species, with a probability that these numbers would be increased as the work of examining the specimens proceeded. This year, through the persistent efforts of Col. C. C. Grant, the section has again been brought into prominence. The very large number and variety of the graptolites obtained from the Niagara rocks at Hamilton have attracted the attention of eminent scholars, among whom is Prof. R. Gurley, of Washington, D. C., who is busy preparing a work on the Graptolites of North America, and who has from time to time asked that specimens be sent to him so that the work will contain as complete a list as possible, properly illustrated and described, of the fossil graptolites of North America. Col. Grant has sent a very large number to Prof. R. Gurley during the past year, and we doubt not that this locality will be well represented in the work.

There is yet another source from which the section can wiew with some satisfaction the appreciation by outsiders of the result of our patient endeavors to keep our section before the world as an institution worthy of the Hamilton Association. This new avenue is the result of a personal visit to our museum of Prof. Schuchert, of the Washington Museum, D. C., who has now under preparation a work on the North American fossil star fishes, and asks the loan of such specimens as we have in our collection.

A request has also been made by one of the geological staff at Ottawa (Mr. Ami) to send him the printed proceedings of the Hamilton Association, particularly those numbers which contain papers on geological subjects, because he is engaged writing a bibliographical work on the paleontology of Canada, and wishes to include the names of the authors of papers on geology and subjects treated in them.

During the year just ended there have been many specimens added to the museum, particularly from the Niagara and Clinton formations at Hamilton.

A very liberal donation of miocene fossils from the museum at Washington, D. C., has been added to our collections, obtained through the influence of Col. C. C. Grant.

The Chairman, Mr. A. E. Walker, has presented to the section a carefully prepared profile drawing of the cutting on Hunter street, extending from Park street to Queen street. It shows the various strata throughout, and indicates points where animal and vegetable deposits were found.

Papers of geological interest were read at all our meetings, and it is a matter of regret that more of the members do not avail themselves of the opportunity to attend these meetings and take part in the proceedings.

Following are the dates of meeting and the subjects of papers read:

Nov. 22nd, 1895, Geological Notes on the Grimsby Ravine. Col. C. C. Grant.

Jan. 24th, 1896, Geological structure, as represented by the tunnel on Hunter street between Park and Queen streets, by A. E. Walker, Chairman.

Feb. 28th, 1896, Answer to Geological Critics. Col. C. C. Grant.

March 28th, 1896, Notes regarding our local Graptolite. Col. C. C. Grant.

April 24th, 1896, Geological Notes on the Pipestone District, Manitoba, by Jas. A. Denoghy.

Respectfully submitted.

A. E. WALKER, *Chairman.*

A. T. NEILL, *Secretary.*

GEOLOGICAL NOTES.

Read before the Geological Section of the Hamilton Association, Nov. 22nd, 1896,

BY COL. C. C. GRANT.

The recent visit of Prof. Chas. Schuchert, Curator of the Paleontological Department, National Museum, Washington, U. S. A., author of an able paper on the "Classification of the Brachiopods," induces me to think that a short account of our proceedings here and at Grimsby may not prove altogether uninteresting to the geological section of the Hamilton Association. I was about to leave for Winona when I received Dr. Gurley's letter informing me the curator was proceeding on a collecting tour, and intended to pay Hamilton a visit. His arrival seemed so uncertain, I went on, leaving a few parcels for him containing what I considered some new species of Graptolites, and giving directions to let me know at once, if he called during my absence. I ascertained on my return he arrived the day before, got the fossils, and had gone to Toronto, but was to be back in a day or two. When he returned on Monday, I took him to "The Hamilton Museum," after we selected some specimens from my private collection. He passed a considerable time in examining our characteristic local fossils, the Clinton ones especially Arthroclema, an undescribed species, probably the colored Lingulæ, Dr. Jas. Hall's Posidonia, and the plants of the series.

On coming to the case containing the Niagara specimens, he recognized some of the Tennessee Sponges we obtained from Dr. Head, Chicago. He stated they are so numerous there, you may collect a bushel of them in a day. Sections of the Hamilton Sponges formerly were equally numerous, but the localities are limited and many thousands have since been taken away. I pointed out a few slabs from the Niagara Shale at Grimsby, and stated if he could spare time I thought he would find the quarries there highly interesting. The Shales possessed many well preserved Crinoids or Sea Lilies, and when I was stationed in camp there I succeeded in getting a good specimen of a Trilobite (Homalonotus delphinocephalus). This circumstance perhaps induced the professor to pay the locality a visit, and it was arranged to proceed there on the following morning. We fortunately found Mr. Walker at home when we called on him, and had an opportunity of examining his fine collection of Hexactimelid Sponges, aud beautifully prepared sections, together with the large number he recently received from Professor H. Rauf, of Germany.

In the afternoon we visited the corporation quarry, the field where the Chert-flint-flake fossils occur and the higher portion of the same containing sponges, sections. We succeeded in securing several Graptolites, Brachiopods, etc. Prof. Schuchert, on breaking up one of the globular lumps of Chert, laid bare a good section of a sponge, which under the magnifying glass displayed the internal structure, Spicules. I called particular attention to the upper green and Clinton iron bands so well displayed in rear of the upper reservoir, near Judge Robertson's, and pointed out some peculiarities in the Graptolite bed of the lower green band, by which it may be recognized elsewhere.

The general impression among local geologists was apparently that the Clinton series seemed to die out at Grimsby. The upper green band there, rich beyond conception in Dr. Jas. Hall's much debated Fucoid, Arthrophycus Harlani, rested on a red and mottled sandstone. It was represented and figured as a characteristic fossil of the Grey-band Medina Freestone. As the lower beds there are concealed by vegetation in the ravine, their non-existence was erroneously inferred, and while slabs of the concealed measures certainly put in an undoubted appearance in the bed of the brook itself, they were looked upon by myself and others as mere drift material derived from some adjacent locality in the Glacial Age, like the Hudson River rock occasionally noticed there in the bed of the stream.

While residing this past summer at Winona Park, about five miles from Grimsby, I availed myself of the opportunity it afforded me of making a closer investigation of the field geology of the district. Indeed the chief inducement was to ascertain how far the Niagara Chert beds extended, if at all, in that direction (easterly), likewise to correct hurried examinations made there while in command of the rifle practice companies of the 16th Bedfordshire regiment, detached from headquarters at Hamilton, Ontario. It was generally rather late in the day when the firing ceased, and occasionally I was compelled to prosecute my investigations there on a rainy day which the musketry inspector (with a first-class Hythe certificate) considered would be unwarrantable under the circumstances, viz., to expose soldiers unnecessarily to practical discomfort and utterly disgust them with what our own Canadian volunteers now excel in, rifle practice.

As regards the extension of our local Chert, there I found no indications of its existence. Dr. J. Pettit thinks it does not occur east of Stony Creek, and it is not certain that the beds reach the village itself. The new T. H. and B. railway comes out on the escarpment, I understand, a little beyond, and it may yet, perhaps, afford us a chance of furnishing some reliable data for forming an opinion on this vexed point.

In a former paper on "The Grimsby Excursion," published in the proceedings of 1892-93, you may remember I asserted our local Clinton iron band had quite a different aspect there, and was so changed that I hesitated to put forth a statement that the red and mottled sandstones there were the actual representatives of the Hamilton beds. While I doubted I could be mistaken after such a careful examination, I recognized that others probably might not be so readily satisfied by the bare assertion, unsupported by any additional evidence.

During the past summer, while residing on the lake shore (Winona Park), five miles from Grimsby, I paid several visits to the quarries, formerly worked by Mr. Gibson, and obtained the rock specimens now produced in proof that no mistake was made at the time. Even our colored Lingula band you can see is represented. Although the Brachiopods are in rather a fragmentary condition, the others display the alteration which occurs at a similar horizon. All three specimens are found inside fifty yards.

The object I had in view in calling Prof. Schuchert's particular attention to the two upper Clinton beds at the reservoir, near the Jolley Cut, was to enable him to compare them subsequently with the ones at Grimsby, so that he could form an independent opinion regarding this point. When we reached Grimsby, an old acquaintance informed me I would almost certainly find Prof. Schuchert with Dr. Johnston Pettit. (I missed the cars by five minutes, and concluded he had gone on by the train. I had to wait for the following one.) But it was only after repeatedly hammering on the rocks around me that I heard the three blows signal repeated behind and the lost Professor joined me, accompanied by an old friend, the Doctor, and after a brief consultation we set to work. In three or four hours we had collected about as many specimens as we could carry.

In the Niagara Shales at Grimsby, there are some thin limestone layers from half an inch to one and a half inches in thickness in which Bryozoons, Brachiopods, Corals, etc., are fairly preserved. The indurated shales also contain many specimens of Stephanocrinus Angulatus and plates of Caryocrinus are very common. We brought away with us some fine slabs of Hall's Fucoid, Arthrophycus Harlani. There are some magnificent specimens of this plant on large masses of white Clinton sandstone. Unfortunately, they are too heavy for removal by the pathway to the quarries. On pointing out a particularly fine weathered example, which Dr. Head said would be well worth \$50 if we could convey it to Chicago, the professor remarked laughingly "Well, say \$60 if we could only transport it to the Washington Museum." Below one of the first quarries opened and partly concealed by the bush, I have found since our visit others that are little inferior to the one in question, too heavy for removal.

We were sitting on a bank which the Doctor had raised many years ago to prevent the loose slate from sliding down into the ravine and which he removed from above, when he pointed out a particular spot from whence he obtained a fine head of a rare Crinoid (Lyreocrinas) formerly. While we were listening to the relation, Prof. Schuchert commenced to score the shale by his side with the sharp pick end of his hammer. To our surprise he managed to bring up to the surface a remarkably fine specimen similar to the one mentioned by the Doctor, who had a little time before obtained for us another Crinoid I do not recollect to have seen figured or described. However, Mr. Pettit recognized it, as well as the curator. Judging from plates and stems there are many Crinoids in the Niagara Shales at Grimsby. It weathers slowly, being protected by the cliff in rear.

We adjourned in the evening to Dr. Pettit's to see his beautiful collection of Niagara Starfishes, Crinoids, etc. A brittle Star, new species probably, attracted much attention, as well as the remarkably well preserved Crinoids he obtained from the Grimsby Niagara Shales. The Professor considered many much superior to the ones in the United States National Museum at Washington. Dr. Pettit intends to present the collection to the public school at Grimsby, if they provide him with a proper place for their display. I was glad to learn some young fellows there devoted a considerable portion of their spare time to collecting and to Natural History generally. There is nothing more neglected than the latter in the Provincial public schools, as the Doctor justly remarked.

On an earlier visit to the locality, I carried with me a claw-like implement with a short handle, which I understand is used by gardeners in planting seed. Imperfect as it is, it struck me as well adapted to rake up Crinoids hidden under soft surface shales, and on testing it I found it brought to view a small head of Caryocrinus and a few also of Stephanocrinus angulatus. It only requires the teeth a little longer, closer and about twice the breadth, so as to cover more ground, to make it one of the most useful articles the field geologist possesses for extracting specimens underlying the shales exposed on only the surface presented.

I think Professor Schuchert was not quite disappointed when on the following day, along the foot of the escarpment in an easterly direction, it was doubtful whether we were likely to get any of the large slabs from the lower Clinton band containing complete specimens of the Bathotriphus Fucoid. I think I removed every one years ago that I possibly could. However, I succeeded at last in extracting in situ one of the smaller slabs containing the well known indications near the surface edge. On taking it down, the Professor said, " I will stand by, while you split it." When, striking it a little nearer the centre than usual, it opened out disclosing seven well-preserved, colorless (white) Lingulellæ, and together with the casts on the opposite part that lucky blow of the hammer afforded us no less than fourteen Brachiopods, and the plant also put in an appearance on resplitting the upper half. In the Clinton iron band we found the only specimen known to me retaining both valves of Posidonia Alata (Hall). Single ones even are not common here, and as the Professor appeared unwilling, under the circumstances, to accept the only one I possessed, I was very much pleased with this particular find. Several other Brachiopods were also secured. We were fortunate enough to get a specimen from the upper blue building bed Niagara limestone of Pholodops Granti (Hall). They had none in the Washington Museum, and the author of "Classification of the Brachiopods" was particularly interested in it, because it appeared to be the sole survivor of a group which was about to disappear altogether—a relic of a former age.

The electric line to Grimsby offers us an opportunity of securing many interesting specimens of Niagara slabs for microscopical examination, independent of the chance afforded us of raking out of the shales a much prized Crinoid, or the rarest of fossils, a Silurian Star-fish. Dr. Pettit informs me he has noticed grooving and polishing on the sides of the hard rocks up the ravine. This would be of considerable importance if it can be clearly established. I hope to have an opportunity next year of accompanying him to the places indicated and bringing to the notice of this section the result of the investigation, Dr. Pettit is too cautious a man to be led into a mistaken view respecting a locality with which he is so thoroughly acquainted.

NOTES.

MAMMOTH BONES DISCOVERY—THE HUNTER STREET TUNNEL.

The recent discovery in the tunnel at Hunter street of some bones, fragments of the skeleton of a mammoth or mastodon, calls for a more permanent record than was afforded by a daily newspaper. Although occurring in Erie clay or till ($1\frac{1}{2}$ feet from the top) below the ancient Iroquois beach, it is possible the remains may have been deposited more recently than the clay. If mired in the sand and pebbles, which were subsequently cemented by lime filtration through the mass, the weight of the bones would probably sink them to where they were found. Yet the absence of the tusks, heavy leg bones, etc , is certainly noticeable.

An able paper by Dr. Spencer, F. G. S., "On the Birth of the Niagara River," conclusively establishes that 30,000 years have passed since "the Falls" commenced their recession. [This was also Sir Charles Lyell's rough estimate.] The river cuts through this Erie till, and we may, approximately, form an idea regarding the time when this was laid down. Elephants were not confined formerly to warm climates. The ones found in Siberia, like our Canadian ones, were furnished with a thick covering of long hair or wool to enable them to resist the cold. Some of our spiritual instructors appear to be ignorant regarding the fact when they allude to elephant remains scattered over the earth by "The Universal Deluge."

While Sir W. Logan and the officers of the Canadian Geological Survey have referred to "*Arthrophycus Harlani*" as occurring "at the top of the red portion (Medina beds) at St. Catharines," and in blue or greenish shales immediately above "*the grey band*" on the Welland canal at Thorold, I can find no record of its presence at Grimsby either in "the Geology of Canada" or "the Paleontology of Ontario, Nicholson." The fucoid occurs also at Hamilton, but in rather poor preservation. Grimsby appears to be the locality where it flourished and attained its chief development before the latest Clinton beds were submerged to prepare the way for the overlying "Niagara limestone deposit." The upper green band in which the plant occurs, plainly indicates a shallow sea, wave marks are frequently noticed. We must not loose sight of this circumstance. We possess to-day advantages unknown to "Field Geologists" of "the Canadian Survey," in former times, when quarries had not been opened up at Grimsby, and merely on a limited scale (very probably) in the immediate vicinity of this city. Do not imagine for a moment that "Silurian organic remains" (unknown to science) may no longer be discovered here. Every year something new turns up, even in the restricted district to which we are confined, by the Acts of a Canadian Legislature, which, through ignorance of of scientific pursuits, renders jesting by U. S. A. contemporaries allowable, unfortunately at our Dominion's expense.

DESCRIPTION OF THE RAILWAY CUTTING.

Read before the Geological Section of the Hamilton Association, Jan. 24th, 1896.

BY MR. A. E. WALKER.

Beginning at the base of the cutting, west we find three feet of blue till, covered by two feet of jointed clay, three feet of sand and concrete covered by ten feet of yellow brick clay ; this is covered by four feet of red sand and clay loam, where the red sand rests on the clay shows a damp water line. These strata increase in thickness as we reach Poulette street, where a great undisturbed mound of dark red Madina shales rises from the base of the cutting to about seven or eight feet to the surface, dipping more rapidly on the east, the blue till rests on the ragged edges of this mound on the east. The shale in this mound is dark red with bands of pale green shale intermixed, and about two feet from the base there is a layer of pale green shale about one foot thick. East of this mound, and resting on its edges, we have twelve feet of the blue till, covered by eight feet of yellowish clay, the lower part of this clay that rests on the till seems to be of much the same character, containing the same sub-angular pieces of stone, and appears to be an homogeneous clay, but as it nears the surface, or rather the red sandy loam that rests upon it, it becomes stratified clay, on this rests four feet of red sandy loam, being the surface soil.

This describes the cutting up to Locke street. The ten foot band of blue till continues east to Pearl street, but the yellow brick clay feathers out to Pearl street, and the overlaying red gravel and sand rests now, with the exception of a thin band of yellow clay, on the till. The formation is of the same character until you reach Ray street, at Ray street there were two strong springs of water coming out between the red sand and the blue till, the surface water sinks down and rests on the blue till, as this is impervious to water, whenever you reach this layer of sand resting on the till the water filtered into the cutting and caused trouble. The ground rises to considerable height between Ray and Queen streets, at this point the cutting is thirty-two feet, the upper twenty-two feet being coarse red gravel and boulders, a few Hudson river, but mostly of granite and Niagara limestones and sand stone, very much mixed, much larger than are found in the concrete, but well rounded. This formation runs to Hess street, but just before reaching Hess street we come across two more springs, and the material laying on the till is a coarse sand, causing the banks to give way, and from this to Caroline street is very sandy, in which are bands of large boulders, mostly of limestone and sandstone,—I found one or two from the Chert, and many kinds of granite and a few Hudson river boulders. As we approach Bay street these layers of boulders become more frequent above the sand that overlays the till, and before Bay street is reached they become concreted by the infusion of lime, and from here to Park street the whole depth had to be blasted. Between Bay and Park is evidently an old lake beach, a continuation of the Burlington Heights, which cross King, Main, Jackson and Hunter streets, crossing the cutting at an oblique angle at the Central School, and thence crossing James at Young and Robinson streets, reaching the mountain at Maclaren's. From Bay street it reaches the level at Charles street. This gives a general idea of the cutting. I will now make some general remarks about the lowest bed, the till.

This blue till is sometimes called Erie clay, but for what reason I do not know, as the glaciers appear to have come from the north-east, and I should judge that this clay was from the grinding down of the Trenton and Utica shales and the Hudson river rocks, as all the portions of stone found in this clay appear to come from these rocks, with here and there portions of granite and other rocks. This boulder till is a uniform homogeneous mass, showing no trace of lamination, but breaking away in perpendicular columns. The fractions of stone found in this till are always sub-angular, and lay in every direction, sometimes on their edges or at an angle at which they had been driven, they are worn quite smooth on their flattened faces, and the glacial scratches are well marked on most of them. I have not found a rounded water-washed pebble, although I have watched over thousands of tons. Resting on this there is two feet or more of boulder clay of a yellowish brown color which seems to possess all the characteristics of the blue till below. This clay becomes gradually laminated, and is covered by a coarse red sand; on this clay the surface water after filtering down rests, not being able to penetrate these clays. When reaching this sand bed you strike water in more or less quantities. At Ray and at Hess streets, where there is a slight dip in the blue till, the water came as from springs; above this sand is coarse gravel, and filled with boulders of various sizes, the larger ones being Niagara limestone and freestone, and here and there pieces from the chert. These large boulders are not worn into rounded boulders, but are worn down on all their angles. The remaining drift is Laurentian and various other limestones, these are all rounded boulders, and these sandy and gravel beds continue until near Bay street, where we cross the old lake beach, where the water-washed pebbles are all cemented together by the infiltration of the lime held in solution collected from the overlaying clays, which becomes redeposited and recrystallized, forming a solid concrete. All these beds had to be blasted to be removed. You will observe that two-thirds of these pebbles and boulders are from the Hudson river formation, with a few Trenton and Laurentian pebbles.

Now, at the west end of the cutting where it dips to its level at what is called Beasley's Hollow, the ground is cut up into various valleys all running into the Dundas marsh. You will observe that the sand and concrete beds cross all these hills at a water level, showing most distinctly that they have been washed out since the formation of the old lake beach. Just west of the sewer pipe works you will see a conical hill, where two of these streams met, causing the water to swerve around, leaving this small conical hill; they are now cutting it down to obtain the sand. It is a strange sight to view these hills from the west end of Main street where all these various outwashings are well displayed.

I could extend this paper by suppositions as to the probable time of these glacial drifts, and the denuding and laying down of these various beds of drift. But this subject has been so ably described by Professor G. J. Hinde, F. G. S, and others, that it would be presumptuous for me to say more than to note what I have most carefully observed during the progress of the cutting. I have carefully selected striated specimens from the till, also from the concrete and other beddings which will be of interest to illustrate the diagram.

I might mention that there have been several bones and specimens of wood found laying just above the till. The first discovered was the blade bone probably of a moose. This was found twenty-two feet below the surface in the lower concrete bed at the west end of the cutting, near Garth street; this lower bed of concrete rests on the till, like it does at the Iroquois beach at Bay and Park streets. I also found the lower jaw-bone of some carnivorous animal about eight inches long, between Locke and Pearl streets. It also appeared to be from the sand overlapping the till, but of this I could not be certain as much of the surface falls to the bottom and comes up with the till from the bottom. This has been sent to a professor at Magill University for examination. I also found a branch or root of wood in the same vicinity; it appears to be partly carbonized; it may have been partly burnt before it was drifted there. I think it would be worth while to send all the specimens of wood found to Professor Penholland, of Magill University, as he is a specialist on that subject. There have been some more important finds by Colonel Grant and others, from the cutting near Bay street. He will no doubt describe them when he feels certain of their nature. I had hoped to have had these and some specimens of fossil shells found in the fragments of stone found in the till, but they are mostly small and imperfect, and I do not readily recognize them; however, they are mostly from the Trenton Utica shales and Hudson river. I shall, when they are named, leave them with the specimens now before you.

I have made these few remarks with the object of bringing the subject of these formations before you in order that we may discuss the varying arrangements of these drifts and their relation to the formation of the surrounding country.

OUR CRITICS ANSWERED.

Read before the Hamilton Association, February 26th, 1896.

BY COL. C. C. GRANT.

In *Science*, November 15th, 1895, a copy of which Professor Scheuchart kindly sent me, you will find an interesting account of a collector's notes among the Devonian Canadian deposits. In common with all writers on this subject, Mr. Scheuchart was struck with the abundance, variety and exquisite preservation of our fossil corals. "At Hagersville," he remarks, "a large mass of various compound species are numerous; many hundred tons two years ago were broken up for road making. The original carbonate of lime has been replaced by amorphous Silica. Four miles west of Port Colborne is a rock pile more than fifteen feet high, every piece of which contains corals or Mollusca. At Widder (now named Thedford), where Devonian (Hamilton shales) are well exposed, corals are abundant. What a splendid place for a collector, where you can pick up in a day five thousand specimens of Spirifer Mucronatus.

The local enthusiasm here has been developed by the Rev. Hector Currie, who in the small village of one thousand inhabitants is surrounded by no less than four enthusiastic collectors. Here also, he adds, one is left alone or allowed to collect in the cabinets of the minister, teacher, storekeeper, tailor or section boss, not pained to know you are put down as a curio hunter or lunatic, having to reply to such enquiries as, 'Mister, what do you do with them things? Do you take them home and gild um?'"

The above extract I could not well curtail, and I trust that the proprietors of *Science* will excuse the liberty I have taken in extracting so extensively from its valuable scientific pages.

Canadian geologists must all feel the complimentary notice of Rev. H. Currie's work was richly merited. The provincial boorishness and ignorance, alluded to by Prof. Scheuchart, is not confined to the States. This Province of Ontario could display many amusing instances of the notions possessed by the rural scholars of this district regarding natural history, etc. A few years ago, I extracted from the Barton shales above the Albion mill a large number of Niagara corals (Streptilasma Cornicula), curved specimens not unlike minute cows' horns. I put them aside on the bank and proceeded higher, intending to collect them on my return. Unfortunately, during my absence some young lads detected them. I found when I came back I was not far astray when I concluded they evidently were up to mischief, and so it proved. On coming up I discovered the group contemplating with much satisfaction the fragments of my entire collection. I restrained my indignation until I heard an explanation of the unusual proceeding. The spokesman of the party gravely informed me, "Well, Mister, them things are devil's horns, and we always smash um." I did doubt the truth of what he said, and merely suspected the boys had acquired their knowledge of the devil's decorations at a rural Sunday school.

We may regret that so little interest in scientific pursuits is shown in this colony. No doubt it will appear here also in its own good time. In the United States recently, a Chicago clergyman offered as an explanation of the so-called Mosaic account of the universal deluge, that it was merely local, confined to that portion of the world then inhabited by mankind, and only domestic animals need have been taken into the ark. The Dr. explains in a chapter subsequently, with regard to the prophet Jonah, the word "whale" is a mistranslation of the original Hebrew term, and he may have been taken in by one of the big sea lizards, an Ichthyosaurus for instance.

Now since the animals alluded to became extinct countless ages before man's appearance, at least as such, it seems probable that science will hesitate to accept the learned gentleman's correction as entirely satisfactory. On the other hand, we have claims put forth by certain clerics regarding "inspiration," etc., which would lead one to imagine that the great Creator confided to sensational preachers the real interpretations of bible astronomy.

In a sermon recently published in the United States, the Rev. Dr. Talmage, in protesting against some of his weak-kneed brethren, who expressed a hope that something would be done to distinguish the human from the divine, and errors in mistranslation in the authorized version of the old testament, theatrically exclaimed, "I believe" (is not that sufficient?) "every page from cover to cover was inspired. I do believe the sun stood still, as recorded; that Lot's wife became a pillar of salt, and a whale swallowed Jonah."

It may be time for our distinguished fellow citizen, the colored professor, who occasionally lectures on astronomy also, to look to his laurels. I am under the impression that his white brother in the States has been appropriating some of his peculiar ideas in "the astronomy of the Bible." It does not seem exactly fair for this Yankee Galileo to borrow what little he knows from scientists regarding the size and distance of the planets, etc., and then turn about and denounce infidel astronomers. We hope our Hamilton professor was excepted. Taking all things into account the whole proceedings savour strongly of what Archdeacon Wilson calls "theological arrogance." Until quite recently the churches of the various Christian denominations did all they could to arrest the progress of science. The Lutheran church persecuted the followers of Galileo in an infinitely more cruel manner than St. Peter's successors. (Of course this well established fact is carefully suppressed in the interests of religion.) I can recall the theological arrogance of half a century back in Great Britain and Ireland, and reflect on the lavish abuse then poured forth on infidel geologists. Now I know that Thor's hammer is wielded to-day by many a reverend gentleman from Oxford or Cambridge (the English universities.) The various churches have ever been slow to accept any views opposed to such as were held in former times by their respective denominations; yet somehow or other they imbibe (unconsciously perhaps) a coloring from their immediate surroundings. Look back to the civil war in the United States, and who fought more gallantly in defence of that foul blot on the Christian religion (slavery), than the Episcopalian, Methodist and Presbyterian clergymen, who exchanged their pulpits for the soldiers' tents, their cossacks for the grey uniform? (That no historical lies in the future can tarnish.) I can recall the time when our bishops, the spiritual peers of the House of Lords, denounced the abolitionists in England as a band of conspirators and fanatics who wanted to overthrow the constitution.

Now when Dr. Talmage in a truly meek and christianlike spirit deals so liberally in damnation of astronomers and geologists in the sermon, he may be reminded that his impulsive eloquence has led him to forget that he said on another occasion in holding forth on Nature and Christianity: "This is an age of research, nature cannot evade men's enquiries. Hidden laws have come out of their hiding place, the earth and the heavens, since they have been ransacked by geologist, botanist and astronomer appear so different from what they were once that they may be called the new heavens and the new earth. The church rejoices over every discovery as the world rejoices." If Dr. Talmage was moved by the spirit to denounce higher criticism, astronomy, geology, does he not display no little inconsistency now and then in his addresses requiring explanation. It may be he sometimes consults the views of his audience, and his hearers were of a higher class (intellectually) when this latter was delivered than the usual congregation assembled at the Brooklyn tabernacle.

We believe the majority of the clergy on this continent are overworked—that they have too little time to learn anything regarding recent discoveries in the tombs, temples and palaces of Egypt, Assyria, etc. The important records just obtained by Prof. Helprecht, Philadelphia, and Dr. Peters, from the ruins of Niffer, near Babylon, display historical writings dating 4,000 years before Christ. Why are they silent respecting that awful catastrophy the Noachian deluge, said to have taken place on the authority of Archbishop Usher, 2,500 years before our Saviour's appearance on earth? A complete list of Babylonian rulers from 2,600 years B. C. to its fall in 558 B. C. has been obtained. In writing to the States government Minister Terrell expresses his opinion that this American find equals if it does not excel the explorations of Layard at Ninevah or Rasam's excavations. The beautiful obelisk on the Nile which marks the site of the great temple of the sun at Heliopolis, was erected 2,800 years B. C. It is still erect, about 68 feet above the river mud, which conceals a considerable portion of the base, yet this is comparatively modern compared with other relics recently obtained from Egyptian ruins. Old as was the civilization of ancient Egypt, recent research proves clearly that it was indebted to the still older Babylonian empire even for that.

"The world has been satisfied," remarks an English writer, commenting on Sir A. Geikie's inaugural address at Edinburgh, "to take hitherto what we call the Mosaic account of the creation, etc., as a satisfactory explanation enough ; science relentlessly shows we were mistaken in this view. It is highly probable that the first chapters of Genesis were transcripts by Moses of a book ancient even in his time." We all know how bitterly assailed by the various sects of Christianity were modern geologists when they asserted they failed to find any confirmation of the Noachian deluge. "Who believes in it now?" remarks the late Prof. Huxley. The London Times asserts, "where Tyndall stood twenty years ago (at Belfast) our own bishops stand now." Another English writer states, "influence of thought from nature only over a religion which knows not how to defend the divinity of the Word has been immense. The child-like belief which led the Bible's defenders to assert the merest literalism of its records against the hard discoveries and facts of science, we are now (reproachfully) ready to yield altogether." "No such theory as inspiration," adds Archdeacon Wilson, "such as these, namely, the signers of a document who asserted belief that the Bible from cover to cover had divine authority on the testimony of the universal church, is recognized by the church of England or by any branch of the universal church. It is unauthorized as well as unreasoning." Geologists have little time and far less inclination to find themselves involved in theological matters in which they have small concern. Many of the clergy of the different denominations hold liberal and enlightened views on scientific matters. Unfortunately there are others, like "bats from out their narrow spy-holes, looking on the world without." "In former times," remarks the late Prof. Swing, "opinions were made stationary by authority and custom. The people did not possess sufficient education to enable them to perceive new ideas. Liberty removes the restraint and unless the church joins the memoralists in endeavoring to create a better world we cannot promise orthodoxy a bright future. There are three ancient versions of the Scripture,—Hebrew, Samaritan and Greek ; in all chronology differs, and Rawlinson expresses a doubt respecting our having the original chronology. He arrived at this conclusion perhaps after he had been compelled to admit by another Orientalist that he had changed the date in translating an Egyptian record in order to meet the accepted belief then prevailing generally regarding the age of the earth." Think for a moment of such an admission, a falsified date by one of the greatest scholars Great Britain produced in our own time. He yields the lore he learned, the dead language he mastered because he felt the interests of religion may suffer. We feel more inclined to think he supposed the older inscription was a clerical error and he imagined he had a perfect right to correct it. He made a mistake in doing so, that was all.

Now take the statistics of Dr. Talmage's own country, the United States, and what do we find recorded regarding religion there in this falsely styled Anglo-Saxon country? 23 per cent. only of its population are Christian, real and nominal; most part even of these are women. If the reverend gentleman can find such a state of things a subject for congratulation he must be rather easily satisfied with the progress of religion. Not long since a Catholic prelate regretted, " while we are winning back to the fold so many educated Americans, what of the 12,000,000 Irish immigrants and their descendants? Consider this, far more than half have fallen away from the faith." I believe some little time since Dr. Talmage preached a sermon in defence of the chronology of the Bible. He may not be aware of some recent translations of Egyptian and Assyrian records in the British museum which seem calculated to throw a little light on that very obscure subject, namely, the origin of the Bible stories. Extract No. 1 follows: " Early in the last decade of the nineteenth century it was noised abroad that the Rev. Prof. Sayce, of Oxford, the most eminent Assyriologist and Egyptologist was about to publish a work in which what is known as the higher criticism was to be very vigorously and destructively dealt with in the light afforded by recent research among the monuments of Egypt and Assyria. The book was looked for with the most eager expectation by the supporters of the traditional view of Scripture, but when it appeared the exultation of the traditionalists was speedily changed to dismay. For Prof. Sayce while showing some severity towards sundry minor assumptions and assertions of biblical critics, confirmed all their more important conclusions which properly fell within his province. A few of the statements of this champion of orthodoxy may be noted. He allowed that the week of seven days and the Sabbath rest are of Babylonian origin, indeed the word Sabbath itself is Babylonian. That there are two narratives of creation on the Babylonian tablets wonderfully like the two

Hebrew narratives in Genesis and that the latter were undoubtedly drawn from the former; that the garden of Eden and its mystical tree were known to the inhabitants of Chaldæa in pre-semitic days; that the belief that woman was created out of man, that man by sin fell from a state of innocence, are drawn from very ancient Chaldæan Babylonian texts; that Assyriology confirms the belief that the book of Genesis is a compilation, that portions of it are by no means so old as the time of Moses; that the story of Joseph and Potiphar's wife was drawn in part from the old Egyptian tale of the two brothers.

Andrew D. White in *Popular Science Monthly.* One of the stories of creation deciphered by Mr. Pincher, of the British museum, comes from the library of Assar-Banepol, dates from 650 B. C., but the Akkadian text Mr. P. thinks is a copy of one dating 3,000 B. C. or earlier still.

The tomb of the priests of Ammon recently discovered near Thebes goes back to the 11th dynasty, namely, 2,500 B. C, the date assigned to the flood. But reason appeals in vain to the Rev. Dr. Talmage and his fanatical admirers in Canada or the United States. In one of his sermons he deplores that heretical opinions prevail in all denominations. What a pity that such should be recorded; that the very sanctuary itself could not prevent the entrance of doubt in this faithless age! If the Greek monks who translated the old testament were infallible (incapable of errors), God-inspired men, why repudiate the doctrines of this ancient Eastern Christian church? Does the reverend gentlemen possess an intimate knowledge of either Greek or Hebrew? He puts forth no such claim. Neither does he appear to have heard that it is a theological error to believe the Scripture, in part at least, existed in book form 4,000 years, as he alleges. It dates from the return of the Jews from captivity, and the early portion was taken from oral tradition. Max Muller proves the rijveda of the Hindoes is far older. Was that also miraculously preserved? In delivering one of his masterly lectures the late Prof. Huxley laughingly noticed the abusive epithets hurled at him by his clerical assailants—infidel, coward, liar, etc. "Well," he said, "Agnostic as I am, I never doubted the modern church still possesses the gift of tongues." The famous Orientalist, Kennecott, who died at Oxford A. D. 1783, impeached the integrity of the Hebrew text of the old testament and fared no less like abuse. Higher criticism to-day informs us that the translators owing to imperfect knowledge of Hebrew numerals egregiously blundered regarding the ages of Scripture Patriarchs. Dr. Talmage knows they did not. "The worst enemies of the Bible," said an eloquent Jewish Rabbi in Hamilton recently, "are the men who hold all is inspired, who are unable to separate the human from the divine in the records of our people." Scurrilous language and misrepresentation of scientists! This indictment appears to come with ill grace from Dr. Talmage and his ministerial brethren. Is it true? Can this reverend gentlemen name one among the many thousands of geologists on this continent or in Europe who indulges in such abusive epithets as he so liberally bestows on all who happen to oppose the illogical conclusions of this high priest of the Brooklyn tabernacle? He seeks notoriety because he calculates it brings in the dollars, and knows well how to avail himself of ignorance and popular prejudice to further his aims.

ADDITIONAL NOTES REGARDING OUR LOCAL GRAPTOLITES.

Read before the Geological Section, Hamilton Association, March 28th, 1896.

BY COL. C. C. GRANT.

A few short notes regarding our local Niagara graptolites, perhaps may be acceptable. I am informed that only a dozen or so of the members of the association have ever seen the pamphlet published by Dr. Spencer, F. G. S., in 1884, entitled "Niagara Fossils." It was printed as a bulletin of the museum, State University, Missouri, when the author held the chair of geology in Columbia, Mo., and therefore not likely to attract much attention in Canada, although all the specimens described therein, with one or two exceptions, were Hamilton, Ontario, organic remains.

In some cases the graptolites described are not particularly well illustrated (some 30 new species altogether). A copy of the work was furnished to one of the United States magazines and is now in possession of the curator.

As a monograph of the Niagara fossil hydroza is now in preparation at Washington by Dr. Gurly, F. C. S. A, who is considered the best authority on this continent of these fossils, we may confidently entertain the belief that the numerous specimens obtained since 1884 will receive close attention at his hands both as regards description and illustration. The artists employed by the United States geographical surveys are remarkable for their accuracy as regards details as well as the exquisite general appearance of the drawings, etc.

While I have no intention of interfering in any way with Dr. Gurly's work on the Niagara graptolites, it may be as well to point out the principal localities where they are obtainable, together with such information as may prove useful regarding them—this has already been done by Dr. Spencer, F. C. S.,—but his papers on our local fossils were published many years ago, some in the States and one or two only at Ottawa or Montreal, so we may conclude they are known to very few indeed here. I have frequently mentioned that a knowledge of the fossiliferous beds is absolutely necessary, and it is merely a waste of time in turning over or examining ones that rarely or never display organic remains. It may not be amiss here to mention a grave mistake of mine when the Jolley Cut Road was first opened. I carefully noted the position (in situ) of the different graptolites in the Niagara chert. The richest layer of rock which contained the largest number of graptolites was noted as occurring exactly six feet below the glaciated chert of the upper bed. It was not unusual to procure seven or eight specimens at the brow of the escarpment (when the road was first opened) in a day. The upper surface of the bed displayed the greater part of these fossils, but we ascertained when the quarrymen worked back a little they were concealed in the interior of the block. This circumstance was revealed by a mere accident. A shot in the corporation quarry shattered the thick flag and a portion of a dictyonema appeared. On dressing it to make the specimens more portable a stroke of the hammer dislodged a part which concealed the complete form (circular in shape) underneath. But despite the knowledge then acquired, for a considerable time subsequently I made insufficient allowance for the dip of the rocks as the quarrymen worked inward from the escarpment. I feel satisfied a good many graptolites were lost before this inexcusable error was detected.

I believe both dictyonema elegans and dictyonema gracilis to be very restricted in their range; both occur in their cherty layers above the main chert bed. I have always found a difficulty in extracting them uninjured and I do not remember their occurrence either above or below.

The free graptolites, namely ones that could hardly have been rooted in the muddy sediment and with no point of attachment apparently, are rare and probably not confined to particular beds. I noticed they occasionally turn up quite unexpectedly. Some new species were obtained here since the publication of Dr. Spencer's papers bearing a general resemblance to cyclograptus, and recalling some of the Cambro Silurian forms already described and figured by Dr. James Hall. Many would look upon them as modified descendants of the more ancient hydroza perhaps. The late Professor E. Billings, either in a letter or a paper I received from him, expressed the opinion that possibly some of the graptolites fixed to the sea bottom were accidentally detached (broken off) and yet lived on, in the same way as the free species. In one instance a deudrograptus stalk he remarked was rounded at the base (it looked as if the fracture had been repaired) and the slight stem trailed behind it. It is not uncommon here to find merely the impression of the base of a callograptus or dictyonema; so we may infer Billings' specimen was not the only species liable to such an accident.

When Dr. Spencer published his papers on the Niagara graptolites we entertained no suspicion that the glaciated chert beds contained more than three or four species, callyptograptus radiatus, acanthograptus pulcher (Spencer), I noticed as occurring in a more or less fragmentary condition in a polished and grooved layer which had been shattered a little way back from the present road. I concluded it proceeded from a single stalk, as one or two others unquestionably did a little lower down the chert. But later a shot was fired and the blast revealed that remarkably well preserved acanthograptus, described and figured as a pulcher. Since that time many other graptolites have been found differing from all below glaciated grooved layers with a few exceptions.

The upper blue building bed (Niagara limestone) contains quite a number of specimens probably new to this continent. They occur confined to certain parts as it were of the beds. A single shot a few years ago exposed a dozen at least. Since then I got only three by splitting the upper flag, the pentamerus bed or base of the Niagara series or the old Clinton limestone from which I obtained about seven new species (three figured by Spencer), formerly presented. I have had no chance of late years of obtaining any from the ravine below the Mountain View hotel. Since the Incline Railway was started no loose blocks have detached from the bed above.

Resting on the Barton Niagara in the till above the Albion Mills I occasionally find fragments of white chert, more flinty in texture than any noticed in the immediate vicinity of the city. I feel disposed to believe that a second and higher layer of chert existed before the great Ice Age. Our Vice-President may recollect I mentioned that the sloping sides of a high cliff near Dundas (hardly accessible) displayed numerous fragments of chert which essentially differed from that at Hamilton. (Mr. Neill noticed the chert there apparently in situ also). Now if this can be clearly established it may throw additional light on the position of the Tennessee sponge beds. One chert at Hamilton is near the base of the Niagaras. It is said the sponges in the United States occur near the top of the series. I suspect the latter may prove to be ones corresponding with the Dundas chert. The latter displays sponge fragments also.

It may be noticed I have not referred to Clinton graptolites. A dictyonema in the green shales, a small species, may be new—two others have already been described by Hall. The Barton shales as yet have only displayed two others, one already figured by Spencer, which Dr. Gurley, F. C. S. A., thinks identical with a recently named European genus.

The past long winter has been unusually unfavorable for collecting fossils. A great many men were employed in the corporation quarry, but they were changed so frequently, one had not sufficient time to show them how to recognize specimens seen. The frost also penetrated so deeply that it proved difficult for even a practical eye to discover organic remains under the thick coating of ice which enveloped almost every layer in the chert, or blue building beds where the latter were exposed. In fact it was only by splitting the upper grooved and glaciated one of the former, since the workmen ceased quarrying and the snow disappeared partly from the debris left by the last shots on the surface of the cherts, that I succeeded in obtaining a few new graptolites, unknown to me as occurring on this continent in the Niagara Silurians. As we recede from the brow of our local escarpment and approach the overlying Barton shales the graptolites present such a dwarfed appearance that it foreshadows their complete extinction, and specimens new to us may prove merely degenerate descendants of others we have not as yet discovered.

Since the foregoing was written I obtained on the lake shore at Winona a large slab of Cambro Silurian limestone containing numerous specimens of a graptolite bearing to the naked eye a resemblance to graptolithis pristis or diplograptus Hudsonicus (Nicholson). The cell mouths seemed absent and that I considered may be owing to pressure, etc. On examination subsequently Mr. Walker's magnifying glass failed to display the usual cellules of the diptograpti family, but it revealed however, a peculiar structure we have not remarked in any papers on the graptolites known to either of us. The limestone flag (water-worn and rounded at both extremities) is about 12 inches in length, 9 in breadth and 3 inches in thickness, the fossils occurring on both faces, but mingled with a coral (monticulipora or branching chetætes). Probably twelve generations are represented on splitting the matrix, each overlaying the other regularly. I mention this because I do not think the graptolites were washed up or heaped together in the manner indicated by the Clinton star fishes beyond the reservoir at the bluff or cliff.

NOTES ON THE PIPESTONE DISTRICT, MANITOBA.

Read before the Geological Section, Hamilton Association, April 24th, 1896.

BY J. A. DONAGHY.

Geology—The districts I have been in have not been very favorable for making researches on this subject. In this part of Manitoba we have gravel and sand subsoil. The gravel is composed largely of various kinds of quartz, the remainder being fragments of granitic rocks. They call some limestone out here, but is very flinty in its nature; and although they make lime from it in some parts, the lime is of a very poor quality and will not boil when put in water. The rock contains a few fossil shells somewhat similar to a fossil found at Hamilton' but I cannot recollect its name; it is fan shaped, something like a scallop. Some of the pieces of quartz would look very nice if polished, as some are quite transparent. Some have fine white lines through them, something like strata of stone. These pieces are about the size of the end of your finger and the lines not much thicker than paper. They are of a yellowish color, some dark amber, and, if cut across, the lines look very beautiful.

Our surface soil is a scanty soil something like that around Burlington, but not quite so sandy. The surface changes to a clay with clay subsoil a few miles west of here. For sometime I was in what is known as Central Manitoba, at Belmont, about 40 miles south of Brandon. The clay soil there is very often made almost worthless with alkali, and farmers have a hard time to get a well containing water fit for use, on account of the purgative action of the alkali. A poor quality of shale underlies the soil there. It does not seem to contain any fossils, only a fragment of one is found occasionally by looking very closely. The stones on the farms are nearly always big ones—some eight feet in diameter. About six miles north these stones are more plentiful, and protrude above the surface about a foot. There is one peculiar thing about big stones on the prairie that I must mention, that is this, very often these stones are lying in the centre of a circular hollow about 20 feet across and 3 feet deep. The question often asked out here is, "What made the hollow?" The farmers mostly say it was made by the buffalo rubbing themselves against the stone and and wearing out the earth in doing so, but it is hard to say what the cause is. The stones are granite.

The Eastern coal fields is a place I have not visited, but will tell what I do know about them. They do not sink shafts to mine the coal. The mines are in the valley of the Souris river, and they simply dig in from the banks. The beds slope down in an easterly direction so I am told. The coal is peculiar, and almost worthless. It would be worthless in Ontario, but on the prairie the farmers are glad to get it at $4.25 a ton. If exposed to a dry atmosphere above freezing point for a short time, even for two days, a big block of it will fall to pieces; and when being burned in a stove it must not be shook or raked out, or the whole will instantly crumble and fall through the grate. It is known as slack coal, and is soft. I was going to send you a sample but the heat of the house reduced it almost to a powder. It is mined only during the winter, as a stock of it would be only a loss to its owner,—in summer a fine hot day would make it worthless. It seems to contain a large amount of moisture and when this moisture is driven out of it it shrinks, and if dried under a stove will curl up like wood. It shows the grain of the vegetable matter plainly and pieces of it resemble charcoal made from soft wood, such as pine; and if scraped and a match put to it, it burns like charcoal, and without smoke or smell. I have examined lots of this coal hoping to find traces of ferns but can find only their stalks and stems, although I have found pieces of resin as big as a pea, which if put on a hot stove give out a very pleasant smell somewhat resembling ordinary resin.

Before closing the geological part of the paper, I must say a word about the far-famed Winnipeg mud. No wonder it has a name! Winnipeg is situated on a low piece of country, but well drained by the rivers. The soil is known as Gumbo, and contains alkali. In all parts of the country where they have a clay surface soil they have an occasional piece of Gumbo from a few feet in diameter up to several acres: when it is dry it is too hard to put a plow in, when wet it somewhat resembles glue, but is as slippery as soft soap. The Winnipeg people say they can tell a stranger in the city on a wet day, as he walks like a person learning to walk on roller skates, expecting his feet to fly out from under him, while at the same time the mud hangs on like glue. They are paving all the streets in different ways, some planked like a sidewalk. If they did not do so the streets would be impassable in wet weather.

Botany—I consider botany and entomology the two best subjects to study out here as there are so many specimens of both subjects to be found on the prairie. The first wild flower to show itself in the spring is the prairie crocus. It sends up a tender stem bearing the bud, growing about four inches high ; then it opens out into a pretty flower, pink inside and mauve outside. The flowers are about an inch and a quarter across and about an inch deep. After the flower has been open a few days it dies and the plant goes on to produce its leaves, and lives through the summer. It sends up a long stem on which the seed are produced. When in seed the stem resembles a window brush on a small scale, each seed having a long feathery hair about an inch long attached to it. When the crocus is in bloom the prairie looks pretty ; after having our long winter, the prairie is covered with bloom, and without any exaggeration I can say there at least three blossoms for every square foot of prairie, so you can imagine what it must look like But it lasts only for about ten days. Towards sunset, when the plant is in seed, a fine sight is seen by looking towards the setting sun,—the millions of fuzzy bunches of seeds give the ground a misty appearance. I cannot in this paper give the dates the different plants blossom on, but will make special notes next summer. The buffalo apple or prairie plum is a flat growing plant. It lies on the ground and sends out its branches in all directions so that the plant is circular ; I understand it belongs to the pea family. Its flower is a red pink, and appear in bunches, it resembles the pea flower only smaller. Its fruit is about an inch long, or perhaps a little over, its width is about half its length. To eat them raw before the skin gets tough the taste is exactly like eating pea pods. Some say that if picked young they make good pickles. The fruit is merely a thick pod divided into two equal apartments containing seeds, and become a mere dry shell in the fall. The wild orange lily is a very nice plant. It grows up straight for about twelve inches and then blossoms. The leaves are few, being attached to the main stem with scarcely any petiole. They are about one quarter of an inch wide and two and a quarter long; dark spots inside something like the tiger lily, in fact it resembles it more than the orange lily. Usually only one flower is found on a plant, but sometimes two or even three are found, the flowers being on the top of the stalk.

The wild rose bushes are a weed out here. They grow in the fields and make such a mass of tough stringy roots that it is hard work to plow where they are. They grow only ten or twelve inches high, but for a good supply of roses and a fine perfume I do not think they can be excelled. While they are in bloom the air is fairly saturated with perfume, and although a person may be in a spot where they can see no roses they will be able to smell the perfume of a bunch of them probably a hundred yards away. We have another plant that rivals it for perfume, but not in looks. It is a low plant not over four inches high, the leaves growing close to its stalk, and its yellowish green flowers looking as though they were part of the leaves. It blossoms before the rose, and no other wild flower is visible at the time. It is a puzzle to strangers where the perfume comes from,—they never think of this little plant, because it does not appear to have any blossoms, and looks as though it had an unpleasant smell instead of a very fragrant one.

There are three kinds of violets,—two violet ones and a yellow one. The difference in the two violet ones is in the leaves: one has ordinary violet leaves, while the other has a leaf very much cut. We have many other pretty flowers but strange to say the prettiest are very bad smelling, while the humblest looking ones are the ones that have a delicate perfume. For a wild fruit we have a native wild black currant. It is very productive, the fruit being large but slightly bitter until cultivated for two or three years. The saskatoon is very similar to the eastern huckleberry, but under very favorable circumstances they grow ten feet high; the majority of bushes, however, are only about four feet high. We also have the common wild raspberry, and the strawberry. Our strawberry seems different from the Ontario berry; the Ontario berry is long and pointed while ours is a short plump berry of good size. Another fruit called the cranberry grows on trees. It is a red fruit about half an inch long and a quarter of an inch in diameter and has a flat seed about threesixteenths of an inch in diameter. The common wild gooseberry is also on the list, and wild plums too are found in some places, but are not so common as other fruit. As for grasses, I will mention only a couple of varieties. One is the common sweet grass that Indians make fancy articles out of. It is one of the worst pests a farmer can have, it will form a dense mass of roots and choke out crops. Its roots are like common white string ; a piece of it is apt to get carried some distance with the harrows and thus starts a fresh spot. It is a very hard grass to get rid of. The spear grass is another very bad pest. Its seeds are like oats, except that the hull finishes up in a long stiff bristle about three inches long ; this bristle has *teeth* all pointing to its outer end. When a person is walking where this grass is these seeds drop and the big end, which has very sharp point at its base, enters the clothes and the long bristles serve to force the seed ahead. It will weave itself in and out of the cloth in a peculiar manner, every movement serving to send it ahead. To get it out it has to be forced through frontwards, like a barbed hook. Sheep have been butchered and after their hides were taken off the carcasses found to be a mass of scars and the skin full of the spears.

Zoology—The first animal to be noticed is the troublesome gopher. It is similar to the prairie dog. It lives in the ground and depends on the farmer for its living. They are about as big as a squirrel, but have a small tail like the chipmunk, and are a yellowish gray color. Their claws are made for digging. These pests multiply at a fearful rate and destroy lots of grain. The farmers have to fight them with poison, dogs, guns and any means possible. They store away immense quantities of grain for winter use.

The badger is another animal that lives in the earth. In some parts the farmers protect them as they are said to live amost entirely on the gophers ; others, myself among them, object to them on account of the holes they dig while going down after a gopher. They dig a regular post hole and many a good horse has been hurt by getting a leg in one of these holes on a dark night. A favorite spot for them to dig is right in the middle of the trail, the most dangerous spot they could dig on account of the traffic across the country. We also have skunks. I have never chased one to its den so I cannot say where they live, but judging from their claws I should think they lived underground.

Weasels are animals that have their friends and their enemies. They kill gophers without having to dig a big hole to get after them, but also kill chickens.

Prairie wolves or coyotes are getting scarce around here at least, although one has passed here several times lately. They are great cowards, and will run from a human being every time. I have chased a whole pack from a dead horse, so that I could lay out poisoned bait. I had not the least thing with me to defend myself if they turned on me, but no one need be afraid of coyotes; with timber wolves it is a different story. These are up north of the main line of the C. P. R. in the timber country. Foxes are also on the list; they seem to be seldom out in daylight; at night they roam around making a hideous noise, three or four short barks then a piercing scream. It would make a person feel queer if he were out alone and heard one quite close. The buffalo of course is extinct. Their bones are scattered over the prairie with the teeth marks of wolves still showing plainly.

Ornithology—As for wild fowl, I will not go into detail over the common varieties. There are prairie chickens, said to resemble old country grouse, patridges, common gray geese, millions of them, also millions of wavies or white geese, the latter not protected by law. I have seen a flock of wavies covering several acres, also a flock of both varieties together covering several acres. A rifle ball often kills four or five before it loses its force. The sandhill crayone is a dark brown bird; some think it the finest game in the fowl line. They make a peculiar croaking noise that can be heard a long way off, although they do not croak very loud. They fly very high; I do not think I am exaggerating when I say they are often half a mile above the earth. When seen on the prairie they appear a fair size, but they fly so high that a person has to watch very close to see them at all, they appear as mere specks. During flight they circle round, stopping every little while to make a sweep, except when flying low. On rare occasions I have seen white ones with the others. We have numerous small birds, wrens, gray birds, wood peckers, blue jays (a winter bird), blackbirds and many others. There is one whistler I have never had a close look at yet. It will sit on a tree and whistle a low soft note, repeating it several times; then it will try a higher note the same way, and so on till it seems satisfied that its whistle is in tune. It seems to possess five or six notes and cannot whistle any others. It sounds more like a flute than a bird. When it is satisfied that its voice is all right it starts to play a soft sweet tune, not very fast. Its lowest note is rather low, and its highest rather high. I have never heard a name for this bird.

The cow birds are the tamest of the lot. They like to roost on the backs of cattle and on their horns. The female is a brown slate color; the male a fine glossy peacock blue, and has a very sweet musical voice, but the only sound it makes is a very sweet "clink-clink." It half expands its glossy wings and ruffles its feathers up. They will follow at the very heels of a person plowing; I have had them within two feet of me. They pick insects out of the freshly-plowed earth; we have no earth worms out here.

Our best singer is a dark bird about the size of the canary. It is a dark brown, a dirty looking color. When it is going to sing it rises almost straight up for about twenty-five feet, then starts its song and soars down to the earth, singing as it goes, and lights about 100 feet from the spot it rose from, finishing its song a few seconds after lighting. I think it can excel anything I have heard.

The last bird I shall mention is one of the most interesting. During spring, early in the morning from daylight till seven o'clock, their sound is heard. It always seems to come from a point near the horizon, and as there are scores of them it makes a continual noise.

Their noise is a "boo - woo - oo." The "boo" is a low soft sound, the "woo" is a note or two higher, and the "oo" is higher still. As each bird keeps its song up, it sounds as if the prairie was coming back to life. It is a strange thing that the sound always seems to come from a point several miles off, but as each bird has different notes it is a pleasant sound, it is so soft and travels so far.

ATMOSPHERIC PHENOMENA.

This is a very interesting subject, as our atmosphere is, in my estimation, the most wonderful part of Manitoba.

As you know, our atmosphere is a very dry one, especially during the winter, when the thermometers may go down to 60° below zero and the cold not be felt any more than it is in Ontario at 15°

below. In the summer we have the other extreme, except that our nights are very cool.

One of the first things I will mention will be the distance sound travels. It is generally in the evening; a peculiar stillness comes over the prairie, a stillness that cannot be described. When the air is in that condition we can distinctly hear every word spoken at over a mile; houses are far apart here, generally a mile apart, and I have often heard my neighbor talking in the evenings. Sometimes it is the same in the morning, and stays so till about noon. I remember one day especially, it was a very foggy morning,—a rare thing out here. I was plowing, and had got to the other end of my field, when I heard a voice come out of the fog. It was a man speaking to his team. He appeared to be only a few feet from me, and I almost expected to see him any moment. I started back to the south end again, that is half a mile, but seemed to get no nearer the man and team. About noon however the fog got thinner, and I saw it was a neighbor of mine plowing south of me, it was a little over a mile and a half from the north end of my place to him, and yet I heard him as distinctly as if he had been beside me.

On another occasion, it was a moon-light night in the fall during harvest. A neighbor two miles away was cutting his wheat very late at night, near ten o'clock, as the night was threatening frost. Every sound of the binder was distinctly heard, and every word he said when he turned the corner. He was over two miles away, (when he was at the far end of his field) probably two-and-a-quarter miles, yet we could hear the machine tie every sheaf and throw it out.

It would not do to be running down your neighbors on such days as these. Mirages are common. The only wood visible from here is some on the Indian reserve, but many days we see miles of timber around us. Some of it must be a long distance off. Turtle mountain, ninety miles away, is often brought very close. These mirages are seen in winter; in summer we see a different class,—lakes and rivers that do not exist at all. I started home one day from town, walking along the railroad, about a mile away appeared a grand lake with rippling waves, and the houses on the opposite shore reflected in it as natural as life. The track ran into the water and disappeared, but came out on the other side. The lake extended over a mile south of the track and ran for miles north-west, where it dwindled into a narrow crooked river with marshy shore. My house was on an island in the river, and was reflected very naturally. I would have liked to have photographed it; the gentle breeze caused it to ripple in the hot sunshine, and all it needed to complete the picture was a vessel or two, but as I approached the lake it faded from view, and I waded through it on dry land.

Here is the cause of it, a layer of over-heated or highly heated air lay along the prairie, and all the low land being lower than myself, I was able to look across the surface of this heated air, and it acted as a mirror reflecting the sky or anything else near its "shore"; but as soon as I was low enough so that my eyes were below the level of this stratum, it no longer acted as a mirror.

There is a marsh just north of town that was dry all last summer, but one night after sunset, while coming home, it appeared flooded again, cattle were standing up to their knees in water. It was very natural looking but only a layer of thick mist, probably only three feet thick in the middle of the marsh. Another evening just about dark a mist came creeping over the prairie from the north-west. It kept in the low spots, and came very slowly. My house is on a hill, and by the time it was dark it appeared surrounded with water.

Another interesting thing is whirlwinds. I was reading the other day that in the northern hemisphere whirlwinds revolve the opposite way to the hands of a watch if held face up, while in the southern hemisphere they revolve with the hands of a watch. From my observations I would say that is wrong, as I have taken particular notice of them to see if they all whirl the same way, and have noted that they all whirled to the right, and noted that if a screw were turned in the same direction it would go *down*, while the dust went *up*. Whirlwinds are all sizes, from four feet in diameter by ten feet high to fifteen feet in diameter and over a hundred feet high. They can be heard coming across the prairie by the sharp swishing sound in the grass, and can be traced by watching the grass bowing down in it. When it travels over plowed land a column of black dust rises up like a huge chimney travelling over the prairie. A small tornado passed near me last summer. I will enclose a drawing of it. It twisted a stable or two out of place and picked up a haystack.

The wind does some peculiar things. I have seen it blow at a fearful speed from the southeast for three days, and then suddenly drop at night, and five minutes later be tearing down from the very opposite direction with the same terrific speed.

Storms will come across the prairie battling with a heavy wind but stopping for nothing. We were having a big southeast wind one day, and a big storm came down from the northwest. The front clouds on the storm were whirled over and over, and, when over my place, a huge mass of clouds was sucked down till it nearly touched the prairie, and then whirled aloft in an instant. It was a peculiarly wild scene.

During the winter the principal sights are sundogs and northern lights. The sundogs are grand when there is lots of frost flying in the air. A ray of light extends from the sun to the right and left. At the point where it crosses the inner circle it forms a ball of white light bigger than the sun and from these the rays extend completely around the horizon. At a point directly opposite the sun a dull misty ball is formed, and the same at a point on each side half way between the sun and the light opposite it. The uppermost half circle is the most brilliant and the centre of it is always directly over head. This circle lies horizontal, although in a drawing it is impossible to make it look so.

Sun dogs are our only reliable weather signs. They always mean colder weather; it does not need a certain temperature to cause them; it may be 20° below zero for a week and sundogs may not appear, but if they do appear it is sure to get colder, even if it is above zero. One fine day in May I was rolling a field. It had been a hot day, but towards sunset a pair of sun dogs came. I thought they were decidedly out of place at that time of the year, but next day was cold—too cold for comfort.

This country has a bad name for blizzards, but it is not so bad as people think. The reason is that the word "snow-storm" is not used; a real blustery snow-storm is called a blizzard.

We have some very bad thunder storms out here, the worst I have ever seen. I often wonder how the few houses manage to escape the lightning; but very few ever get struck, although my nearest neighbor has had his struck twice.

The northern lights are very interesting. They are very bright, often lighting the prairie as good as the full moon. I have seen two-thirds of the sky covered with the fiery-green darting rays. I did not think they would be visible to the south of us, but sometimes they appear a long way south of us. The whole sky seems to be a waving mass of green fire ; they are at their best at 9.30 p. m.

One night I saw something a little out of the usual line, a luminous spot appeared directly overhead, and faint rays ran out in all directions from it. It gradually lightened till the whole thing was blazing very brightly with a great variety of color, red being the most prominent. The centre was a fiery cloud ; the rays seemed to point down to the earth on all sides, forming a fiery canopy. It lasted only a minute or two and then faded away.

I have heard of a horse being killed by a flash of lightning from a clear sky, but did not see how it could be possible. One Sunday night, however, after we had had a storm the sky cleared up entirely, and at sunset only a huge mountain of cloud was visible. It was miles away in the south-east. All at once a loud report directly over our heads made us look up just in time to see a white streak darting across the dark blue sky. It went straight north, but did not strike at the earth. There was no cloud within fifty miles of us, except the huge bank in the south-east, and it was at least 20 miles away. That is the only time I have ever seen such a thing occur. I have seen a few hail storms. One gave us hail stones as big as your fist. They were slightly flattened, and one side hollow so they resembled birds' nests. They fell at night, so no damage was done to people or stock. I believe one of them would have killed a man.

REPORT OF THE PHOTOGRAPHIC SECTION.

Read at the Annual Meeting, May 7th, 1896.

BY J. M. EASTWOOD.

Interest in amateur photography in Hamilton has greatly increased during the past year. The study of the photographic art has been encouraged, and the educational advantages offered by the Hamilton Association have been brought to the favorable notice of the public. There are now forty-one names on our roll. Nine have been added to the membership during the past year, and two have withdrawn. The Section mourns the loss of one of its active members, Mr. Walter Chapman, whose death by drowning while bathing in Hamilton Bay is a sad loss to the Hamilton Association of which he was a valued member.

No club outings were held during the year. Demonstrations on lantern slide making were given by Messrs. Moodie and Baker. A professional treatment of Aristo platino paper by Mr. Weed, at the studio of Mr. C. S. Cochran, was of much interest to the large number of members who were present.

Practical addresses have been given by the Honorary Adviser of the Club, Mr. A. M. Cunningham, and also by Mr. S. John Ireland, principal of the Hamilton Art School, whose advice on "Composition of a picture" was instructive and profitable to all the members of the Camera Section.

At the Club Competition, held in June '95, very creditable work was exhibited by the members, and prizes of dry plates, supplied by the makers by favor of Messrs. Cochran and Cunningham, were awarded for the best prints. The members and their friends have had the pleasure of seeing the prize set of slides of the "American Photographic Journal," the American interchange set of the Chicago, Buffalo and Bethlehem, Pa., Clubs, by special favor of Mr. F. C. Beach, New York, and the Rau professional set of foreign views loaned by Mr. G. W. Gilson, of Toronto, at the series of open meetings held during the season.

The President, Mr. J. R. Moodie, deserves the thanks of the Section for his kindness in giving his valuable time and attention to further the interests of the Camera Section, also Mr. Julius Grossman and his efficient orchestra for their valuable assistance at the Club's recent "At Home."

It is important that the members work together to secure a set of representative slides which will be accepted by the Board of Examiners of the American Lantern Slide Interchange for this year.

J. R. MOODIE,
President.

J. M. EASTWOOD,
Secretary.

CURATOR'S REPORT.

Read at the Annual Meeting, May 7th, 1896,

BY ALEX. GAVILLER.

Two Zulu Assagai from the battlefield at Ibeka, during the Gaika Gallaka war in South Africa of 1877-8-9. Donor, Mr. Geo. W. Richardson.

A number of curiosities, donated by Mrs. S. J. Myles, sent by her from California at two different times. A number of shells, corals, dried ferns, beans, a small Japan tea service, one spoon particularly finely made from two shells, fourteen large Sea Gull eggs, a very perfect specimen of Tarantula spider and Mason spider nest, a Ceylon fan, and other small articles.

A number of animal bones and pieces of timber dug out of the tunnel cutting constructed along Hunter street in this city for the T. H and B. railroad, during December last. Some of these remains were found at a depth of thirty feet, some at forty feet, below the surface, in the conglomerate section. A very interesting eight feet long colored draft, shewing the different strata of this deep cutting, has been made by Mr. A. E. Walker, of this city, and presented by him to the Museum.

A very large cup sponge, and some smaller specimens, donated by Mr. A. Rutherford.

A specimen of branch coral. Donor, Mr. D. G. Leester.

A number of shells; one particularly, a fine "Echinus." Mrs. Beasley, Hamilton.

A ninety year old Flax Hackle, belonged to the grandmother of the donor, Mr. J. Terryberry.

A brass Icon (dated 1567) of the Greek Church, in good preservation, and doubtless held in great veneration by the original owner.

The Museum has been kept open every Saturday afternoon during the year, and has been largely visited during that time; and many travellers passing through the city have also dropped in for a short time.

HAMILTON ASSOCIATION.

Statement of Receipts and Disbursements for the year ending May 7th, 1896.

RECEIPTS.

Cash balance from 1895	$ 206 10
Government Grant	400 00
Subscriptions	134 00
	$740 10

DISBURSEMENTS.

Rent Museum and Dark Room	$ 174 00
Caretaker	42 65
Printing Annual Report	106 00
Insurance	20 00
Grant to Photographic Section	39 50
Gas	17 50
Stationery, Postage, etc	20 00
Sundry accounts	89 90
Balance on hand	230 55
	$ 740 10

J. M. BURNS, *Treasurer.*

We have examined the vouchers and found them correct.

H. P. BONNEY,
F. HANSEL, } *Auditors.*

REPORT OF THE CORRESPONDING SECRETARY.

Submitted at the Annual Meeting, May 7th, 1896.

BY REV. J. H. LONG, M. A., LL. B.

To the Officers and Members of the Hamilton Association :

Your Corresponding Secretary for the session 1895-6 begs leave to report as follows :

I. He has, during the session, carried on the ordinary correspondence of the Association.

II. He has sent "The Journal and Proceedings" to the members of the Association, and to the following bodies :

I.—AMERICA.

(1) CANADA.

Astronomical and Physical Society	Toronto.
Canadian Institute	"
Natural History Society of Toronto	"
Department of Agriculture	"
Library of the University	"
Geological Survey of Canada	Ottawa.
Ottawa Field Naturalists' Club	"
Ottawa Literary and Scientic Society	"
Royal Society of Canada	"
Department of Agriculture	"
Entomological Society	London.
Kentville Naturalists' Club	Kentville, N. S.
Murchison Scientific Society	Belleville.
Natural History Society	Montreal.
Library of McGill University	"
Nova Scotia Institute of Natural Science	Halifax.
Literary and Historical Society of Quebec	Quebec.
L'Institut Canadien de Quebec	"

Natural History Society of New Brunswick .....St. John.
Manitoba Historical and Scientific Society......Winnipeg.
Guelph Scientific Association..................Guelph.
Queen's University.........................Kingston.

(2) UNITED STATES.

Kansas Academy of Science..................Topeka, Kan.
Kansas University Quarterly..................Lawrence, Kan.
Psyche.............................Cambridge, Mass.
American Academy of Arts and Sciences.......Boston, Mass.
Library of Oberlin College...................Oberlin, Ohio.
American Association for Advancement of Science.Salem, Mass.
National Academy of Sciences................Cambridge, Mass.
Museum of Comparative Zoology............ " "
American Dialect Society.................... " "
United States Department of Agriculture.......Washington, D.C.
Biological Society of Washington.............. " "
Philosophical Society of Washington........... " "
Smithsonian Institution....................... " "
United States Geological Survey............. " "
American Society of Microscopists............Buffalo, N. Y.
Buffalo Society of Natural Sciences........... " "
California Academy of Sciences...............San Francisco, Cal.
California State Geological Society........... " "
Santa Barbara Society of Natural History....... " "
University of California......................Berkley, Cal.
Minnesota Academy of Natural Sciences.......Minneapolis, Minn.
Academy of Natural Sciences.................Philadelphia, Pa.
Academy of Sciences........................St. Louis, Mo.
Missouri Botanical Gardens.................. " "
American Chemical Society..................New York City.
New York Microscopical Society.............. " "
The Linnean Society........................ " "
American Astronomical Society............... " "
American Geographical Society.............. " "
New York Academy of Sciences.............. " "
Torrey Botanical Club...................... " "
Central Park Menagerie..................... " "

Cornell Natural History Society . . . . Ithaca, N. Y.
Johns Hopkins University . . . . Baltimore, Md.
Kansas City Scientist . . . . Kansas City, Mo.
Wisconsin Academy of Science, Art and Letters . . Madison, Wis.
Society of Alaskan Natural History and Ethnology. Sitka, Alaska.
University of Penn . . . . Philadelphia, Pa.
Franklin Institute . . . . " "
War Department . . . . Washington.
Field Columbian Museum . . . . Chicago.
Academy of Sciences . . . . Chicago.
Agricultural College . . . . Lansing, Mich.
Colorado Scientific Society . . . . Denver, Col.
Museum of Natural History . . . . Albany, N. Y.
Rochester Academy of Sciences . . . . Rochester, N. Y.

(3) WEST INDIES.

Institute of Jamaica . . . . Kingston, Jamaica.

(4) SOUTH AMERICA.

The Royal Agricultural and Commercial Society
of British Guiana . . . . Georgetown.

II.—EUROPE.

(1) GREAT BRITAIN AND IRELAND.

England.

Bristol Naturalist's Club . . . . Bristol.
Literary and Philosophical Society of Leeds . . . . . Leeds.
Chonchological Society . . . . "
Royal Society . . . . London.
Royal Colonial Institute . . . . "
Society of Science, Literature and Art . . . . "
Geological Society . . . . "
Manchester Geological Society . . . . Manchester.
Mining Association and Institute of Cornwall . . . . Camborne.
Cardiff Photographic Society . . . . Cardiff.

Scotland.

Glasgow Geographical Society . . . . Glasgow.
Philosophical Society . . . . "

Ireland.

Royal Irish Academy........................Dublin.
Royal Geological Society of Ireland............ "
Naturalist's Field Club......................Belfast.

(2) AUSTRIA-HUGARY.

Anthropologische Gesellschaft..................Vienna.
K. K. Geologische Reichsanstalt.............. "
Trentschin Scientific Society..................Trentchin.

(3) BELGIUM.

Société Géologique de Belgique...............Liége.

(4) DENMARK.

Société Royal des Antiquaires du Nord.........Copenhagen.

(5) FRANCE.

Académie Nationale des Sciences, Belles-Lettres
et Arts...............................Bordeaux.
Académie Nationale des Sciences, Arts et Belles-
Lettres................................Caen.
Académie Nationale des Sciences, Arts et Belles-
Lettres................................Dijon.
Société Géologique du Nord..................Lille.
Société Géologique de France.............. ...Paris.

(6) GERMANY.

Naturwissenschaftlicher Verein................Bremen.
Naturwissenschaftlicher Verein................Carlsruhe.

(7) RUSSIA.

Comité Géologique.......................St. Petersburg.
Rüssisch-Kaiserliche Mineralogische Gesellschaft "

III.—ASIA.

(1) INDIA.

Asiatic Societies of Bombay and Ceylon.
Asiatic Society of Bengal...................Calcutta.
Geological Survey of India.................. "

(2) STRAITS SETTLEMENT.

The Straits Branch of the Royal Asiatic Society . . Singapore.

(3) JAPAN.

Asiatic Society of Japan . . . . Tokyo.

IV.—AFRICA.

(1) CAPE COLONY.

South African Philosophical Society . . . . Cape Town.

V.—AUSTRALIA.

(1) AUSTRALIA.

The Australian Museum . . . . Sydney.
Royal Society of New South Wales . . . . "
Linnean Society of New South Wales . . . . "
Australian Natural History Museum . . . . Melbourne.
Public Library of Victoria . . . . "
Royal Society of Queensland . . . . Brisbane.

(2) NEW ZEALAND.

New Zealand Institute . . . . Wellington.

(3) TASMANIA.

Royal Society of Tasmania . . . . Hobartown.

It will be noticed that several new names occur on this list of scientific bodies. It is hardly necessary to say that our Association receives copies of Proceedings, Journals, and in some instances valuable books, from these various societies and governmental departments.

All of which is respectfully submitted.

J. H. LONG,
Cor. Sec'y H. A.

HAMILTON ASSOCIATION.

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JOURNAL AND PROCEEDINGS

OF THE

Hamilton Association

FOR SESSION OF 1896-97.

NUMBER XIII.

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H. B. Witton, B. A.	A. Alexander....... F. S. Sc.	Richard Bull.......	A. Gaviller.
Thos. Morris, Jr....	A. W. Stratton, B. A.	Richard Bull.......	A. Gaviller and G. M. Leslie.
Thos. Morris, Jr....	C. R. McCulloch...	Richard Bull.......	A. Gaviller and G. M. Leslie.
W. McG. Logan, B. A.	S. A. Morgan, B. A.	Thos. Morris, Jr....	A. Gaviller and W. Chapman.
W. McG. Logan, B. A.	S. A. Morgan, B. A.	Thos. Morris, Jr....	A. Gaviller and W. Chapman.
Rev. J. H. Long, M. A., LL. B.	S. A. Morgan, B. A.	J. M. Burns........	A. Gaviller and W. Chapman.
Rev. J. H. Long, M. A., LL. B.	S. A. Morgan, B. A., B. Paed.	P. L. Scriven......	A. Gaviller and H. S. Moore.

MEMBERS OF COUNCIL.

1857—Judge Logie; Geo. L. Reid, C. E.; A. Baird; C. Freeland.

1858—Judge Logie; C. Freeland; Rev. W. Inglis, D. D.; Adam Brown; C. Robb.

1859—Rev. D. Inglis, D. D.; Adam Brown; Judge Logie; C. Freeland; Richard Bull.

1860—J. B. Hurlburt, M. A., LL. D.; C. Freeland; Judge Logie; Richard Bull; Wm. Boultbee; Dr. Laing.

1871—Geo. Lowe Reid, C. E.; Rev. W. P. Wright, M. A.; A. Macallum, M. A.; A. Strange, M. D.; Rev. A. B. Simpson.

1872—Judge Proudfoot; Rev. W. P. Wright, M. A.; John Seath, M. A.; H. D. Cameron; A. T. Freed.

1873—Judge Logie; T. McIlwraith; Rev. W. P. Wright, M. A.; A. Alexander; I. B. McQuesten, M. A.

1874—Judge Logie; T. McIlwraith; Rev. W. P. Wright, M. A.; A. Alexander; I. B. McQuesten, M. A.

1875—Judge Logie; T. McIlwraith; Rev. W. P. Wright, M. A.; A. Alexander; I. B. McQuesten, M. A.

1880—M. Leggat; I. B. McQuesten, M. A.; A. Alexander, Rev. A. Burns, M. A., LL. D., D. D.

1881—T. McIlwraith; H. B. Witton; A. T. Freed; Rev. W. P. Wright, M. A.; A. F. Forbes.

1882—T. McIlwraith; H. B. Witton; A. T. Freed; A. F. Forbes; Rev. C. H. Mockridge, M. A, D. D.

1883—A. Alexander; A. Gaviller; A. F. Forbes; T. McIlwraith; R. Hinchcliffe.

1884—A. Gaviller; A. F. Forbes; T. McIlwraith; R. Hinchcliffe; W. A. Robinson.

1885—W. A. Robinson; S. Briggs; G. M. Barton; J. Alston Moffat; A. F. Forbes.

1886—J. Alston Moffat; Samuel Slater; Wm. Milne; James Leslie, M. D.; C. S. Chittenden.

1887—J. Alston Moffat; James Leslie, M. D.; P. L. Scriven; Wm. Milne; C. S. Chittenden.

1888—J. Alston Moffat; B. E. Charlton; T. W. Reynolds, M.D.; S. J. Ireland; Wm. Kennedy.

1889—T. W. Reynolds, M. D.; S. J. Ireland; William Turnbull; A. W. Hanham; Lieut.-Col. Grant.

1890—Col. Grant; A. W. Hanham; W. A. Robinson; A. E. Walker; Thomas Morris, Jr.

1891—Col. Grant; W. A. Robinson; J. F. McLaughlin, B. A.; T. W. Reynolds. M. D.; Wm. Turnbull.

1892—T. W. Reynolds, M. D.; W. A. Robinson; P. L. Scriven; Wm. Turnbull; Wm. White.

1893—James Ferres; A. E. Walker; P. L. Scriven; William White; W. H. Elliott, Ph. B.

1894—James Ferres; A. E. Walker; P. L. Scriven; J. H. Long, M. A., LL. B.; W. H. Elliott, B. A., Ph. B.

1895—J. E. P. Aldous, B. A.; Thomas Morris, Jr.; W. H. Elliott, B. A., Ph. B.; P. L. Scriven; Major McLaren.

1896—J. E. P. Aldous, B. A.; Thos. Morris, Jr.; W. H. Elliott, B. A., Ph. B.; George Black; J. M. Burns.

REPORT OF THE COUNCIL.

Your Council take pleasure in submitting their report for the session of 1896-97.

There have been held during the present session six meetings of the Council and eight of the General Association.

At five of our General Meetings papers were read, as follows:

1896.

Nov. 5th.—"Inaugural Address," President A. T. Neill.

1897.

Jan. 7th.—"The Battle of Stony Creek," Inspector J. A. Smith.

Feb. 4th.—"The Function of Poetry," F. F. Macpherson, B. A.

May 6th.—"The Dynamics of Social Peril," Mr. J. T. Barnard.

June 3rd.—"Lake Medad and the Kwin-Ni-Bi-Nah Collection of Indian Relics," J. O. McGregor, M. D.

The programmes for the three remaining General Meetings were furnished by the members of the Photographic Section.

Three new members have been added during the session and none have withdrawn.

Many valuable additions have been made to the Museum: among these special mention should be made of the unique collection of Shells and Indian Relics, lately placed in the Museum through the kindness of Mrs. S. E. Carey.

T. J. W. Burgess, M. D., an Honorary Member of the Association, has kindly consented to act as our representative at the approaching meeting of the Royal Society of Canada.

In closing this, another year, in the history of our Association, while we may justly look with pride on the work of the present session, yet every member conversant with its needs and its possibilities must feel that much still remains to be accomplished. Notwithstanding the untiring efforts of our various sections, it may truly be said that we are as yet but beginning to investigate the rich stores which nature presents to us in this favored locality, while much already in our possession needs both more room and a better arrangement in order that it may effect its highest possible good as a means of scientific education. This, however, can be effected only by each member striving to do well what pertains to his particular department.

All of which is respectfully submitted.

A. T. NEILL,
President.

S. A. MORGAN, B. A., B. Paed,
Secretary.

INAUGURAL ADDRESS.

READ BEFORE THE HAMILTON ASSOCIATION.

BY PRESIDENT A. T. NEILL.

It had been my intention to take up the subject of Museums in my opening remarks, but that subject has been very ably dealt with by the past President, Mr. A. Alexander, who read a very interesting paper on "Local Museums" during the last term. This paper you will find in the printed proceedings of the Hamilton Association for last session. I therefore concluded to supplement my previous remarks made in the inaugural address last year, upon the pleasure and benefits derivable from the study of Natural History Science.

Owing to the very interesting programme which has been prepared for your entertainment, I have been limited in time, so that my remarks will be general in reference to the above named subject, though specific in regard to the effect upon the mind when pursued not merely as a recreation, but studied with the view of deriving a permanent benefit, and should these few remarks awaken in any of my hearers a desire to take up the study of Natural History, I would suggest that such ones should become members of the Association and connect themselves with the section which best suits their inclination and taste. Active participation in the work is the only way to succeed in the study of Natural Science, and under the guidance of a member of experience, you will be conducted to the various fields where specimens can be obtained. Much valuable time will thereby be saved to be spent in the study of these specimens. Should any difficulty arise as to the identification of the species, the specimens in the Museum are always available for comparative study, and will no doubt greatly assist the earnest student.

I shall now proceed with the remarks upon the subject which I have intimated.

To those whose minds are imbued with the love of Nature as she presents herself in the ever varying attitudes of organized existence, and attires herself in robes of richest green, so welcome and so refreshing to the senses after a long and dreary winter, and after having drunk deeply of the pleasures of the summer season, we are now permitted to participate in the beautiful and picturesque scenery which the autumn presents in the various tinted slopes and dales, sadly suggestive of a summer that is gone and reminding us of the near approach of winter; to those who welcome truth in whatever phase she is discoverable in the physico-vital records of a past and passing world; to those who cherish glimpses of the infinite, and would fain tear aside the veil that separates the seen from the unseen; to those, in short, who look through Nature up to Nature's God, I may be privileged to speak a word or two to-night.

There never was a time in the history of the world when the demand for workers in all the departments of Natural Science was so widespread as it is at the present day, consequently we hear of many able and scholarly men devoting their time and talents to the study of the sciences, and as a result of their investigations, we learn almost daily of some new discovery in economic or physical science. These discoveries, which are so frequently announced through the medium of the press, have the effect of stimulating other workers in this great field to a laudable ambition and a desire to communicate something new to the world. We might ask in how many cases has the student, in any branch of science, not been rewarded in a greater or less degree by some important discovery.

It is a peculiar fact that men of leisure do not, as a rule, devote their time and talent in the direction of the most entertaining and fascinating branch of education. The human mind is naturally inquisitive, and as such, can find full scope for all its energies in the scientific field. A thirst after knowledge is in itself a refreshing symptom of healthy progress, though it may in some minds result in the mere fact of gratifying a desire to be entertained, instead of affording that peculiar and substantial satisfaction as experienced in the acquisition of further definite knowledge in some one of the branches of scientific study.

In the daily walks of life, whatever direction our duties may take, or whatever character they may assume, nothing is more essential than a well regulated mind, able to observe, to store up and to form a correct estimate of the value of facts, and also to draw deductions based upon a reasonable hypothesis, to their proper conclusions as warranted by the circumstances, and the possession of an intellect of this discerning power is of immense advantage, not only in the acquisition of knowledge, but in the formation of correct opinions.

It is admitted that in so far as a man of narrow sympathies is concerned, a fair amount of the so-called common sense principle may be all that is absolutely necessary for his pecuniary advancement, but if we desire to obtain the higher and more intellectual development of a well regulated mind, the power of detecting the most subtile distinctions between one thing and another, and a thorough comprehension of our social position, we must look to the cultivation of our mental processes. The absence of a retentive memory is by no means indicative of original stupidity, want of industry, or lack of talent, yet those who would become masters of this valuable product of mental discipline can only do so by pursuing some subject, the study of which would involve a methodized and continuous process of abstract reasoning. Confusion and obliviousness are after all the result of indiscriminate observation, and the highest degree of cerebral activity will fail to recall facts once familiarly known unless the storehouse of the mind has been filled in a gradual and tentative manner. Those of you who have at times bewailed the lack of a retentive memory, in proof of the above statement, may in some degree recall the circumstances or conditions under which the knowledge of a subject was obtained, and now is, as it were, shrouded in mental darkness despite your anxious and impatient attempts to recall the desired fact, rule, or name of subject under consideration.

This is an age of rapid progress in which time does not seem long enough to enable many of us to say with eminent satisfaction that we have completed this day's work, and the avenues through which we derive knowledge of the world, its business and social relations, preferring at all times brevity in the treatment of subjects, hurrying over many items at one time which is productive of confusion of facts and has a tendency to induce the habit of indiscriminate observation. The brain cannot and will not store up knowledge under such circumstances and be ever ready at the call of the indifferent student. There must also be a lively and active interest bestowed upon the subject, and where possible, so as to fix indelibly the impressions about to be made, use appropriate illustrations which appeal to the sense of sight. When the eye has become familiar with the form and color, and with all the minutæ of detail, it will aid the memory in recalling the name of fossil, plant, bird, or other object. The memory, like other organs of the body, is strengthened and invigorated by reasonable exercise. It is true to-day, as it was in the earlier times, though not to so great an extent, that in many instances the cultivators of Natural History Science confine themselves, for the most part, to the mere collection of cabinet specimens, whose individual worth is estimated by comparative beauty or singularity of form, whilst the more important facts and phenomena respecting the relation of these animal, vegetable and mineral bodies, the one to the other, are entirely overlooked.

I would not condemn these collectors. They should be encouraged, for by their desire to possess a goodly collection, by whatever name you may choose to designate it, they very frequently meet with and procure valuable specimens, and in such a state of preservation, as regards form and color, that they might be regarded as typical of their species. These collectors are thereby unconsciously doing a good work, and the army of scientific workers are not slow to acknowledge the fact.

It would be exceedingly difficult for us to imagine a mind capable of retaining within its grasp the multitudinous facts which scientific investigation has unfolded and brought to light. Let us suppose, for the present, that there was such a mind capable of comprehending in full detail the whole range of the scientific world, and could see mirrored before him not only the explored, but also the unexplored fields of Science. We cannot doubt but that a flood of light would be thrown upon their intermutual relations, and special dependence on the objects by which they are surrounded. Notwithstanding this drawback, the limitation of the human mind, as regards the comprehension of nature in all its phases, the various students of natural and scientific research, have, perforce, become specialists in their particular branch of study, and have produced, as the result of their labors, a cogent statement of facts, which, when united, places before the student a concise and instructive collaboration, based upon the fundamental unity of plan, which pervades all created nature throughout time and space.

Those who look upon botany, zoology and geology, as so many distinct sciences, should bear in mind that the laws regulating the facts which these various branches of study have generally brought to light, exhibit but one grand scheme of contrivance, adoption and design. The philosophical and truth loving naturalist perceived that in all epochs of the world's history, in whatever condition its cosmical elements have appeared, the laws prevailing hitherto are the same as those in operation at the present day, and the singularly varied results that we now witness are regulated by the degree, direction and conditions imposed upon those laws by the allwise Creator, who alone is capable of ordaining or abrogating their existence.

In the study of Natural History, in the widest acceptation of the term, I can claim, as I did in my remarks one year ago to-day, especial consideration, on the ground of its uplifting and ennobling tendency, and in doing so can powerfully appeal to the honest convictions of one of her most favored sons. I refer to the eminently philosophical address, by the late Professor Huxley, on "Natural History as Knowledge, Discipline and Power," delivered in the capacity of Fullerian Professor, at the Royal Institution, in 1856, forty years ago. He said: "Let those who doubt the efficiency of science, as moral discipline, make the experiment of trying to come to a comprehension of the meanest worm or weed, of its structure, its habits, its relation to the great scheme of nature. It will be a most exceptional case, if the mere endeavor to give a correct outline of its form, or to describe its appearance with accuracy, does not call into exercise far more practice, perseverance and self denial than they have easily at command, and if they do not rise up from the attempt in utter astonishment at their habitual laxity, an inaccuracy of their mental processess and in some dismay at the pertinacious manner in which their subjective conceptions and hasty preconceived notions interfere with their forming a truthful comprehension of objective facts. There is not one in fifty whose habits of mind are sufficiently accurate to enable him to give a truthful description of the exterior of a rose." It is too true, that things familiarly known and understood, often fail to leave their due impression on the mind. They teach no lesson. They do not awaken even a passing interest. Such indifference should not exist in man possessed of the faculty of appreciation in so eminent a degree, if his mind has been fully awakened to the importance of using aright, and not allowing to lie dormant those heaven-born faculties, which tend to make this life a brighter and happier one.

LAKE MEDAD AND THE KWIN-NI-BI-NAH COLLECTION OF INDIAN RELICS.

READ BEFORE THE HAMILTON ASSOCIATION.

BY J. O. McGREGOR, M. D.

This beautiful little lake, with the homely but filial name, is situated just within the western limit of Halton County, in the 2nd Concession north of Dundas Street. It has an area of about 40 acres, and is undoubtedly the remains of a lake eight or ten times as large, having a broad outlet running in a northerly direction, as well as a much smaller one leading into Lake Ontario. That the adjoining marsh to the west, and the marshy ravine extending northerly, together with the present lake, were once parts of the same body of water, is shown by the marl deposit found at the bottom of all three. The existing portion of the old lake has been preserved by the entrance here of several streams fed by powerful springs, of which the largest could furnish the city of Hamilton with an abundant supply of pure water, while the adjoining marsh has been made such by washings from the banks which form its borders.

Lake Medad is noted for its pure water and ice; the excellent quality of its fish: its beautiful and picturesque scenery, as well as for marl of first quality, but most of all for things archæological. With these last in an honest and imperfect manner I shall now attempt to deal.

The western border of the lake is a rugged and mostly perpendicular ledge of rocks. Here at the bottom of the ledge bursts forth the principal spring that feeds the lake. Near this spring, on the bank above, which, as well as the adjacent country for miles around, was and is the best of corn land, was situated a large Indian village or town, which, as shown by the position of its ash-pits, occupied the northern slope of a U shaped piece of ground, gently rising in three directions, north, east and south from the open part of the U, which may be conceived to be on the top of the ledge just mentioned.

LANDING PLACE—LAKE MEDAD.

Through the midst of the U, from top to bottom, ran a deep cut, which with the ledge just mentioned served to protect the town to some extent on its southern and western sides, while the northern and north-eastern sides of the U, which form a ridge, were most probably palisaded. I have no doubt that this village was the Otinawatawa, visited first by LaSalle in 1669. In the fall of this year that unfortunate but heroic explorer was among the Senecas seeking a guide to the Ohio (then identical with the Mississippi). He failed to get one, but a young Indian who was on a visit then from the Iroquois colony of Otinawatawa, offered to conduct him to his home, where he would find a competent guide. LaSalle accepted and set forth. His party proceeded to Lake Ontario, thence along the southern shore of the lake past the mouth of the Niagara to the head of the lake, thence north a few miles to the village of Otinawatawa.

This account answers perfectly to the location of the village described above (which is about five miles, as the crow flies, from the head of the lake), and to no other known Indian village. At this village, or one of the neighboring villages, LaSalle (in September) met Louis Joliet, another explorer almost as celebrated as himself. These villages will be referred to later on.

About four hundred yards to the north of Otinawatawa was the burial ground of the colony. As in all other observed similar cases, this burying ground was the most elevated part of the ground adjacent to the village, and was discovered to the present generation by the bones and wampum which a hedge-hog threw out of an ossuary wherein he had made his burrow. So far three ossuaries have been found here and explored. They are similar to those of other localities, being five or six feet deep, of variable size, and containing, in addition to human bones, the utensils, implements and ornaments of those therein buried. These ossuaries, as well as the neighboring ash-pits, had all been opened up before my attention was called to them; yet by far the greater part of my collection has come from the banks of Lake Medad.

The other localities from which I have obtained Indian relics are an ossuary on the banks of the 12-mile creek, about a dozen miles from Bronte, near which, on the river he loved so well, Chief Kwin-Ni-Bi-Nah was buried, after whom I have named my collection;

also the 10th and 13th concession of East Flamboro, and the 7th concession of Beverly. In all these localities ossuaries have been discovered in connection with the ash-pits, except those in the 13th concession of East Flamboro. The ash-pits here are so different from the others I have mentioned as to merit special attention.

In the first place they are very old, being covered with soil and vegetable matter to the depth of two feet, and the ash-pits themselves are four feet or more in depth. In the first foot of the ash-bed pottery of different patterns was found; in the next two feet bones and bone implements, while near the bottom were broken and charred human bones mingled with the bones of the deer, the bear and other animals. This last circumstance proves that anciently the Indians of this village were cannibals.

As no articles of European manufacture are found in these ash-pits, we must conclude that the village ceased to exist before the beginning of the 16th century. It was in one of these ash-pits that I found my most valued ceremonial stone. In shape it is the segment of a circle's circumference, and nearly round; in size it is about 10 inches long and 1 inch thick; in color a reddish brown. There is a hole in the centre like that of a pick-axe ready to receive its handle.

The large univalve shells found occasionally in the ossuaries are interesting from several points of view. They are all of one type, being inversely spiral, or what is known as cone shells, and are said to be peculiar to the Gulf of Mexico. If so, we need not wonder that these Indians could tell LaSalle and other white men of the great river Ohio (which was identical with the Mississippi) and of the immense gulf into which it emptied.

Moreover, the Indians of Otinawatawa must have been either great travellers or enterprising traders, and very rich, as proved by the vast number of precious things made from these shells. From these precious shells were made wampum (or Indian money), beads, amulets and other ornaments of the highest character. Of the three cone shells in my collection, two came from the ossuary at Otinawatawa.

The Kwin-Ni-Bi-Nah collection includes about a peck of wampum, a magnificent necklace, two feet long, made of cone shell and stone beads, ranging in size from peas to acorns, and arranged so as

AN UNEARTHED OSSUARY ON BANK ABOVE LAKE MEDAD.

to have one stone bead followed by two shell beads. The above necklace was found at the bottom of the ossuary arranged in this order—the money of course, being decayed away. Also a very peculiar shell amulet, heart-shaped, 3½ inches by 4 inches in size, made from one of these cone shells, and having an owl's face carved on one side: (Query: Was the owl selected as representing wisdom?) All of the above I obtained from Otinawatawa stores, and yet I came upon the scene after the treasure-house had been ransacked.

Of perfect pipes I have about 40, besides a great number of broken ones; most of my perfect pipes are made of stone. One that I have is in an unfinished state, both the bowl and the stem being only partly drilled out. Perfect clay pipes are comparatively rare, owing, I presume, to their being so easily broken. Some of the above are carved so as to represent the human bust or face; others represent some well known animal. Some of these figures look towards the smoker and some in the opposite direction.

Of flint arrow-heads and spears I have about a peck; also several stone hammers and about 80 stone axes or adzes; also 4 totems (stone), one representing a bird and one a wolf; also a fine specimen of an Indian mill, weighing about 150 lbs. To the above list of articles of native manufacture must be added many bone and horn implements and utensils, as well as ornaments, such as awls, spears, needles, beads, latley bones, etc.

Of course my collection includes articles of European manufacture, such as iron tomahawks, glass beads of various patterns and sizes, a few copper arrow-heads, a pewter ring with I. H. S. engraved upon it, also an almost entire brass kettle, about 7 inches in diameter and 6 deep. The state of this kettle, though not quite entire, goes far to disprove the generally received opinion that the Indians invariably spoiled the kettles which they buried with their dead so as to prevent them from being stolen. Besides, why did they not destroy their pipes for the same reason? and again, if they were to be of service to the dead, to spoil them must necessarily defeat that object.

There is one thing that I have noticed in collecting Indian curios that we never come across a duplicate except in wampum and arrow-heads.

ANNUAL REPORT OF THE GEOLOGICAL SECTION OF THE HAMILTON ASSOCIATION FOR THE YEAR ENDING MAY, 1897.

The Section has much pleasure in submitting this, their annual report, because of the satisfactory progress which has marked its efforts during the past year.

The members who have met from time to time to carry on the work feel that they have been amply rewarded for the little sacrifice made in the interest of the Section, because of having been kept in touch with the march of geological discoveries, as well as the scientific topics, which are occupying the minds of the Palæontological students of the different countries. Last year, while Professor Rauf, the German student, was busy with the analysis and classification of the stromotoporidæ, Professor Head and others, of the United States, were engaged in studying the fossil sponges, the graptolites, and the star fishes. This year the channel of inquiry has been extended to include a large number of heretofore obscure genera and species.

The monograph of Professor Gurly, upon the graptolite of North America, alluded to in last year's report, has not yet been completed, and he has had sent to him, by Colonel C. C. Grant, additional specimens to further illustrate his work.

Since our last year's report the members of the section have had submitted to them some difficult problems relative to the possibility of their being a large area of the carbonaceous deposit in Ontario, because of the reported discovery of anthracite in the Algoma district among the Huronian rocks.

The amiferous rocks of Western Ontario have attracted the attention of not only the geological student and mining engineer, but also the enterprising speculator. Mining developments have revealed the fact that some of these rock areas possess much mineral wealth. This has had the effect of diverting much of our ready money into new channels, and as a result, a number of new towns, as they are called, have sprung up suddenly and dot the plains and the hillside.

During the past year the magnificent collection loaned by Mrs. Carry, containing many geological specimens, has been placed in the museum of the Hamilton Association. This loan, it is needless to say, is duly appreciated by all the members of the section. In addition to this, quite a large number of fossils have been added to the museum by Col. C. C. Grant, from the quarries of this vicinity and from the boulders found amongst the gravel on the Burlington Heights. Mr. A. E. Walker, the chairman, contributed polished sections of sponges obtained from foreign parts.

Colonel Grant, during his researches, has discovered what he considers to be the correct horizon of the arthrophycus harlanii, that is, in the upper sandstone bed of the Clinton formation, and not in the Medina as heretofore allocated.

Colonel Grant has prepared a list of the additions recently made to the museum. This list contains many new species not yet determined.

The Section discussed the advisability of having prepared a full and complete list of all the fossils contained on the shelves and the cases of the museum.

Papers of geological interest were read at all the meetings held by the Section. The following are the dates of the meetings and the subjects of the papers read :

1897.

Jan. 29th —" Notes on Some Recent Additions to Ontario Palæontology," by Col. C. C. Grant.

Feb. 26th.—" Local Fossils and Additions to Palæontology," by Col. C. C. Grant.

March 26th.—" Local Palæontological Notes Continued," by Col. C. C. Grant.

April 30th.—" Minerals of our Local Rocks," by Col. C. C. Grant.

May 27th.—" Concrete Forms and Stratography of the Cutting of the Spur Line," by Mr. A. E. Walker.

A. T. NEILL,
Secretary.

NOTES ON SOME RECENT ADDITIONS TO ONTARIO PALÆONTOLOGY.

READ BEFORE THE HAMILTON ASSOCIATION.

BY COL. C. C. GRANT.

The tunnel on Hunter Street, Desjardine's Canal and the southern shore of Lake Ontario, near Winona and Grimsby, afforded me, during the past summer, an opportunity of securing some rare and fairly well preserved Cambro Silurian fossils, embedded in drift shingle. I need not state how difficult it must be to declare whence travelled specimens came from originally. Take our Trenton and Hudson River rocks (lower Silurians), for instance; so many fossils are common to both. We may find it no easy matter to assert as to which of the series these wandering, water-worn fragments belonged. The term "Cambro Sil." has been objected to, and when rocks are found in situ and the horizon clearly defined, it may seem unnecessary to add to the nomenclature, but where the conditions are different, as in "the Drift," the name is assuredly convenient when characteristic specimens of a series are absent. Where a doubt exists, the general term "Cambro Sil." appears to be more suitable, since no error can possibly occur. The Drift specimens of the tunnel, Hunter Street (with perhaps one or two exceptions), were well-known Upper Hudson ones, and were rather few in number; this may be owing in a great measure to cemented gravel adhering to the shingle, which prevented one from noticing the indications outside. The Lake Iroquois Beach, at the canal, presented some interesting slabs before the debris at the foot of the cliff, near the bridge, was broken up for road metal. This locality is well-known to possess fossiliferous shingles, containing many rare and well preserved fossils, chiefly from the Upper Hudson River (or Bala) series of our English Geologists. However, a Trenton Slab also occasionally puts in an appearance, as well as others, difficult to locate since the organic remains are common to both. It has long been a favorite hunting ground for local collectors (the writer included); Dr. Spencer, F. G. S.; the Rev. Dr. Hartley Carmichael; my friend, the late Wm. Turnbull, etc. On breaking up a few of the water-worn shingles which had been detached from above last spring, I discovered remains of two or three Lingulæ, which differed from any figured, at least in one case; and from a large flag, containing two Trenton fossils, the interior cast of a valve which appeared to bear a near resemblance to the Clinton Lingulæ (L. perovata—Hall). Close beside it, another in a badly fractured condition, displayed the concentric and longitudinal lines characteristic of the Trenton Obolus Filosus, figured on page 200, 3rd edition, Dana's Manual. The hollow cast of a Lingulæ valve resembling L. quadrata (Trenton also), was obtained at the same time and place, and I cannot find either mentioned as putting in appearance in Canada, by Billings, Spencer, or Nicholson. So we may record the circumstance.

Some of the hard red shingles at the canal contain numerous specimens of the minute Ostracod, named by T. R. Jones, Royal G. S. London—Leperditia Canadensis. I was surprised to find embedded in a grey limestone there, several examples of this interesting microscopical group (varieties probably), differing in size (and shape occasionally). May not this represent different stages of growth, as well as varieties proceeding from the parent stock? A Cyrtodonta, nearly related to C. Hindi, is rarely found at the Iroquois Beach, and a fine cast of Orthis Occidentalis (Hall) is occasionally discovered. The late Mr. Turnbull informed me he preferred the modern lake beach to any locality near Hamilton for lower Silurian fossils. The shingle there is free from adhering gravel or sand, and one can more easily detect outside indications of the organism inside. That may be so, but for my part, I formerly found more rare specimens in the gravel pits at Slabtown than at the Beach. I have not been there for many years. It appears to be an unknown hunting ground to them.

The lake shore near Winona and Grimsby furnished me with some very fine Cambro Sil. Slabs during the past summer; some few are in one of the cases of the museum, but the greater part were too large for the limited space on the shelves, and were forwarded to the Redpath Museum, Montreal, which already possesses an interesting collection of our local fossils.

Sir W. Dawson, when in London a few years ago, described and figured several of the organic remains from Hamilton, Ont. More recently, I understand, the Toronto *Globe* gave a brief account of another paper in which the grand old Canadian geologist calls attention in the motherland to some others obtained since from this neighborhood. A very large quantity of drift and boulders was deposited on the lake shore about a mile east of Winona Park. The land there is slightly sloping, and merely a few feet above the surface of the lake now. The mottled red and white sandstones of the "Clinton Upper Red Band," of the Grimsby ravine and quarries, leads me to suppose that some at least of this material was brought down by river floods, conveyed by lake currents and ice perhaps to the point in question. This current along the southern lake shore, alluded to in a paper by Mr. VanWagner, Stoney Creek, hardly admits of disputation. I have noted it experimentally at Winona when the water was perfectly calm, and also when the wind was actually blowing from an opposite direction. The granites, greenstones or other igneous boulders are not uncommon in the "Erie or boulder clay." The Lake Ontario itself is gradually gaining on the land at Winona Park, more so than is generally supposed, and if unchecked the encroachment may surprise many who believe it a trifling matter, not likely to occur for many years yet, nor in our time. The limestone shingle in many places along the lake shore is exceedingly tough under the hammer, and it is by no means an easy matter to extract the fossils uninjured, yet occasionally you find exceptions as in a large slab containing numerous generations of the Trenton Bracheopod, "Leptæna Sericea," found also in the Hudson River or Bala beds. I cannot find in the Palæontological works I consulted any reference to a species of this shell, a variety perhaps, with a shorter hinge line. It usually occurs at least on a different layer. It bears some resemblance to L. transversales, of the Clintons, presenting however, a more flattened appearance, which may be due to pressure. The keeled and sculptured Cyrtolites Ornatus (Conrad ?) L. Sil. Europe also occurs in a hard limestone, together with numerous casts of Murchisonea Gracilis ; it proves difficult to extract. It seems strange to find it so frequently associated with the other Gasteropod. While we added a few specimens to our collection of local drift fossils recently, the Geological Section must admit it is still very incomplete, and poorly represented in our cases. The late Professor Nicholson does not seem to have been even as successful as ourselves, since he merely figures in the Palæontology of Ontario a little over a dozen already known as Hudson River Characteristic Fossils.

This able Palæontologist, intimately acquainted with the Lower Silurians of Ohio, U. S. A., etc., arrived at an opinion which the writer thinks hardly admits of dispute, viz: That the greater part of our Cambro-Sil. limestone shingles along the lake shore of Ontario originally came from Hudson River (Upper Bala Beds). In the limestone shingle on the Beach at Hamilton, along the lake shore as far as examined, the examination agreed with the same conclusion. When quartered formerly at Toronto I got a considerable number of specimens along the lake shore by wading into the water and examining not only the upper surface of shingle, but the lower also, turning over any likely looking flag or pebble.

The catalogue of Drift Fossils, Hudson River formation, found by Dr. Spence., F. G. S., on the old and new beaches, is incomplete, although he names a few which apparently were not discovered in Ontario by Dr. Nicholson. In addition to the few specimens I have already mentioned, I think several others may be added to Professor Spencer's list—Ambonychia Bellistriata (Hall), who gives it as Trenton; one found by writer at the Iroquois, and another at the modern Beach by the late W. Turnbull, Murchisonia Bellicineta (Hall), Strophomena Fluctuosa (Billings), (found at Anticosti also), Bellerophon bilobata (Hall). There are three or four specimens of a Nov. Gen. figured by Hall and Whitfield in the Palæontology of Ohio, viz.: Orthodesma Contracta, O. Curvata, O. Recta. I have been unable to find any record of their occurrence in Canada. All three, however, are found at the Iroquois Beach, and two in lake shore shingle; one (or more perhaps) was in Mr. Turnbull's collection from the modern Beach. Orthonota Parallela (Hall), according to same authors, belongs to this new Genera.

At the lake shore near Winona, recently I discovered the cast of a dorsal valve of a Crania. I thought at first it might prove nearly allied to C. Lælia (Hall), a Cincinnatti specimen, even although I remarked the absence of radiatory Striæ characteristic of the species, and also its occurence in what I considered a Trenton limestone. On comparing it subsequently with Dr. James Hall's figure and description, I saw I was mistaken; the outline is oval, not circular, the apex prominent, not sub-central, but close or nearly overhanging the cardinal margin. I cannot recall any of the Cranidæ it resembles, and I doubt if it has been claimed as a Canadian hitherto—Strophomena Nicrassata (Hall). There are several others in so imperfect a condition that it would be exceedingly difficult to recognize them. Some undoubtedly may be referred to Cypricardites (Conrad) and Certodonta (Billings). Professor Miller considers the claim to priority of nomenclature should be admitted and accorded to Conrad. Cypricardia was a name conferred by Lamark many years earlier than either.

In conclusion I cannot see why we do not possess a more varied assortment of Hudson River and Trenton Drift Fossils. We certainly could double the number recorded by Dr. Spencer, F. G. S. With few exceptions the young fellows in Hamilton take but little interest in our Association or its Sections. In all matters relating to Natural History, Antiquities, etc., Canada lags far behind. There is hardly a city in the United States, of moderate size, where you will not find a naturalist located as a dealer in shells, fossils, corals, etc. An establishment of the kind does not exist even at the seat of govern- of this Province, Toronto, and where a flourishing University exists. It does not seem creditable to Ontario that we are compelled to send to the United States for almost everything we require in the shape of Natural History objects. I often wonder why men who have been well educated will rush into professions already overcrowded and neglect opportunities of starting Natural History establishments so much needed here. I know many are doing well in Rochester and Albany; there are two in the latter place, and perhaps others that I am not acquainted with. On mentioning the circumstance to a gentleman recently, he remarked: "Yes! you see Canadians don't care for things of that kind." At a future time I may offer a few remarks on lately acquired Clinton or Niagara fossils. I annex a list of the Cambro-Silurians which may be added to the ones recorded by Dr. J. Spencer, F. G. S., etc.

SPENCER'S LIST.—FOSSIL FROM MODERN AND ANCIENT BEACHES, HAMILTON (CAMBRO SIL. DRIFT).

Stenopora Fibrosa	Goldfass
Columnaria Alvaolata	Billings
Athyris Headi	"

Strophomera Alternata . . . . Conrad
Strophomera Deltoidea . . . . "
Modiolopses Modeolares . . . . "
Avicula Demissa . . . . "
Cyrtolites Ornatus . . . . "
Orthis Occidentalis . . . . Hall
Obolella Crassa . . . . "
Ambonychia Radiata . . . . "
Murchesonia Gracilis . . . . "
Orthoceras Lamellosa . . . . "
Orthoceras Cribisepta. . . . . "
Leptaena Serecia . . . . Sowerby
Orthis testudinaria . . . . Dolman
Orthis Lynx . . . . Echwold
Cyrtodonta Narrietta . . . . Billings
Modiolopsis—several . . . . ——
Orthonota . . . . ——
Ctenodonta . . . . ——
Syrodesma post-striata . . . . Emmons
Leperditua Canadensis . . . . Jones

CAMBRO SIL. DRIFT FOSSILS FROM HAMILTON AND LAKE SHORE, WINONA.

Diplograptus Hudsonicus . . . . Nicholson
" Pristis . . . . Hall
Graptolite undetermined yet.
Orthodesma Contracta . . . . Hall
" Curvata. . . . . "
" Recta . . . . "
" Parallela . . . . "
Orbiculoidea Tenni lamellosa . . . . ——
Obolus filosus . . . . Hall
Murchesonia (not M. Gracilis) Bellicinata . . . . Hall
Bellerophon Bilobata . . . . Sowerby
" Expansa . . . . Hall
Crania—undetermined yet—2 species.
" Scabiosa . . . . Hall
Discina—1 or 2 species . . . . —

Lingulella—2 species.............................——
Modiolopsis Concentrica..............................——
" Pholadeformis..........(recognized by Prof. Foord)
Cleidophorus Placinlatus..............................Hall
Leptobolus...Hall
Cleidophorus Sp.......................................Hall
Leperditia—several varieties.............................——
Orthoceras Mulle Cameratum..............................——
" Junctum..Hall
Strophomena Fluctuosa..................................Billings
Ambonychia Belli-Strata.................................Hall

(A few others undetermined yet).

NOTE.—About 22 added to Spencer's list.

NOTE.

Since our last meeting we forwarded a considerable number of fossils from Hamilton, viz.: to Mining School, Kingston University; Geological Survey Office, Ottawa; Smithsonian Institute, Washington; 2 boxes containing 60 Graptolites, about 50 others respectively, with a few more local forms added.

A request was made for a few Silurian Fossils by Mr. Patterson, T. C. D., which was sent to Dublin, per post.

Another small collection, about 12 Graptolites, was transmitted direct to Dr. Gurly, by same means.

We have also furnished some few local collectors with named characteristic specimens of local fossils by request. They are such as are generally found here. We may at least hope these may induce a few of the recipients to take a little interest in the Geology and Palæontology of a district which attracted the attention of many outside the Dominion itself. Dr. Head, of Chicago, on a recent visit, very kindly presented a small collection of Niagara sponges and sections from the Tennessee beds, U. S. A., to the Museum. Some of the specimens appear to be new Genera or Species.

A small collection of Hexactineled sponges, etc., from here, was also forwarded to the Queen's College, Cork, Ireland.

LOCAL PALÆONTOLOGICAL NOTES IN CONTINUATION.

READ BEFORE THE GEOLOGICAL SECTION OF THE HAMILTON ASSOCIATION.

BY COL. C. C. GRANT.

The Medina rocks, following the Cambro Silurians in ascending order, afforded us very few organic remains recently. The freestones of the grey band have been nearly worked out here. It could hardly pay to quarry it close to the escarpment, owing to the thickness of the debris, etc., resting on it. The freestone quarry near the reservoir, where I obtained so many Fucoids formerly, was abandoned many years since. An Athyris was not uncommon on, or rather inside, a thin layer, which, if not identical, was closely allied to Athyris Intermedia (Hall). As the specimens represented only internal casts, it would not be safe to be positive on the point. They displayed the concentric lines of growth and general appearance, but were larger than the Clinton Brachiopod. This, as also a Gasteropod obtained at Grimsby Ravine from a large detached block, may be added to Dr. Spencer's rather meagre list of Medina fossils. It was sent to Ottawa for Professor Whiteaves' determination. He thinks from a hurried examination it may come under the head "Holopea." Where the mouth (orifice of the shell) is not clearly displayed, there is always a little difficulty in classification.

Dr. Spencer mentions the few shells in the series are mere casts in the grey band Sandstones, ill preserved. Appended, you will find some few others, in List B., unknown to Spencer, but I am under the impression I may have omitted others (not more than three or four probably). Even with this addition, the series display in this neighborhood is a decidedly meagre list of all organic remains, save Fucoids. Dana remarks: "The rocks of this epoch, in New York and further west, contain few fossils also." Dr. James Hall, however, describes specimens we have not found here yet.

The Orthoceras, now in the Redpath Museum, Montreal, was obtained from the under surface of a thick layer in a quarry near the city, and the Stromatopora, from the upper of a singular block, in a pocket or hollow. Both quarries have since been abandoned (worked out).

We next come to the overlying Clinton beds, known in the Old Country as the "May Hill Sandstones." You are all aware how the action of the Grand Trunk Railway authorities closed up and rendered inaccessible to us the chief and most interesting portion of this series, below the brow of the Niagara Escarpment. It appears difficult to understand how such a clause was ever inserted in a Dominion Railway Act, without the approval of the company and its legal advisers. How it was smuggled in without opposition from the representatives of Nova Scotia, a province possessing such a man as the Hon. J. Howe and others, seems incomprehensible. New Brunswick, too, the home of Harte, Bailey and Mathews—why were its representatives silent when a clause was inserted in this Railway Act, which unfortunately admits of no explanation, save this: It was passed through ignorance and carelessness, by such men as we Canadians generally select (especially in Ontario), as representatives (?) It seems unfortunately true, as was remarked recently, the better class of men in Canada feel little disposed to take an active part in politics. This circumstance may explain the reason for the purchase at Ottawa, a short time ago, of an old ramshackle building for the Dominion Geological Survey Office and Museum, altogether unfitted for the purpose, where the priceless treasures therein contained are in danger of being destroyed by fire, etc., at any moment. Are they not insured? Perhaps, gentlemen of the Dominion Parliament, there are organic remains contained in that totally unsuitable building that never could be replaced and that money could not purchase. Do not, through ignorance or indifference, ignore the representations frequently brought to your notice. Do not afford our cousins south of us further grounds for tauntingly upbraiding Canada with the slow progress we are making in Geological Science. When our neighbors point out the extent of yet unexplored territory, I presume they allude to what all scientific men know, viz.: That the Geological Survey Staff is insufficient in number for the work it has to perform. How it has accomplished so much, with such inadequate means, is what must astonish any one who takes the trouble of examining the maps published by the survey.

An erroneous idea generally prevails in Ontario that the chief object of the field geologist is to find out and locate where minerals occur. We want some show for what geology costs us. If this expressed opinion is accepted and passes without rebuke from legal legislators at the seat of government at Ottawa, need we be surprised when men of similar pursuits as ours in the United States scornfully point to our Dominion as the only civilized country in the world that places impediments in the way of scientific investigation—that offers every obstacle possible to research. I am reminded the States are not themselves beyond reproach. Witness the case of the late Professor Winchell, for instance. Well, that was the act of a few fanatical bigots. The regents of an obscure denominational college, whose very name was almost unknown outside its own state until the Professor's appointment to the chair of Geology attracted attention to it. The Michigan University, of far greater importance, was only too well pleased to offer a wider field for the exercise of his unquestioned abilities. That was merely the work of about half a dozen ignorant, narrow-minded bigots, whose action was received with contempt or indignation both in Canada and the States. But is there not a measurable distinction between an act emanating from such men and an Act passed by the Dominion Parliament, which renders the Canadian naturalist liable to be prosecuted as an ordinary vagabond if he happens to cross a railway track in pursuit of a butterfly, or as a geologist ventures inside a railway fence to examine the face of an escarpment or cliff in order, in the interest of science, to settle some disputed point, or obtain for a Canadian museum a rare fossil not found elsewhere?

In an extract taken from the *Canadian Magazine*, written by G. T. Blackstock, I find as follows: "When we are making bold to emulate her (the United States) prosperity, at the same time that we exhibit a higher civilization, a better type of manhood, it is at such a time that an artificial handicap is placed upon us in the race by the solemn acknowledgment by the mother country, in the face of Christendom, that the United States is the paramount power on this continent." Now is this fact, above stated, proof of the more advanced civilization he claims for our Dominion? When I mentioned to a Smithsonian and another Professor lately that I regretted the Directors of the Grand Trunk Railway had warned off naturalists from the chief points of interest about Hamilton, and mentioned the reason assigned for so doing, they expressed considerable astonishment at such an occurrence, and doubted if the railway people had not made a stupid blunder in wrongly putting a construction never intended on the clause of the Act in question. A higher civilization —how is that displayed? Take science for instance. A short time ago the Dominion Geological Survey Office was removed from Montreal to Ottawa. No preparation was made to provide a suitable building for the priceless organic remains, minerals, etc., collected at great expense during half a century. I am informed that a gentleman who possessed some influence, political I presume, had a sort of white elephant on his hands in the shape of an old barrack which he could not convert to any useful purpose. He interviews his friend, the head of a government department, and states he is willing to dispose of the same for the required offices, the bargain is made, and the Director-General of the Geological Survey invited to take possession of the recent purchase. It was useless to remonstrate and point out its unsuitability for the purpose. "Now, my dear fellow, stow away your confounded old stones and things as well as you can; it is too late to tell us all that." No money insurance could compensate the Dominion, or restore even a fraction of the loss we may sustain at any moment, by an accidental fire, for instance. A short time ago I understand some very uncomplimentary remarks regarding the progress of scientific research in Canada, appeared in a paper published in the States. I have not seen it. If we are open to a charge of this sort the blame does not lie with the staff of the Geological Survey Office. The annual sum appropriated by the Dominion Legislature is quite inadequate for the survey of a territory as extensive as the United States combined; independent of that, what a vast difference there is in examining and reporting on an unexplored country and one that has been opened up and penetrated by rail or road in all directions. The fault, if it exists, does not rest with the staff, but the government, which grudgingly gives the smallest sum for the advancement of science. "The chief object of geologists," remarked a gentleman who visited the Museum recently, "I take it is to locate on the maps the places where valuable minerals may be discovered." Our visitor's views most probably are entertained by a great many representative men at Ottawa, and sarcastic remarks we may expect from our relatives south of us, until a superior class, educated in Canadian Universities, are selected by members of the Dominion Legislative Assembly to replace many whose sole ambition seems to be merely to advance their own interests. Party feeling, appealing to ignorance, a purchased press, "Tory, Grit or Independent," sums up the glorious record of Canadian democracy. But despite all the disadvantages imposed on our Section by the Dominion Parliament or Grand Trunk Railway (and no person can imagine the infamous clause of the Railway Act was inserted without the knowledge and concurrence of the Company) I am enabled to submit for the information of the members, a considerable addition to the list of Clinton fossils published by Dr. Spencer, even though debarred for many years from prosecuting research along the base of the escarpment at "the bluff" and other interesting points. I annex the lists. I feel, however, at the same time, that in the latter many others are omitted which were obtained several years before specimens were placed in our museum cases.

Despite all our disadvantages and the very restricted portion of the Clinton or Mayhill Sandstone series now exposed to research, we have succeeded in securing some specimens of considerable interest. One is well-preserved Crinoid, with jointed arms, something like a Lecanocrinus, yet I do not think it can be brought under that head; indeed, for that matter, I am unable to find any typical representative figured either in Hall or Billings. Dana mentions that a few Crinoids and fragments are known in this series, but all I see regarding them is in the works I consulted. Two only are named (common also to Niagaras). Another specimen from the shales above the Medina Greyband, also recently obtained, owing to its imperfect state of preservation presents a very puzzling appearance. The writer and our chairman agreed on one point, viz., that it was neither a sponge or coral, although some resemblance to each was noticed; finally we determined to submit it to the Palæontologist of the Dominion Geological Survey, Prof. Whiteaves, for examination, who thought it was an Echinoderm, a Blastoid probably. No doubt it belongs to the Radiates, and it bears a marked likeness to the upper surface of a Blastoid. Yet it may be related to Palæocyclus Rutoloides, one of the Echinus family, found also in same horizon in the States, and figured in Dana's Manual, 3rd edition. The upper valve of a Crania (probably N. S.), may also be noticed as occurring in our local Clintons, particularly since I can find in no work I consulted that this family is recorded as being hitherto obtained in this rock series. Species are found in the Hudson River below and in the Niagaras above.

We have learned from the Toronto papers, that the British Association have accepted an invitation from some of the Professors and gentlemen there interested in scientific matters, to visit that city in August next. It is, we understand, the intention to ask the men of science to devote a day to Hamilton and vicinity. If the statement is true, would it not be as well for the Hamilton members and civic authorities to endeavor to have that infamous clause of the Dominion Railway Act rescinded while they are here. To welcome scientific men from Great Britain and Ireland, if they venture to hunt for organic remains in the most interesting portions of our rock exposures, by prosecuting them as trespassers and tramps, seems rather a singular way of displaying hospitality. "*This is the only civilized country in the world that endeavors to retard the progress of science*," said a gentleman from the States recently, when informed that we were debarred by the Legislature of this progressive and enlightened Dominion, from pointing out the locality where colored Lingulæ are found.

We do not presume to anticipate the steps the municipal authorities of Ontario may take in according the visitors a cordial reception and warm welcome. Yet, subsequently, members of our Association are likely to be placed in the humiliating position of being compelled to inform our invited guests that we are unable to show them over the places where our rarest organic remains are obtainable; that scientific research is looked upon in our Dominion as the pursuit of some idle trespassers, who travel about on foot, instead of taking *the cars*, thereby showing a most reprehensible example to the general public. In the face of such a representation, will not the reception accorded excite anything but contempt for the Federal representatives, whose Railway Act restricts us to the very limited exposure of the corporation and two private quarries at Hamilton, and the long since abandoned ones at Grimsby, containing Dr. James Hall's Silurian Fucoid, Arthroplycus Harlani, which occurs in better preservation there than any found hitherto, perhaps in Europe.

When we consider that all the rarest fossils in the neighborhood of this city have for many years been locked up, or enclosed through the action of the Federal Parliament of the Dominion, that we are unable (now especially) to exhibit a fair collection of local organic remains, star fishes, crinoids, colored shells, etc., are we not fully justified in indignantly denouncing (not only in the interest of science, but of Ontario itself), an act which cannot fail to bring discredit to every Canadian?

I am quite assured, while some may feel disposed to conceal the matter, you will not find one to defend it.

LOCAL PALÆONTOLOGICAL NOTES IN CONTINUATION.

READ BEFORE THE GEOLOGICAL SECTION OF THE HAMILTON ASSOCIATION.

BY COL. C. C. GRANT.

When the Secretary of this Association suggested that a complete list of Local Organic Remains was much required, and that it would be of interest, probably, to some outside the immediate neighborhood who may wish to ascertain whether the fossils discovered here differ from others found elsewhere in similar Silurian rocks, while I admit the request was very natural on his part, we must feel the difficulty of compliance, since our Hamilton fossils were scattered far and wide before the Museum here was established, and no record kept of the specimens so distributed. All that possibly can be done now is to add to Dr. Spencer's Catalogues (the only ones published already), specimens since obtained or others which have not quite passed from recollection.

The Niagara Graptolites and Hexactinnelid Sponges of Hamilton have attracted no little attention outside the Dominion. As regards the former we may be permitted to mention an extract taken from the *Ottawa Naturalist*, written by Dr. Ami, Dominion Geological Staff, viz.: "Dr. R. Gurley, in the *Journal of Geology*, Chicago, gives an interesting list of the species of Graptolites of North America, and in this list are included several species of Graptolites (Canadian) from various formations and localities which are new to science." Dr. Ami thinks that there is no country in the world which can boast of so many and so well preserved specimens of Graptolites as Canada. Since Dr. James Hall's splendid work on the Graptolites of the Quebec group, in 1864, several new forms have been discovered in the lower Province by Dr. Ami, and other officers of the survey. Indeed, it is not improbable that some of us may be compelled to modify our views yet regarding the culmination of the family at a later period in our Niagaras. The two last boxes forwarded to Washington from this, have been received. They contained 112 Graptolites, and one of them contained quite a number from the upper or glaciated chert, which appeared to represent new genera or species. We must not forget several specimens recently have been found in Europe, and described by Lapworth and others who take great interest in the ancient Sertularians. Including small parcels transmitted through the post-office, and ones previously received, probably the Smithsonian Institute is in possession of 400 from Hamilton alone.

When these organic remains are examined and described by Dr. Gurly, we hope some at least will afford connecting links in the chain of life, with specimens obtained from the well known Quebec group of the Canadian Geological Survey and of the late Sir W. Logan.

Perhaps second only to the Niagara Graptolites in interest are our local Sponges, and, unfortunately, as yet few have been figured or described.

When Dr. Head, of Chicago, was in the city recently, we called his attention to a few specimens he had not seen before, and offered to loan them for description. We believe he declined these on the ground that his work on the Niagara Sponges was already completed. Merely a portion of Professor Rauff's magnificent monograph on Fossil Sponges, etc., is known to us here, viz.: the beautiful illustrations accompanying the work, owing to unacquaintance with the German, for unfortunately in the Dominion modern languages, outside of our own, are looked upon as possessing a tendency to disunion. Of course we recognize, as Canadians of this Province, Ontario, that it would be better for the Dominion if all its inhabitants adopted the language usually spoken on this continent. Now it appears, however desirable this may be, we ought to recognize the colonists of the older Province, Quebec (of French extraction chiefly) are unanimously opposed to such a proceeding. You may recollect a paper published in our Proceedings for Sessions 1890-91, written by a member (H. P. Bonny); in that you will find the following remark referring to this subject: "When you find a body of over a million, compact and autonomous, it is absurd to expect that they will change their speech." If such is the case, and if we are ever to become a united people here, would it not be of some little advantage to make French in our schools compulsory, or substitute this for one of the dead languages which seldom are of any use in after life? To the scientific student now a knowledge of such languages as French and German is almost indispensable. As our President has not yet received the concluding portion of Prof. Rauff's great work on "Fossil Sponges," it may not be considered advisable to give at present an imperfect list of our Niagara-Hamilton forms until all are figured and described. In our museum cases you may notice a Globular Sponge, which I pointed out to Dr. Head, of Chicago, recently; the outer surface is covered with minute pores, with larger ones interspersed somewhat irregularly. While in shape it corresponds with Bolastronia granti (Head), the star-like markings appear to be altogether absent. It seems more than doubtful, therefore, if it comes under this Nov. Gen. The specimen in the case is the only one found here as yet.

While I feel assured that many of the Glaceated Chert, Flint-flake Fossils, Cladoporæ, etc., remain undescribed, perhaps it would be better to omit allusion to them until such a time as some one can be found to make such obscure fossils a particular study.

During the past season very few sponges or sections of sponges were obtained in the field on the escarpment beyond the Reservoir; the chert lumps have not had, as yet, sufficient time to weather, and in the ones nearer the city and better known, few are left that are worth removal. The flint-flake localities near the corporation drain proved also rather disappointing. The conditions, however, were not as favorable as in previous years; there was greater difficulty in finding specimens owing to the nature of the crop; if the stubble is long, for instance, or clover laid down to replace oats, etc., it is exceedingly hard to pick out organic remains at all.

A few Gasteropods (sea snails), scarcely so well preserved as to admit of description; a large and fine Crania, like one found several years ago, which was either sent away or lost in removing; and a small Subulites, sums up nearly what the flint-flake fields afforded us last season; however, it may be remarked, that it was necessary to devote more time than usual in order to furnish Dr. Gurly with as complete a collection of the Niagara Graptolites as were obtainable here, in order to enable him to complete his Monograph. These ancient Sertularian remains (duplicates in some instances), were forwarded, not only to the Geological Survey Office, Ottawa, but likewise to the Redpath Montreal Museum. In fact we are open to the taunt, while the Geological section of the Hamilton Association furnishes our own cases with few specimens, we are, perhaps, too liberal in recklessly distributing far and wide all that may be more wisely retained as characteristic of that upper portion of the Silurian age here. Unfortunately we have not sufficient room. The Hamilton Graptolites alone would fill the largest case in the museum, and if a complete set of the Niagara Sponges, sections and varieties, displaying internal structure, etc., could be procured, they would take up a far greater space than we can now afford.

Only a few visits were paid, during the past season, to the water-lime quarry (Barton-Niagara), Russeaux Creek, and nothing new was found there. Appended to this Journal of Proceedings you will find a catalogue of our local Niagara fossils by Dr. Spencer, F. G. S., etc. Others are added, although the list is supposed to be yet incomplete.

THE MINERAL OF OUR LOCAL ROCKS.

READ BEFORE THE GEOLOGICAL SECTION OF THE HAMILTON ASSOCIATION.

BY COL. C. C. GRANT.

My friend, Mr. Neill, President of the Hamilton Association, at a recent meeting of the Geological Section, informed us that he had received from a "well wisher" (anonymously) the very liberal contribution of $20, to be expended in a certain manner that the writer indicates, in order to induce the younger generation to take a greater interest in Canadian Natural History, Minerals, etc. With your permission, gentlemen, I respectfully submit some few notes on local Mineralogy, which may prove of some little assistance to the student, if I rightly interpret the intention of the generous and anonymous donor. I have noticed, more especially of late, quite a number of people here take a far greater interest in Mineralogy than is generally supposed; doubtlessly this is owing to the prominence of late given to mines and mining matters in the public press. I remarked, on several occasions, onlookers were attracted to the various rocks, Auriferous Quartz, etc., displayed in city stores on some of our principal streets. Farmers, not unfrequently, bring me specimens of decaying granite boulders, containing veins of golden or silver mica, for examination, and are much disappointed when informed they did not possess the properties of the precious metals; iron pyrites also are often mistaken for gold. At or about the end of last month I was shown a very fine cabinet specimen of the latter; its owner concluded there was a copper mine close by somewhere, and did not seem altogether satisfied with what he heard regarding it. It came, perhaps, from a pocket in the Barton Niagaras at Lime Ridge, or may have been obtained from lower beds of limestone nearer Hamilton. The Mineral appears to be rare in both, at least in the Crystalline form. Still rarer a Pseudomorphus Crystal of Sulphur, one that presents a form which is foreign to the species to which the substance belongs (Dana). In the case of the only one seen by me in Canada, it occurred in the Hancock Quarry at the head of the Jolley Cut. It assumed the primary cubic shape of a Fluor Crystal, and was enclosed in Dolomitic Limestone. Probably the original Fluor disappeared, and the space it occupied was refilled by infiltration of the matter. Sulphur Springs are very common in this district. One which was tapped in the waterlime beds of Russeaux Creek, two or three years ago, left a large deposit of the Malodorous substance there.

Mr. Carpenter formerly opened a quarry on the Barton and Glanford road, a few miles in rear of the escarpment, for road metal. Unfortunately it has long since been abandoned. To a few of us in Hamilton it was known as "the Barton Mineral Quarry," and we thought it richly deserved the distinction, owing to the large number of small, but beautiful, Fluor Crystals, as well as various minerals occurring in limestone pockets. The former (wine-red, sky-blue, white, etc.) were exceedingly brilliant, and had so much the appearance of real gems that Dr. Spencer and the writer had some difficulty in convincing the farmers' sons about the place that they were not the genuine articles, and were deficient in hardness. They were so much admired by visitors that I gradually gave away my entire collection, and found, by accident only, one poor specimen remaining, which I placed in a museum case. One of the minerals found was recognized by Dr. Spencer as Elastic Bitumen. He mentioned that it was considered very rare, and on reference to Dana I found he credits only three places with its possession, viz.: a lead mine in Derbyshire, England; a coal mine in Montrelais; and at Woodbury, Ct., in a bituminous limestone. Mineral tar was another strange production there. Dr. Spencer mentioned it in a paper, but he did not venture on any theory regarding its origin. It was found in pockets also. I noticed there an unusual number of crushed Cephalopods, so completely flattened by over-pressure that it was altogether impossible to form any idea regarding the species whenever four or five were found massed together irregularly—some lying across others and all presenting the peculiar appearance of the Mount Bolca Fishes I had previously examined in Europe. I found whenever a pocket in the limestone underneath occurred, it was almost invariably filled with mineral tar (bituminous matter), and that petroleum was derived from animal matter—at least in this instance—can hardly be disputed, and for the reason given in a former paper published by the Hamilton Association, I doubt if mineral oil owes its existence to vegetable matter at all. I believe it to be a production of the animal kingdom. Zinc Blende (Galena) and Celastine were obtainable also in this quarry. I got a few fossils. An Avicula, probably N. Specis, occurred in the lowest bed of all. I have not been there for many years, and I am not aware whether it has been re-opened since.

In the quarries at the head of the Jolley Cut some fine cabinet specimens of White Baryta, Selinite and Earthy Gypsum are obtainable not unfrequently in the thick limestone band below the Niagara Shales, which is known to the quarry-men by the singular name of "the nigger-head bed." You may notice in it occasionally empty pockets lined with what is commonly called Dog's-tooth Spar. The mineral gypsum has a great affinity for moisture, rain water, etc., and if it succeeds in penetrating to where its relative is concealed, it takes it off altogether, and merely leaves the empty pocket—the void or hollow—which we are asked to explain. In numerous instances the student of Mineralogy may notice in our local Niagara rocks that Selenite undoubtedly was deposited at a period subsequent to the formation of the Dog's-tooth Spar. In many instances you may notice the transparent mineral resting on the crystals.

The travelled boulders brought from the north in the great Ice Age, which we remark lying on the surface of the fields in every direction, do not come under the head of local rocks, yet specimens of much interest are frequently embedded in them. A vein in a greenstone, close to the road fence near the Lime Ridge, afforded me a remarkable fine cabinet specimen of Feldspar (Orthoclase). This mineral, one of the constitutents of granite, is used extensively for the manufacture of porcelain or china ware, and may prove of some commercial value if only the original place it came from could be discovered. Another boulder near the corporation drain afforded me Silver Mica and Black Biotite, while another presented some inferior Crystals of Garnet.

A fragment of a Metamorphic Rock (a Quartz and Jasper Conglomerate), was presented to me some time ago. It was said to be taken from a weathered, rounded boulder near Waterdown.

Professor Chapman, Toronto University, mentions that this remarkable Conglomerate occurs in Situ, north of Lake Huron. Well, to-day this ancient traveller finds a resting place at last in the cabinet of *another tramp*, perhaps less appreciated.

The above-named gentleman published a very useful work some years ago, entitled, "A Popular Exposition of the Minerals and Geology of Canada." The student will find the later (corrected edition) useful. Dana's Mineralogy, an excellent work for more advanced students of the science, is, I am told, universally used as the text book in the leading universities of this continent. The gifted author's researches seem simply marvellous—they were not confined to America. Every country on the face of our globe contributed its natural mineral treasures to enrich the pages of nature's famous historian.

How applicable, although not addressed to Dana by Longfellow, are the words of the invitation :

"Come wander with me, she said,
Into regions yet untrod,
And mark what is still unread
In the manuscripts of God ;
So he wandered away and away
With Nature, the dear old nurse,
Who sang to him night and day
The song of the Universe."

As regards the localities of minerals, it is absolutely necessary for the young collector to possess some little knowledge of what scientists call Igneous, Metamorphic and Sedimentary rocks (the latter alone are represented in situ in this part of Ontario) ; the cavities in the other two are frequently rich in minerals. It would be advantageous also to possess a few characteristic fossils of the various formations known to geologists. We often learn, for instance, that gold has been found in a quartz vein running through rocks of a certain age. We may be enabled to discover it in other localities on finding the organic remains to correspond with the named specimens in our possession. Men known as practical miners (not mining engineers), often know but little respecting the dip of the rocks, the direction of metal-bearing veins, etc. We feel how hopeless a task it is, however, to endeavor to convince the general public in Canada to the contrary. Thousands of dollars have already been buried deep in the soil, in a fruitless search for coal in Silurian sea sediments. Well, it reminds me of an occurence in Ireland about the time I received my first commission in Her Majesty's Service. The Government of the United Kingdom of Great Britain and Ireland, after mature deliberation, arrived at the conclusion that the natives of the latter Island could not well prove an utter neglect of their interests, when we, My Lords, have already directed the general officer in command of the scientific branch of the army, to select such men, officers, etc , as he may consider necessary to carry out the suggestions of certain supporters, who ask us to give them what they call a Trigonometrical Survey of that portion of the empire. In due time, detachments of the Royal Engineers (then known as the Royal Sappers and Miners), arrived and commenced operations by erecting pillars of large, loose boulders on the highest points of the mountain chains. English tourists, I understand, have mistaken them since for Druidical Monuments, or Altars of the Pagan Sun Worshippers. Unfortunately, during the progress of the work on which they were employed, some Silurian Graptolites were laid bare and mistaken for land plants of the Carboniferous age, and worse still, the places where discovered, marked on the maps as coal fields. As a natural consequence, relying on the assertions of the survey, mining companies were started, and many thousand pounds sterling expended in what every geologist knew to be a fruitless search. The military authorities appear never to forget the ridicule the scientific corps of army brought on themselves and their selectors on that occasion. The sarcastic comments of the men of the hammer were so bitterly resented, that long after the occurrence, a Horse Guards communication addressed to the Commanding Officer of a regiment serving abroad, clearly intimated the displeasure of an important personage while he strongly disapproved of geological pursuits on the part of military men altogether. The matter above stated may show the neccessity of the changes which have recently taken place in the British Army.

Let me give another instance where a slight knowledge of geological matters would not have been amiss in this scientific branch of the service. At Newcastle, in the Blue Mountains, Jamaica, a reservoir was made for the use of the troops stationed there. The bottom was lined with porous, earthly material, not with the proper article—stiff brick clay. As fast as the rain, in the rainy season there, poured into it, it found an exit below. An engineer officer was sent up from the lowlands to rectify the matter. He amused himself one day poking fun at an old highland captain, asking him if the weather on the hill did not remind him of the Scotch mists in the Isle of Skye. "Why, the rain is utterly beastly here!" "Well, mon, if you find it so vera disagreeable, how would it do for you to shift your quarters to the *only dry place* here known to us, *the engineer's water-tank!*" A roar of laughter from all present followed this *nemo me impune lacessit*, as the gallant officer retired discomfitted and badly demoralized, like the retreating sergeant and his party at an early stage of a fight during the Civil War. The story is: The brigadier noticed a considerable number of men retiring rapidly, and at such a pace that he rightly concluded they were not wounded (falling to the rear), so he directed a staff officer to ascertain the cause of this unusual proceeding. After a hard gallop they were overtaken, halted, and the non-commissioned officer in charge asked by the indignant galloper "Why in h—— are you conveying so many slightly wounded from the field; none are seriously injured." "True, sir," said the sergeant, as he gave the military salute, "but you may inform the general the men were *badly demoralized.*" As far as I know he resumed his retreat, despite all remonstrance.

I placed a few local minerals (as a temporary arrangement) in the large case at the upper end of the museum. We must regret our inability to find anyone willing to take charge of this department, or to replace the long-felt loss we sustained in other departments by the removal of Moffat, Hanham and Leslie from the city.

MEMO. OF THE CUTTING ON THE SPUR LINE WHERE IT CROSSES MAIN STREET WEST.

READ BEFORE THE GEOLOGICAL SECTION OF THE HAMILTON ASSOCIATION.

BY A. E. WALKER.

The cutting here is over twenty-two feet in order to admit of the building of a bridge over the main road; the upper part of the cutting is brick clay; about five feet below this is some five feet of clay containing so much lime that it is useless for brick purposes; where this clay rests on the concrete bed of the old line of the beach, the lower part of the clay is filled with little concretions of clay, called by the workmen ginger roots; they have much that appearance, being very crooked and twisted. They are probably formed by the lime water running into the cracks and crevices of the clay, converting them into stony matter by the same process that forms the concrete beds of pebble. The concrete beds here are about four feet thick, the upper part a fine concrete, and the lower part coarser, with here and there a layer of sand between the beds. Below these beds we have five feet of very fine sand. Here we strike a very singular formation which the workmen supposed to be packed brushwood; it is about two feet thick. It is here that we strike water, which runs from east to west with the cutting. These streams of water as they run through the sand have deposited so much liquid lime that they have consolidated the sand into streams of stone. It seems strange that the water should run horizontally through this loose sand, leaving long stick-like forms like twisted ropes, varying from the size of your finger to the size of one's arm. The sight was wonderful to see: a layer nearly two feet thick, which looked like the ends of sticks or bamboo rods, standing out in bold relief, for the cutting was directly across this formation; the sand falling away, left them sticking boldly out on both sides of the cutting. Of course these stick-like forms do not continue for any great length in uniform thickness; they often coalesce and divide again into very strange forms, breaking into thin streams or twisting into knotty folds. Below this is another bed of the same sand, and it is in this bed just below these stick-like forms we come across strange globular forms, which have been called petrified melons. Some bear a striking resemblance to those forms, while others are like pears, plums and other fruits. Some one remarked that this part of Ontario was the finest fruit-bearing section, and it had evidently been so some twenty thousand years ago, as petrified fruit was found in abundance. I stood by and saw five of these forms taken out from one square yard of sand. They take all imaginable forms. I saw one like a dumbbell, a straight bar about five inches long with a perfect globe at both ends. It is not uncommon to find drips through the sand, stalactite forms of various shapes, but in the two-foot beds above described they run parallel to the lay of the sand, and many of the globular forms were no doubt formed by dripping water. About two feet below the railway bed you strike the blue tile.

After you cross the railway bridge, on Main Street going west, you strike a much higher elevation. On the south side of this elevation the bank is cut into to obtain the sand. This cutting is over twenty feet deep, and there is a very fine vein of sand beds, showing the various lines of drift. It would be of much interest to the Association if some member of the photograph section would take views of both sides of this cutting, showing the concrete beds and various beds of sand. The lowest of these beds of sand show the same consolidated strips, and under these the same globular forms of all sizes, like those found at the railway cutting, but they are at an elevation of some fifteen feet higher. There appears to be no dip and no connection with the lower beds at the railway cutting. The same form appears to be repeated at a higher level; on the opposite side of the road they are reaching lower beds of sand, but not so low as those of the railway cutting, so that I could not find if they were repeated. These hills and washings-out reach the marsh and are of much interest, cutting through the Burlington Beach. The cutting of the railway to the canal is also of much interest.

THE FUNCTION OF POETRY.

READ BEFORE THE HAMILTON ASSOCIATION.

BY F. F. MACPHERSON, B. A.

In undertaking to write a paper on "The Function of Poetry," I do not expect to give expression to any novel views on poetry, because, in the whole domain of literary criticism, there is no subject that has received more attention at the hands of writers of all degrees of attainments and of the greatest diversity of opinion. My aim is only to recall to you one of the most important and least understood departments of literature. It behooves us especially to interest ourselves in poetry now, because there is a danger, for reasons that will appear later, of poetry losing its hold temporarily on the public.

The first question that confronts us is—what is poetry? To this question one might give almost a score of answers, from Aristotle of ancient Greece to Stedman of the New World. There is no one definition, however, of all that are before us which satisfies us, in which we can see the principles that are found in the several kinds of poetry, simply because there is one, the greatest, principle which defies definition. But to a person of literary taste, who has cultivated that taste in the manner described by Ruskin, it is not so difficult to tell whether a certain poem possesses poetic excellence, though it would be more difficult to explain minutely the points in which such excellence dwells. There are, however, certain requisites to poetry which will bear discussion and exposition without injuring our appreciation.

In fact it is entirely unnecessary to be able to criticise a poem in a technical way in order to appreciate it; on the contrary, if one has the proper spirit to comprehend the poet, a descent to technicalities may injure the purity of the feeling. The lines of Byron on the beauty of Venus de' Medici are apt in this connection:

"We gaze and turn away, and know not where,
Dazzled and drunk with beauty, till the heart
Reels with its fullness ; there—forever there—
Chained to the chariot of triumphal art,
We stand as captives and would not depart.
Away !—there need no words, nor terms precise,
The paltry jargon of the marble mart,
Where Pedantry gulls Folly—we have eyes :
Blood, pulse and breast confirm the Dardan shepherd's prize."

And again :

"Let these describe the undescribable :
I would not their vile breath should crisp the stream
Wherein that image shall forever dwell ;
The unruffled mirror of the loveliest dream
That ever left the sky on the deep soul to beam."

When we wish to know exactly something in any branch of study, we go very sensibly to those who are proficient in it. To poets themselves let us appeal as those who can teach us best. No one, I think, states better the two necessary principles than Shelley in 'The Skylark :'

"Better than all measures
Of delightful sound,
Better than all treasures
That in books are found,
Thy skill to poet were, thou scorner of the ground !"

The poet here emphasizes the fact that in the highest kind of poetry there must be beauty of expression as well as nobility and loftiness of thought. I shall discuss these principles in their order.

For a long time after Aristotle, the dominant idea of poetry was that it consisted of *invention*, the form or expression being held of small value. By the artificial school of modern times the form was exalted above the matter. But in the finest of the world's poems there is seen the combination of nobility of thought with the most artistic expression. It is a familiar fact that when the mind of a people is stirred by strong emotion, the form of expression chosen is rhythmical. We see this in the chants of the savage, in the musical myth of Orpheus and in the ballads of all nations. This natural music or rhythm must be in harmony with the thought, and accordingly as the poetic thought of the world becomes more sublime, the artistic expression of that thought must rise in beauty with it. One of the best writers on the subject of poetry has thought so strongly on the importance of rhythmic expression that he asks: "Unless the rhythm of any metrical passage is so vigorous, so natural and so free that it seems as though it could live, if need were, by its rhythm alone, has that passage any right to exist?" He goes on to say: "Are we not driven to admit that certain poems whose strength is rhythm, and certain other poems whose strength is color, while devoid of any excellence of thought, may be as fruitful of thought and emotions too deep for words as a shaken prism is fruitful of tinted lights?

Sometimes in prose even we find the language which expresses some deep pathos assuming the rhythmical flow of verse. In 'The Mill on the Floss' we find a striking and well-known example of this: "The boat reappeared, but brother and sister had gone down in an embrace never to be parted, living over again, in that one supreme moment, *the days when they had clasped their little hands in love and roamed the daisied fields together.*" In what else does Portia's speech on the quality of mercy differ from prose but in its rhythmical flow? The order of words is not different from that of prose, but it is a proof of the poetic genius of the author, that he has chosen words which do not require manipulation for the purposes of rhythm. Any sign of artificial arrangement for rhythm is always distasteful. To conclude this discussion of the importance of poetic form, it is a most instructive and educative pursuit to compare the verses of some of the old artificial schools where rhyme and rhythm were the whole aim and poetic thought almost entirely unconsidered, with the loftier efforts of some of our later poets, such as Wordsworth, Shelley or Tennyson, where there is more attention paid to the thought, but where the form is almost perfect too. It will be enough to give one quotation from one of Wordsworth's sonnets on 'King's College Chapel,' where he describes:

> "That branching roof
> Self-poised, and scooped into ten thousand cells,
> Where light and shade repose, where music dwells,
> Lingering—and wandering on as loth to die,
> *Like thoughts whose very sweetness yield the proof*
> *That they were born for immortality.*"

This brings us to the second and more important part of the subject: What is Poetic Thought?

Ruskin, in a passage in which he deals with the essence and condition of Beauty, holds that the sense of the beautiful must be conjoined with high morality; that no true artist can be without lofty ideas. If this be so, and we cannot doubt it, it follows that no master of poetic beauty can be without the loftiness of thought and emotion which raises the true prophet to be a leader and guide of men.

The essence of the poetic temperament is the power of prophecy, of spiritual insight, the power to see into the heart of the world and human nature, and connect us with the divine. The grandest of all poetry is the Hebrew, and this power of prophecy is there seen with the least concealment.

Perhaps the best way to make clear what this power is, is to indicate in what poetry is different from prose, on the one hand, and from science, on the other.

The older writers were accustomed to contrast poetry and prose. But in our time there has come to be recognized a new kind of composition, called "poetic prose." What is the real difference between poetry and prose, and how may they be so harmonized as to be united into poetic prose?

Theodore Watts has stated the answer to the first of these questions in very felicitous language: "For what is the deep distinction between poet and prose man? A writer may be many things besides a poet; he may be a warrior like Aeschylus, a man of business like Shakespeare, a courtier like Chaucer, or cosmopolitan philosopher like Goethe; but the moment the poetic mood is upon him, all the trappings of the world with which for years he may, perhaps, have been clothing his soul—the world's knowingness, its cynicism, its self-seeking, its ambition—fall away, and the man becomes an inspired child again, with ears attuned to nothing but the whispers of those spirits from the Golden Age, who, according to Hesiod, haunt and bless the degenerate earth. What such a man produces may greatly delight and astonish his readers, yet not so greatly as he astonishes himself. His passages of pathos draw no tears so deep or so sweet as those that fall from his own eyes while he writes; his sublime passages overawe no soul so imperiously as his own; his humor draws no laughter so rich or so deep as that stirred within his own breast." Such is the extasy of the poet; the prose writer never forgets himself so.

It is apparent to all that there are many different kinds of prose, according to the object of the writer, but in all there is felt the constant control of the Reason, of Logic. No matter how high the flights of thought, how magnificent the expression, the whole is kept under the guidance of the intellect and follows the line of argument. This is prose.

Poetic prose does not free itself altogether from this control of reason, but adds to it the prophetic power which is the distinctive quality of poetic thought, a happy combination of reason and imagination. It is a significant fact that some of the greatest writers of this class have at first had the intention of expressing themselves in verse. Plato, Carlyle and Ruskin had this ambition, and each gave up the idea mainly because he was forced to acknowledge his deficiency in the power of rhythmical language. Yet I doubt if there are many who are called poets who excel them in prophetic power.

On the other hand we have the contrast of Poetry to Science. This truer contrast is first remarked by the Lake School of Poets. Coleridge expressed it in one of his conversations, and since then there has been little hesitation in accepting it. Science, it is said, deals with the relation of things in the universe to each other: poetry with the relations of the universe to man and God. A good illustration of this difference can be found in the way in which a poet and a scientist approach any great phenomenon. If we can suppose them to see for the first time a rainbow in the sky, we find the wonder of the poet leading him to seek the moral and spiritual meaning to him, as did the sons and daughters of Noah:

> "His heart leaps up when he beholds
> A Rainbow in the sky."

The wonder of the scientist, no whit less than the other, will lead him to investigate the physical causes and to reduce the phenomenon to the action of a few laws. Each grows perhaps a little intolerant of the other. We read of how Keats and Lambe proposed the toast "Confusion to the memory of Newton," because he had destroyed the poetry of the rainbow by reducing it to a prism. A still more striking illustration of the narrowness of the purely scientific mind is offered by Balzas in 'The Search for the Absolute,' as quoted by Stedman: "Balthazar's wife, suffering agonies, makes an attempt to dissuade him from utterly sacrificing his fortune, his good name, even herself, in the effort to manufacture diamonds. He tenderly grasps her in his arms, and her beautiful eyes are filled with tears. The infatuated chemist, wandering at once, exclaims: 'Tears! I have decomposed them; they contain a little phosphate of lime, chloride of sodium, mucin and water.' Such is the 'last infirmity of noble minds' to-day." A poetic mind will prompt one to pluck a flower, and by gazing on it with rapt attention, rise to an appreciation of its beauty and feel himself the nobler for it; a scientist will pull it to pieces, separate it into stamen, petal, stem, root, etc., and be satisfied with being able to catalogue it correctly.

> "A primrose by the river's brim,
> A yellow primrose was to him,
> And it was nothing more."

It possesses for him no suggestiveness from associations, which is one of the strongest elements in poetry.

The difference then between science and poetry is: the one analyses, the other spiritualises. And these two things cannot be reconciled. One writer, Prof. W. H. Hudson, in an article in the *Popular Science Monthly* on the subject of Poetry and Science, holds that "the business of the poet in his capacity of spiritual teacher is to help us to clothe fact with the beauty of fancy; not to try to force fancy into the place of fact. Let us understand what is scientifically true, socially right, and our feelings will adjust themselves in due course. It is for science to lead the way, and the highest mission of the poet is ever to follow in its wake, and in the name of poetry and religion claim each day's new thought as its own." Surely a strange claim this for science to make in regard to poetry, which antedates it by a thousand years! There is a dash of truth in the words, because the poet must have some facts to build on, but the writer shows most emphatically that he does *not* understand the true nature of poetry. If what he says be true, what chance was there for the ancients of the earth to rise to any loftiness of poetic thought? Science has demolished the old beliefs in the method of the creation of the world; does that detract from the grandeur and glory of the Hebrew poetry? It should if poetry is always to be found in the wake of science. Plato believed that the earth was flat, no doubt;

did that hinder him from expressing thoughts as high as any of us can follow? Sophocles believed in omens and oracles; did that hinder him from writing dramas which still claim the admiration of the world, in spite of the 'dry light' of science thrown into the dark corners of error and superstition? Milton chose to base his Paradise Lost in a theory of the universe, which was not believed even in his own day; does that lessen the greatness of the conception and the excellence of its treatment? It has been said that no one in our day could write Paradise Lost, not even Milton, were he alive; I do not doubt it; but why? This gives us the key to this whole misconception.

. When a poet has conceived, in a moment of inspiration, some mighty thought, and burns to deliver this his message unto men, he must do it in a way intelligible to them, as nearly as language will do it. It would be folly for him to employ symbols of thought which would not appeal to those whom he wishes to reach; he must use the words they know; he must employ as comparisons objects they are familiar with; he must translate the divine idea into the language of fact, and only so far is the poet bound down by and made the follower of science. Science is continually adding to our stores of knowledge; poetry must make use of these stores as a vehicle to convey its meaning.

Besides there is a realm into which poetry enters from which science is forever barred. Science can tell us what physical changes take place at the moment of death, but it is absolutely incapable of dealing with the question of why a man 'lays down his life for his friend'; that belongs to Religion and Poetry.

In concluding this question of the contrast between Science and Poetry and Religion, I hazard the statement that it does not follow from this contrast that they are opposed to each other. There has been too much said about the opposition of Science and Religion especially. There can be no opposition of them if each confines itself to its own sphere. It is said that Carlyle, one of our prose-poets, was bitterly opposed to Science, but such is not at all the case. His true position is stated plainly in a short passage in 'Heroes and Hero-worship:' "This green, flowery, rock-built earth, the trees, the mountains, rivers, many-sounding seas; that great, deep sea of azure that swims overhead; the winds sweeping through it;

the black cloud fashioning itself together, now pouring out fire, now hail and rain; what *is* it? Ay, what? At bottom we do not yet know; we can never know at all. It is not by our superior insight that we escape the difficulty; it is by our superior levity, our inattention, our *want* of insight. It is by our *not* thinking that we cease to wonder at it. Hardened round us, encasing wholly every notion we form, is a wrappage of traditions, hearsays, mere *words*. We call that fire of the black thunder-cloud 'electricity,' and lecture learnedly about it, and grind the like of it out of glass and silk; but *what* is it? What made it? Whence comes it? Whither goes it? Science has done much for us; but it is a poor science that would hide from us the great, deep, sacred infinitude of nescience, whither we can never penetrate, on which all science swims as a mere superficial film. This world, after all our science and sciences, is still a miracle; wonderful, inscrutable, *magical* and more, to whosoever will think of it." There is here no opposition to science, but rather a just estimate of its value and its limits.

What is left now is the hardest part of the task. It is difficult to say very much, with any degree of clearness, about what is almost indescribable, which must be felt, not taught. To say it briefly, poetry is the record of the inspirations which have been sent by some higher power to help us on our way. It is the habit of some to laugh at inspiration as a cloak to hide all sorts of extravagances and fancies, but that is not the inspiration which moves the world. There is hardly any one who does not know it in some degree. Many a time flashes will visit us, presenting a new thought or an old one in a new and grander way—we know not how it came or was suggested—nothing seemed to lead up to it, but there it was, and perhaps never left us. Such little flashes, or twinklings, rather, are to the inspiration of the poet but as the stars to the sun.

> "Each year brings forth its millions; but how long
> The tide of generations should roll on
> And not the whole combined and countless throng
> Compose a mind like thine? though all in one
> Condensed their scattered rays, they would not form a Sun."

These flashes of inspiration are the fountain of poetry, or, in the words of Shelley, "poetry redeems from decay the visitations of the divinity in man."

These moments of inspiration come mysteriously and unbidden, but not unconditionally. The conditions are that the mind should dwell on the subject long and lovingly.

"If Thought and Love desert us, from that day
Let us break off all commerce with the Muse;
With Thought and Love companions of our way,
Whate'er the senses take or may refuse,
The mind's internal heaven shall shed her dews
Of inspiration on the humblest lay."

We must by contemplation put ourselves in the way of inspirations. There is no habit more strongly emphasized by the wise men than contemplation. David in the fourth Psalm commands to "*commune* with your own heart on your bed and be *still*;" and again, "be *still* and know that I am God." It is this virtue of silence which Carlyle holds in such reverence as the mother of truth and insight.

The faculty by which the poet creates his poetry is the imagination. What imagination is has been well expressed by Prin. Shairp: "Imagination is not, as has sometimes been conceived, a faculty of falsehood or deception, calling up merely fictitious or fantastic views. It is pre-eminently a truthful and truth-seeing faculty, perceiving subtle aspects of truth, hidden relations, far-reaching analogies, which find no entrance to us by any other inlet. It is the power which vitalizes all knowledge; which makes the dead abstract and the dead concrete meet, and by their meeting live; which suffers not truth to dwell by itself in one compartment of the mind, but carries it home through our whole being—understanding, affections, will."

There are two ways in which the imagination works: (1) by presenting to us in concrete outline the forms of things not present; (2) by adding to material things a spirituality which they do not possess in themselves. The first is well described by Wordsworth in his sonnet on the Inner Vision, with a hint of the second:

"Most sweet it is, with unuplifted eyes
To pace the ground, if path be there or none,
While a fair region round the traveller lies
Which he forbears again to look upon,
Pleased rather with some soft ideal scene,
The work of fancy, or some happy tone
Of meditation, slipping in between
The beauty coming and the beauty gone."

Ballad Poetry generally is the result of the first kind of imagination and delights in rousing it in others. The simple scenes, the quick transitions, the mere hints to suggest the complete picture—all these bespeak the working of the simpler kind of imagination. As examples of the higher kind of imagination, I can only refer you to Wordsworth's Education of Nature, "Three years she grew in sun and shower," and to Shelley's 'Skylark,' two of the finest short poems in our language. This is the imagination which

> "adds the gleam
> The light that never was on sea or land,
> The consecration and the poet's dream."

The working of the higher imagination is most beautifully and exactly described by Wordsworth in his 'Tintern Abbey:'

> "Nor less, I trust,
> To them I may have owed another gift,
> Of aspect more sublime; that blessed mood,
> In which the burthen of the mystery,
> In which the heavy and the weary weight
> Of all this unintelligible world
> Is lightened: that serene and blessed mood,
> In which the affections lead us gently on,
> Until, the breath of this corporeal frame
> And even the motion of our human blood,
> Almost suspended, we are laid asleep
> In body, and become a living soul:
> While with an eye made quiet by the power
> Of harmony, and the deep power of joy,
> We see into the life of things.
> * * * * * *
> * * * * * *
> For I have learned
> To look on nature, not as in the hour
> Of thoughtless youth; but hearing oftentimes
> The still, sad music of humanity,
> Nor harsh nor grating, though of ample power
> To chasten and subdue. And I have felt
> A presence that disturbs me with the joy
> Of elevated thoughts; a sense sublime
> Of something far more deeply interfused,
> Whose dwelling is the light of setting suns,
> And the round ocean and the living air,
> And the blue sky, and in the mind of man;
> A motion and a spirit, that impels
> All thinking things, all objects of all thoughts,
> And rolls through all things."

This, then, is some indication of the result of the working of imagination on the material of the whole world—nature, man and God. What the world would have been without the presence in it of the poet and his song—it is beyond the power of thought to conceive. We could do without philosophy, without science even, but without poetry to spiritualize our dreary monotony, life would be a woful desert, full of dead men's bones.

As a fitting conclusion for a discussion, however inadequate, on this subject, let me quote the words of Tennyson's Poet's Song :

"The rain had fallen, the Poet arose,
He passed by the town, and out of the street,
A light wind blew from the gates of the sun,
And waves of shadow went over the wheat,
And he sat him down in a lonely place,
And chanted a melody loved and sweet,
That made the wild swan pause in her cloud,
And the lark drop down at his feet.

The swallow stopped as he hunted the bee,
The snake slipped under a spray,
The wild hawk stood with the down on his beak
And stared with his foot on his prey,
And the nightingale thought : I have sung many songs,
But never a one so gay,
For he sings of what the world will be
When the years have died away."

THE DYNAMICS OF SOCIAL PERIL.

READ BEFORE THE HAMILTON ASSOCIATION.

BY J. T. BARNARD.

In this paper I purpose dealing with one cause of uneasiness and apprehension as to our social future. Thoughtful men everywhere discern a dark shadow keeping pace with all productive and moral advance; a shadow that deepens by contrast with the lustre of our industrial development. The Rev. Dr. John Hall recently startled his fashionable Fifth Avenue congregation by saying: "The war cloud hanging over America is discontent and despair among its citizens."

Three elements or symptoms are discoverable in our social disorder:—

Disappointment.
Dissatisfaction.
Distress.

If Bishop Ridley, lying in the Tower, before his condemnation, had been vouchsafed a vision of nineteenth *fin de siecle* advance; if he had seen clearly, though afar off, the harnessing of steam and electricity; if he had seen man's needs and comforts being produced a hundred-fold faster than in his day; the spinning jenny, the power loom, the knitter, the sewing machine, the reaper, the thresher, the power planer and all the other myriad appliances for lightening toil and increasing human enjoyment; if he had seen time out-stripped by the telegraph; men conversing audibly a thousand miles apart; the hurricane distanced by the locomotive; the steamship reducing the time of voyages from weeks to days; if he had seen the printing press daily turning out miles in length and tons in weight of literature; if he had seen his beloved Bible published in hundreds of dialects and yearly distributed in millions; if he had seen the awakening of the Christian heart to the needs of the heathen and missionaries by the thousand penetrating to every pagan land; if he had seen over a hundred millions speaking the English tongue; British navies dotting the oceans everywhere, their ships bearing Christianity and civilization to earth's remotest ports; if he had seen Britain and her eldest daughter Columbia virtually rulers of the world, foremost in political freedom, in liberty of conscience, in commerce and in wealth ; what would have been the martyr's thoughts and emotions? Would he not have longed with vehement desire to witness the coming glory, when the world would stand on the very threshold of the kingdom of heaven on earth, if indeed it were not fully set up in the days when such wonders would come to pass?

Let us imagine the last desire of the martyr gratified; let us imagine him conducted from the celestial regions back to the earth in this our day; let us suppose a discrete power of vision only permitted him ; a capacity for hearing only certain sounds; let us suppose him guided over the nations of Christian civilization, able only to see warlike preparations and to observe the sorrows and misfortunes of its peoples. All Europe would lie below him a military camp, the din of preparation for deadliest warfare everywhere assailing his ears. Let him, accompanied by his heavenly Asmodeus, pass over Chatham and Woolwich—working night and day in the same fearful occupation ; let him visit the shipyards and behold wonderful instruments of destruction of gigantic size; let him then be handed over by his guide to the escort of General Booth; with him let the martyr visit the dockyard gates of London, the wealthiest city of the world and the very heart of the world's Christian effort, and see there the anxious, eager search for a chance to work at roughest toil; let him see the despair in the faces of the hundreds who turn away not fortunate enough to obtain the privilege of abject drudgery ; let him visit the refuges in the slums of the east end ; the hundreds of thousands of hopeless toilers in sweater's dens; let him hear Gen. Booth speak of three millions of Englishmen on whom the sun of prosperity never shines, whose lives are passed in deepest gloom, scarcely living at all indeed, but rather slowly sinking from the cradle to the pauper's grave, born in adversity, reared in poverty and dying in despair. Witnessing these horrors in his beloved home, what must the emotions of the martyr be? If the redeemed can weep; if the glorified soul can be wrung with anguish, that of Ridley would go back to his heavenly home, his eyes fountains of tears and his heart heavy with grief. The news he would take to the rest of the glorious army of martyrs would be: "The Kingdom has not yet come to earth, the power of Satan there is greater now than ever."

And as he felt so ought we to feel. Bitter disappointment, profound dissatisfaction and keen distress are ever with us.

Let us ask why?

We have much to gratify us. The pauper of to-day can see sights of beauty in art; can enjoy comforts and luxuries impossible to a Tudor prince. Asphalt pavements, electric lights, etc., are free to the pauper; the prince of the olden time waded in darkness through mud. But with all our advance something vital is lacking in our progress, the chalice of civilization has bitterness in its aftertaste.

Political freedom, education, invention, schemes for enjoyment to the full, abundance of things to delight the eye and please the ear; with all such blessings to the full, we despond, our hearts sink with fears at evils yet to come. We are disappointed, dissatisfied, distressed.

We ask why; do we really care to know? A sick child loathes physic, and we sick children of an unhealthy civilization shrink from knowledge of our malady and put away from us any suggestion of real remedy.

We would charge with insanity the occupants of a house if they refused to regard evidences of fatal defect in the foundation; if they were so intent on decorating the reception rooms, the living rooms, the library and the picture gallery, that they bestowed no attention on the critical condition of the foundation walls, and the soil on which they rested. Tapestries and works of art may conceal cracks in the walls they cover, but they do not repair them, much less affect their cause. And we vainly hope to uplift society by arts and occupation that do not recognize the depths to which we are surely sinking.

What shall be our first task? Sink our social foundation walls to the bed-rock of justice? or shall we go on geologising, photographing, studying ancient history or gravely collecting relics? All these are excellent in their place, but their proper place is in a society securely planted on justice. They are the decorations of our earthly home. The firmness, security and stability of that home is our first consideration.

Planted on justice! Is our civilization thus happily situated? Are man's rights recognized, asserted and secured by our social organization?

But first, has man any natural rights? Excellent men say yes as excellent men say no. And this denial either originates in or is fortified by the very popular doctrine of evolution. To accept evolution is to deny natural rights. For if man, an evolution, appears on earth endowed with natural rights, when were they conferred on him? In all his devious paths from the moneron up through millions of transmutations and advances, we can conceive of no point when he came into this alleged inheritance of natural rights. Down that path which we are told has been trod by the predecessors of man in his upward journey, we can see no recognition of natural rights. The lamb might covet them indeed, but to possess them he must first obtain consent of the wolf. The sharpest teeth, the alertest movement, the longest leap, these constitute the natural rights of the animal kingdom. And hence the consistent evolutionist, in dealing with the status of man, denies him the possession of natural rights. He conceives them as the creation of society. Professor Watson, maintaining that society is organic, tells us "individuals can have no rights apart from society."

On the other hand, there are still left some who believe man, physically and psychologically, is an independent creation of the Almighty Granted by Him the privilege of life, the right to retain that life and the right to the exercise of his powers in maintaining that life, and hence the right to the use of the means of maintaining it are corollaries of man's independent creation. Those who hold these views regard man as endowed with rights not bestowed on the lower animals. Whereas, whoso sheddeth man's blood, by man shall his blood be shed—every moving thing that liveth shall be meat for man; into his hands they are delivered. Man may kill an ox and be guiltless, but the ox that gores a man must be stoned to death.

But whether we believe that rights are conferred by society or by the Deity, we may unite in one opinion—man's life is sacred. I may not kill my neighbor, nor may I deprive him of his means of livelihood. Divine law and social utility agree in this.

We respect man's life; we guard property rights; have we really taken the pains to ascertain what is property and what is not? A fatal misconception as to what constitutes property will be found on examination to be prominent in our civilization. With this misconception I purpose now to deal, for it is the fateful cause to which I referred in the first words of this paper. That cause sustains the relation to our social organism that a foundation of sand bears to the superstructure. It sustains to social evil the relation that the tree-trunk bears to the limbs, branches and twigs that depend upon it for life. That cau e is a wrong, innocently inherited, ignorantly retained and fondly cherished as a beneficent thing worthy of all honor and of all legal efforts to retain it.

Christianity points to man's depravity as the source of wrong, social as well as individual. Subdue that depravity, it tells us, and the social problem is solved. "Let the wicked forsake his way, and the unrighteous man his thought," is the first step towards a larger life, individual and social. But, if this condition be imperative on the individual in order to escape from evil, it is equally binding on a number of depraved units of which society is composed. If we can be brought to recognize a specific wrong created and maintained by individuals acting in their corporate capacity, ought not society, that extended human organism, repent as each individual component must repent? If society has created the right to life and the right to liberty, the right to produce and the right to own the thing produced; if society insists on industry; if it condemns the voluntary pauper, should it not also insist that opportunities to produce shall be equally available to all? If it does not so insist; if it has not thus far made provision for free productive exertion, has not society failed in its functions? To insist that man shall be industrious, and then to impede his industry, is inconsistent. Society demands that its units shall not beg or steal; has it not therefore created for itself a duty, the duty of assuring to each a free chance to obey its mandate?

Has society so far recognized this duty? It most certainly has not. "Here, you fellow, get to work at once!" cries society, "but before you do work, see to it that you pay some fellowman a proper fee for the privilege of setting to work." If the wretch refuses to pay, or cannot pay, society banishes him from civilization. He may freely locate in the wilderness, if he can get there. There, and there only, may the worker for a while enjoy what society ought to secure him anywhere and everywhere.

An able man, mentally, physically strong, can pay for the privilege of working, and prosper, becoming himself one of those who exact tribute from workers. Less capable men can pay and live; the weakest cannot, and hence become dependent, humbly seeking the privilege of being set to work by the stronger, and regarding employment as a boon.

Society insists on the industry of its members. Society insists that the industrious shall pay tribute to other units. Society has thus created a condition that must cease, or society will be overthrown. An irresistible force and an immovable substance cannot both exist. If society imagines it is immovable, it will some day, and no very distant day, discover what is meant by irresistible force. Disappointment, Discontent, Distress, must crush all who impede their action and who stimulate their force.

A collision impends. Everywhere can be seen the signs of the times. The barometer of social peace is falling, the thermometer of diffused prosperity is dropping. We may by artificial methods cause both to rise, but we do not thus dissipate the storm—we do not thus drive back the advancing cold wave. Natural weather is beyond our power to control, but, thank God, the social atmosphere may be cleared and the freeze out of industry may be forever thawed. It is in our power to avert the threatened social cyclone.

The first business of society in the premises is to establish in practice what is as undeniable as an axiom: Inasmuch as it is man's duty to produce, it is his right to freely perform that duty.

What is it to produce?

It is the drawing forth and adapting from nature, and the transportation and exchange of those things which supply man's needs, comforts and luxuries.

What are the factors of production?

Man's own exertion, on the one hand, and the natural material on which alone that exertion can be expended, on the other. The first is called Labor and the second Land. All wealth is the result of Labor expended on Land.

What is wealth?

Natural products that have been secured, moved, combined, separated, or, in other ways, modified by human exertion, so as to fit them for the gratification of human desires.

All is not wealth that is called wealth. A man who holds in possession deeds of land, scrip, promissory notes, mortgages, bank bills, etc., is said to be possessed of wealth. But in Political Economy these are not wealth. They might all be burned up, or cancelled, or repudiated, and the world would be none the poorer. It is one thing to possess the power of exacting wealth, it is quite another thing to possess it. Wealth consists of such things (product of labor), the existence of which is for the benefit of the race, and therefore the lessening or the increase of which constitutes general loss or gain.

The material welfare of the race depends: First, on the production; and second, on the proper distribution of wealth.

Is mankind satiated with wealth?

No; man is insatiable for wealth. Therefore, as land is the raw material of wealth, and as labor is the inexorable condition of its creation, scarcity of employment must be due to some impediment to the free exertion of labor on land. Geographically, land is abundant; legally, there is perpetual famine of it, and this famine ever increases in intensity as we approach great centres of population. This famine is due to the inconsistent action of Society.

Society having implicated itself, through its imperative demand that no man shall either beg or steal, it should give to all an equal opportunity to obey its mandate to produce. In this opportunity it must insist that no one shall occupy a position inferior to another. To demand that a horse shall compete in a race, then hitch him securely to the starting post and punish him because he does put forth his speed, would be unreasonable and cruel. To demand that men shall not beg or steal, but work, and then permit others to bar them from their only opportunity, is equally unreasonable, equally cruel, but far more dangerous. You can keep from a horse's heels; you cannot so easily escape from an intelligent being made desperate from a sense of injustice. Dynamite bombs reach farther than a horse's hoofs.

But is society now actually perpetrating this unreasonable, cruel and dangerous thing?

By its authority land is not reserved for the equal use of all. Some are favored, others are necessarily deprived. If society recognizes the right of an industrious man to remain in civilization within reach of its benefits, if it insists that he shall not beg or steal for a living, it is also in duty bound to give that man an opportunity to freely exert his productive powers, and to save him from the exactions of those who would fain despoil him. The command to labor implies the duty of providing the opportunity. The prohibition to beg or steal lies equally on all; the opportunity to work appertains equally to all.

What are equal opportunities to produce?

Does it mean that society shall sub-divide its territory so as to give to each an equal opportunity? This was done in Israel under Joshua; and where production is in its simpler forms, where each family is its own farmer, miller, baker, tailor and shoemaker, such a method is infinitely superior to the plan followed by Britain in America, where it created and maintained such wealth-exacting institutions as the Canada Company, the Hudson Bay Company, etc.

But now that sub-division of labor is intensified, such a simple mode of dealing with land is no longer effective. While retaining the principle acted on by Joshua, we must adapt it to our more highly differentiated industrial condition.

Does it mean nationalization of the lands, society assuming ownership, becoming in its units landlord as well as tenant and therefore dispossessing or buying out the present owners, and letting out their lands in lots to suit tenants? It need not; equal rights to the use of the earth may be created and maintained without any such social upheaval, without any such perpetuating of the burdens now borne by the producer.

We are familiar with the phrase "land values," or the value of land; have we taken the pains to think out the genesis and the nature of such values?

Land varies in usefulness—in fertility or position—but so long as a country is uninhabited, its land has no value, for value is the relation one thing bears to another in exchange, and no man will give anything in exchange for the privilege of using land in uninhabited territory; he can get the use of it for nothing.

Dineen's corner, at the junction of King and Yonge Streets, Toronto, was purchased for a few dollars about 70 years ago. What is its value to-day apart from the improvements?

It was leased for years for $6,000 per annum (ground only). That lease recently expired. The lessee, after careful calculation, wrote the owner (a resident of London, England), an offer of $9,000 a year. He was indignant; he fully expected the offer would be \$12,000, for a lot of land 60x90 feet. What action of its owner created that enormous increase of value, from \$20 to over \$200,000? None. No man can create or increase the value of the land he occupies. It was the existence of population near that lot; it was their increase in numbers, in enterprise, that wrought the mighty change. Land values appear with people and disappear with their departure. Lots in Port Moody were once at boom prices; when I passed through it 8 years ago, no merchant would take a store in it rent free. Population had been driven away by the extension of the C. P. R. to the site of the present City of Vancouver.

After the Simpson fire in Toronto the Ontario Government withdrew the Jamieson lot from sale because \$5000 ground rent could not be realized. One man was ready to pay \$4,200 per annum for it, a lot about 40x80, and there was no semblance of improvement on it; the debris of the fire was an expense, for it had to be removed, but hundreds of thousands of people pass that corner every year.

Now in this genesis of land value we have two things of moment to us as patriots.

1st. The value of land being created, that is, produced by the people, society, by virtue of its assumed protection of the rights of property, must demand that value shall be kept for the enjoyment of its producers—the people. If society says to the individual, "You shall use and enjoy what you produce," it must also say to the people as a whole "you also shall enjoy that which you have produced."

2nd. The second thing we find with this discovery of the genesis of land value is a sure and certain mode by which the industriously disposed shall have free opportunity to exert their productive powers.

If each man monopolizing valuable land, yearly gives to society that value of his land which is created and maintained by the presence of people, he enjoys no better opportunity than does the man who is monopolizing land that has no value, for this man has nothing to pay, and the other yields up all the advantage of his superior location. Both are on the same footing therefore, so far as opportunity to produce is concerned.

But we have discovered more.

If society, realizing the genesis of land values, takes as its right the value its presence creates, it removes from the individual all motive to hold more than he puts to the best use, hoping to realize gain from its rise in value. Land, therefore, will be valueless except to the user. Hence the worker need never be landless, need not solicit employment, need not regard employment as a boon conferred. Right here in civilization, within sound of church and school bell, hard by railway and trolley lines, accessible by the daily paper, both urban and rural, are lands unused or poorly used that would become available immediately for industry.

But we have discovered still more. Inequality of opportunity is the hot bed of involuntary poverty, discontent and a strong incentive to vice and violence. With the death of hope comes the life of the fiend. A sense of injustice, well founded, underlies the discontent of civilization; it is the cause of the social ferment that is arousing the gravest apprehension as to our future, among thoughtful men who wonder whither we are drifting.

Communism, Anarchy on the one hand; Special Privileges and their creature the Plutocracy on the other—these are the forces lining up for a struggle, which, if it begins, must destroy our civilization.

The recognition on our statute books of the equal right to the use of the earth, by taking the whole value of land as public property, is the flag of truce, the peacemaker, the recognition of a universal brotherhood. Only in this action is safety to be found. Disdain the study of this right to the use of the earth; fritter away time in dilettante recreation, and you as positively help on the coming revolution as though you waved the red flag and the torch, and flung the dynamite bomb. There are two dangerous classes, those who pooh-pooh all possibility of peril, who say things are all right and are daily growing better; and the other, the ever increasing host of the malcontent, beaten in life's struggle, cherishing hate for those who have won. The self-satisfied, the indifferent, the too-busy and the disbelievers on one side—the Anarchist and his recruiting ground the hosts of the submerged, on the other; both dangerous, equally dangerous. To which do we belong?

REPORT OF THE PHOTOGRAPHIC SECTION FOR THE SESSION 1896-97.

Interest in amateur photography in Hamilton has been steadily increasing during the past year, and the members of the Photographic Section have reason to feel gratified by the way the members of the Association and their friends have attended the exhibitions of lantern slides given by them, thereby showing their appreciation of the efforts made by the section to promote the study of the photographic art, and we expect that the outcome of these exhibitions will be a greatly increased membership.

There are now forty-eight names on our roll. The Section mourns the loss of one of its members, Mr. E. Jackson Sanford, who died in Texas while in search of health.

The club outings during the year were very well attended, especially the one to Bronte Ravine, no less than twenty members being there; a very pleasant afternoon was spent and a number of good views were secured. Other outings were held, including Red Hill Ravine, Tapleytown, Dundas and vicinity, Rock Chapel and DeCew's Falls.

The thanks of the Section are due to Mr. S. John Ireland, for kindly criticism and advice on work done by the members, also to Mr. John S. Gordon, for his instructive lecture on picture composition.

Practical demonstrations were given by the following members: Mr. A. M. Cunningham, on development; Messrs. J. R. Moodie and A. H. Baker, on lantern slide making; Mr. S. Briggs, on printing and developing bromide paper; and Mr. J. H. Land, on lantern slide development with Glycin.

The Section were successful in having a sufficient number of their set of one hundred lantern slides sent to New York pass a critical examination of technical perfection, to allow them to enter the American Interchange, which includes clubs of all the large cities of United States, also Toronto and Montreal, and the members were very much encouraged to know that no less than seventy-six were selected by the examiners, and the opportunity of seeing the work done by the different clubs during the season has been very instructive and very much enjoyed by all who attended the exhibitions.

The Section is also a member of the Canadian Lantern Slides Exchange, which is composed of clubs in the cities of Toronto, Montreal, Ottawa, St. John's, N. B., Halifax and Hamilton.

We are looking forward to another successful season, and it is to be hoped that each member will continue his interest in the work and maintain the gratifying reputation gained by the Section.

J. R. MOODIE,
Chairman.

J. M. EASTWOOD,
Secretary.

REPORT OF THE BIOLOGICAL SECTION FOR THE SESSION 1896-1897.

The Biological Section has only held two informal meetings during the winter, and have given attention to Botany only.

What should be a very strong section is at present in a weak state, and should have more attention from the members, not only in the line of Botany but in other branches of Biology.

Our members have been devoting their time to identifying and catalogueing the specimens collected during the past few seasons.

A careful comparison of these with the lists of Logie and Buchan, and additions made in this Society's Proceedings of 1889 and 1890, shows that we have collected 128 species and varieties not hitherto reported from this locality, a couple of these being new to America, a few new to Canada and several new to Ontario, while three critical forms are withheld, subject to Prof. J. Macoun's further examination and report.

The local additions are as follows:

Thalictrum purpurascens—L.
Ranunculus Flammula var. reptans—E. Meyer.
Cimicifuga racemosa—Nutt.
Corydalis glauca—Pursh.
Cardamine rotundifolia—Michx.
" Pennsylvanica—Muhl.
Draba Caroliniana—Walt.
Alyssum *calycinum*—L.
Nasturtium *Armoracia*—Fries.
Thlaspi *arvense*—L.
Viola Selkirkii—Pursh.
" palustris—L.
" lanceolata—L.
" *tricolor*—L.
Dianthus *barbatus*—L.
Saponaria *Vaccaria*—L.
Hypericum Canadense var. minimum—Chois.
Malva *sylvestris*—L.
Callirrhoe digitata—Nutt.

Linum *usitatissimum*—L.
Euonymus atropurpureus--Jacq.
Aesculus *Hippocastanum*—L.
Polygala polygama—Walt.
" Senega var. latifolia--Torr. & Gray.
Lupinus perennis—L.
Trifolium *hybridum*—L.
" *incarnatum.*
Medicago *sativa*—L.
Robinia viscosa—Vent.
Desmodium rotundifolium—D. C.
Vicia *sativa* var. *angustifolia*—Seringe.
" Caroliniana—Walt.
" *sepium*—L.
Gleditschia triacanthos—L.
Prunus *Cerasus*—L.
Spiraea tomentosa—L.
Physocarpus opulifolius—Maxim.
Fragaria Virginiana var. Illinoensis—Gray.
Potentilla arguta—Pursh.
" *recta*—L.
Poterium *Sanguisorba*—L.
Rosa humilis—Marsh.
" *cinnamomea*—L.
Crataegus punctata—Jacq.
Pyrus *Malus*—L.
" *communis*—L.
Sedum *acre*—L.
Epilobium *hirsutum*—L.
" adenocaulon—Haussk.
Mollugo *verticillata*—L.
Viburnum Lentago—L.
Galium lanceolatum—Torr.
Asperula *arvensis*—L.
Solidago rugosa—Mill.
Heliopsis laevis—Pers.
" scabra—Dunal.
Chrysanthemum *Balsamitæ*—L.

Artemisia *Absinthium*—L.
" *vulgaris*—L.
" *Abrotinum*—L.
" *biennis*—Willd.
Senecio aureus—L.
" *Jacobaea* -L.
Cnicus muticus—Pursh.
Centaurea *nigra*—L.
Cichorium *intybus*—L.
Hieracium *aurantiacum*—L.
" *murorum*—L.
Lobelia Dortmanna—L.
Campanula *rapunculoides*—L.
Vaccinium stamineum—L.
" macrocarpon—Ait.
Kalmia glauca—Ait.
Pyrola rotundifolia—L., var. incarnata—D. C.
Asclepias quadrifolia—L.
Frasera Carolinensis—Walt.
Myosotis arvensis—Hoffman.
" verna—Nutt.
Lithospermum canescens—Lehm.
" angustifolium—Michaux.
Nicandra *physaloides*—Gaertner.
Gratiola aurea—Muhl.
Gerardia tenuifolia var. asperula—Gray.
Teucrium occidentale—Gray.
Pycnanthemum muticum—Pers.
Salvia *officinalis*—L.
Monarda fistulosa—L., var. mollis—Benth.
Nepeta *Glechoma*—Bentham.
Scutellaria parvula—Michx.
Plantago *media*—L.
Polygonum tenue—Michx.
Ulmus racemosa—Thomas.
Myrica Gale—L.
" asplenifolia—End.
Betula lutea—Michx, f.
Salix alba—L.

Salix *viminalis*—L.
Populus *alba*—L.
" monilifera—Ait.
Goodyera repens—R. Br.
" Menziesii—Lindl.
Habenaria lacera—R. Br.
Muscari *botryoides*—Mill.
Hemerocallis *fulva*—L.
Polygonatum giganteum—Dietr.
Streptopus amplexifolius—D. C.
Trillium grandiflorum var. (?) viridescens—Peck.
" cernuum—L.
Sparganium simplex—Hudson.
Sagittaria graminea—Michx.
Potamogeton heterophyllus—Schreb.
Eriocaulon septangulare—Withering.
Cyperus Schweinitzii—Torr.
Carex prasina—Wahl.
Dulichium spathaceum—Pers.
Eriophorum gracile—Koch.
Milium effusum—L.
Cynodon *Dactylon*—Pers.
Pellæa gracilis—Hook.
Aspidium spinulosum—Swartz.
" cristatum—Swartz.
Botrychium ternatum—Swartz, var. obliquum.
Lycopodium lucidulum—Mich.
" annotinum—L.
" obscurum—L.
" complanatum—L.
Selaginella apus—Spring.
Marchantia polymorpha—L.

Taken outside of our limits but new to Ontario:

Echinops *exaltatus*—Schrad (Beeton).
Utricularia minor—L. (Niagara Falls).
" resupinata—B. D. Greene (Georgian Bay Island).

J. M. DICKSON, *Chairman.*

H. S. MOORE, *Secretary.*

Yours Sincerely

William Yates

Hatchley Augt 3d/97

NOTES BY THE WAYSIDE.

READ BEFORE THE BIOLOGICAL SECTION OF THE HAMILTON ASSOCIATION.

BY WILLIAM YATES, OF HATCHLEY.

One of our most pleasant outings was that undertaken during the month of June just now past, the territory gone over being a part of Brant County, and also a part of Norfolk County, near the Lake Erie shore, from about Port Ryerse to Turkey Point. We were accompanied by Mr. James Goldie, sr., of Guelph, Ont., who has inherited a large share of botanical and horticultural enthusiasm from his father, who attained a certain historical fame seventy or eighty years ago as a collector and classifier of British and North American Floras.

At the date of our starting out (June 15th) there had recently been abundant rainfalls, and the wild rose bushes, *Rosa blanda* and *Rosa lucida*, which adorned the margins of the fields and the waste places by the roadsides, bore a greater profusion of their aromatic pink blossoms than usual; and a number of the small frame dwellings of the residents of these light sandy localities seemed fairly embowered with this interesting shrub, which flourishes best in a dry and porous soil. We noticed, also, amid the "Oak Scrub" bordering the road near the village of Walsh (Charlotteville Township) the handsome blue spikes or thyrses of the Lupine, *Lupinus perennis*, a sight never to be forgotten.

In a number of farms that one passes, a feature of great beauty and picturesqueness was lent to the sandy knolls by the clustering aggregations of *Lithospermum hirtum*, whose cyme-like masses of yellow blossoms rivalled the brilliancy of the flowering Gorse bushes, which (as narrated in botanical annals) aroused the admiration of Linneaus on viewing these flowers for the first time on an English common. This species is larger, but has scarcely as symmetrical foliage as its congener *L. canescens*, which is the common form in Brant County.

On the bluffs bordering Lake Erie, the bright pink and roseate tints of the flowers of *Phlox sublata* were very noticeable, and it was remarked that some of the residents of the neighboring town of Simcoe had transplanted this wildling as an adornment to their lawns and flower borders. The Juniper bushes, and also the Sassafras shrub, were of frequent occurrence on the same elevations.

Where the two Phloxes (*P. sublata* and *P. divaricata*) were met with, that rare and beautiful species of Violet, *V. pedata*, was known to be of frequent occurrence in the shaded thickets of this district; but clouds arising, that threatened thunder-showers, induced us to shorten the programme of journey for the day, and not a single specimen of this coveted wild-flower graced our collection on this occasion.

A species of Ranunculus that seems peculiar to barren, sandy spots, and whose foliage had a dwarfed appearance, was thought by Mr. Goldie to represent *R. rhomboideus.* In some of the shaded dells through which gurgling rivulets pursued their course towards Lake Erie, were many tall flower stems tipped with brilliant yellow button-like flowers; these our companion believed to be a species of Senecio, of which *S. aureus* seemed most common.

An interesting botanical "find" occurred by the roadside, one mile to the north from Vittoria village; this was the so-called scented fern shrub *Comptonia asplenifolia.* The locality seemed a bit of primitive but half-cleared boggy land, and it was thought that the foliage well deserved its fame of being "sweet scented." This shrub belongs to the Myricaceæ (Sweet Gale Family).

In that portion of the jaunt into Brant County, a curious instance of plant "Albinism" was met with on a previous occasion later in the season. This was *Asclepias incarnata.* Some roots of the same plant found growing at the same spot this 15th day of June, were dug up for transplanting, but had not arrived at the blossoming stage of growth.

What was believed to be the rare native form of honeysuckle *Diervilla trifida* was seen on a gravelly hillside, but the date being too early for blossoms, identification was difficult or risky. However, it may be remarked that this shrub has been found incontestibly near Stratford.

A number of instances of the yellow star-grass *Hypoxis Erecta* were noticed, but *Gillenia trifoliata* had not come into blossom and was difficult of detection among the dense growth of shrubs and briars; however, the neat little Irid, *Sisyrinchium Bermudiana*, was found in flower, and also the wild Columbine, with *Anemone thalictroides* and a few samples of *Lithospermum Canescens*, were in an early stage of floral beauty. *Sanicula Marylandica* was noticed, but only just showing blossom buds. *Polygala Senega* and *Helianthemum Canadense* were two weeks more backward in growth than at the same date in 1896.

In the depth of the forest, a bird note was heard resembling the solemn tolling of a distant church bell; this was soon ascertained to be one of the rare imitatory "calls" of the blue jay, and only a woodsman of experience would have expected that bird capable of producing such a musical sound, but doubtless the mellowing effect of distance in the cloistered groves lent a charm to the tone.

The notes of the Hermit Thrush, which have been scant this year, were listened to with unfeigned delight on this occasion, and the sylvan and silvery echoes of the "Veary" were conspicuous in the evening; also the reiterated "whittilee, whittilee, whittilee" of the *Maryland yellow-throat*, and the loud, bold performance of the *Rose-breasted grossbeak* were prominent among the bush orisons, as was also the innuendo "zee, zee, zeeing" of the Canada warbler, and in the willow scrub the "witch, witchow" (witch-witch, witchow) of the *Bay-breasted Warbler* and other common finch notes added to the concerted melody of the mid-June evening, on the homeward drive, winding up with the weird calls of the Caprimulgidæ, as the shades of night came on, of which the so called *Night Hawk* was one.

At the home of a near neighbor there are regular nocturnal visits from one or more Whip-poor-Wills, and these birds, perched on the roof peak of an adjoining kitchen, voice their invective for hours together in the moonlight intervals, and these vocalizations keep alive rather sombre memorials in the minds of the human inhabitants of the dwelling, as "poor Will" symbolizes in the language of affection a missing member of the family who thirty-two years ago went away to seek Dame Fortune in the far west, and of which son or brother no tidings have for three decades been obtainable. The articulation of these syllables by this moonlight disturber of the silent groves is quite distinct. Even the trill of the letter 'r' is very pronounced, and an emigrant is said once to have jocularly remarked "that this country was evidently laid out for an English speaking race, where even the birds in three or four instances call to each other with an imperial purity of enunciation, and cannot be corrupted into dialects or provincialisms, but stick to their watchwords, "Whip-poor-Will," "Kill-deer," and "Bob White" in the presence of all comers.

The bob-o-links have been, I think, unusually numerous and songful during the present summer. These birds did not come into the new clearings of this part of Burford Township until extensive areas of clover and other meadow grasses had been established. The bob-o-links and larks dislike the smoke and burning operations of clearing bush land, and though they were numerous three or four miles away (in other settlements), twelve or fourteen years elapsed after the land was cleared ere they came to regularly frequent these parts.

After a dry period of about two weeks duration, we in this section were favored with some very copious showers on June 29th, and to a human weather guesser the indications pointed to an unsettled condition of the atmosphere. On Wednesday morning, the 30th, the sky was partly overcast with dark and threatening clouds, and the air was stuffy with a light and variable breeze, but the spider tribe seemed to have had information from a private source that dry, fine weather was coming, or had set in, and the tilled fields were at dawn on the 30th thickly bestrewn with cobwebs that had been woven during the previous night; and the sequel proved that the spider instinct was a trustworthy one, for subsequently to the web spreading phenomenon above noticed, there was a succession of glorious, bright days. The extensive areas overspread by the myriads of webs, where the earth's surface was suitable to the insect's life operations, and not encumbered by dense vegetable growth of grasses or growing grain, created surprise, and the more especially as these insect fabrications seemed to be the work of a single night, as scarcely a vestige of the devices and snares were to be seen at dark on the evening of the 29th.

Many of the so-called lower species seem to have no idea of solid transparencies, such as window glass, as was lately brought to the notice of this writer by a large buzz fly which had found a lodging for the night in a very dim corner of our bedroom; on the first glimpse of dawn the said fly made an impetuous dart towards the window, and struck against one of the window panes with a bang that sounded like the impact of a hail pellet. Similarly an inexperienced shrike, noticing a pair of caged canaries which had been placed on a window ledge inside a front room, made a lunge at what may have seemed an easy capture,but was knocked unconscious, if not silly. The shrike was picked up but never rallied, but was sent to a taxidermist.

A ruffed grouse, whose history we wot of, once, when hotly chased by a hawk, darted at the window of the house of one of our acquaintances, broke the glass and gained ingress to the sheltering room, and was soon let out again through the hastily opened door, as there seemed reason to fear that the big bird would'nt emerge at the same aperture that had afforded an entrance.

A red squirrel that had gained entrance to the room of a dwelling, seemed to become panic stricken and made such a number of absurd attempts to burglarize the window glass, that several persons united in the work of eviction through a widely open door.

The instances of birds colliding in their headlong flight with telegraph wires are so common as no longer to excite surprise or comment. Dead birds which have ended their career in this fashion are very frequently picked up by the section men about here. The birds when seeking their food in the grass or herbage near the railway track are panic stricken by the sudden whistle of an onrushing train, and dart away at hap-hazard speed often in ill-guided bewilderment.

The railway section men also say that they recently picked up the mutilated remains of a full grown racoon that had loitered on the track the night previous; the quadruped seemed to have been dazed by the glare of the seemingly unmoving headlight and remained undecided just one moment too long.

My brother James, who was employed for a large portion of his life in pioneer-like work in the forests, used to relate several grotesque traits, showing the impetuous force in bird-flight, as, for instance, once noticing the rapid approach of a wood thrush, to whose song he had for a short time been listening (he was standing at the time behind a large tree), suddenly jerked out his spread hand right in the line of the thrush's flight, and the shock to the bird was so severe as to bring stunning and unconsciousness, and the point of the bird's beak penetrated the palm of the hand held out, target-like, as to make a wound that after healing left an indelible scar that my brother was accustomed to exhibit years after when narrating the incident.

The golden-quilled wood-pecker, the shore-lark, the meadow-lark and the quail are the birds said to most frequently meet their end by striking the telegraph wires, as reported of by the railway track repairers.

A number of the summer migrant birds are now fostering their second brood of the season. Yesterday (July 2nd) some corn-hoers disturbed a plover of the Kill-deer species that was sitting on four eggs placed in a slight depression of the ground near a hill of corn. It was said that the irritated bird threw most demoniacal looks at the disturbers of her peace and dignity. The bird was as little molested as possible, and the incubating process was soon resumed.

When ploughing in the same field about a month ago, a mother bird of the same species was noticed wandering with a brood of four young that were apparently only a few days out of the egg-shell, and one of the *Sand-pipers* has a nest with eggs situated but a few rods from the above. The eggs of these two birds differ but little in form, size or color.

THE BATTLE OF STONY CREEK.

READ BEFORE THE HAMILTON ASSOCIATION.

BY INSPECTOR J. H. SMITH.

By the splendor of its trappings, by the martial ardor which it inspires, by the heroic bravery of its devotees, and by the pomp and pageantry of its surroundings, war carries the mind of man away from its stern realities and shocking barbarities, where

> "Naked plains and ravaged fields
> Succeed to smiling harvests, and the fruits of peaceful labor."

Could we, if only in imagination, visit the battlefield after the struggle is over, and see the mangled forms of the dead and dying, witness the desolation and destruction that follow in its train, and hear the wail of the widow and orphan as they mourn over loved ones, how differently should we look upon it! With what deep feelings of solicitude would our hearts be stirred if even rumors of war should reach the quiet of our homes! But how much greater would the intensity of these feelings be, if the pleasant valleys and hills of our native land should ever resound to the measured tread of invading armies!

Some such thoughts must naturally have arisen in the minds of these pioneer settlers when they learned that the authorities of the American Republic had openly proclaimed war against Great Britain. Among the peaceably disposed inhabitants of Canada, whose only crime appears to have been a warm attachment to the mother country, and an honest devotion to her laws and institutions, these alarming reports must have spread feelings of terror and dismay. To see their homes and their loved ones exposed to all the hardships and privations of an unprovoked war, and to witness the ruin of their country at the hands of a kindred people, speaking the same language, and holding in common the traditions of a glorious past, nerved them to deeds of valor and aroused a spirit of resistance that must ever command the respect and admiration of their posterity. Our forefathers had not forgotten the bitter experiences of the Revolutionary struggle, nor yet had the courage which animated them during these trying times died out in the breasts of their sons. True in their devotion to British rule, and inspired by a deep, patriotic enthusiasm, they at once organized themselves into battalions of militia, took up arms, and were ready to lay down their lives in defence of home and country.

Whatever reasons there may have been to provoke the colonists to revolt in 1776, it is quite evident that the verdict of history does not in any way recognize the justice of the declaration of war in 1812. The difficulties that arose during the few preceding years might have been peaceably adjusted by the diplomatic agents of the two countries, had not a reckless Democratic majority, bent on conquest, determined to invade the homes of their peaceful and inoffensive neighbors to the north. This they did, but not one acre of territory was annexed, nor yet did they gain one single permanent advantage. On the contrary it strengthened the allegiance of the Canadian people and bound them more closely to the throne of Great Britain.

At this time the situation in Canada was indeed precarious. With a population of less than 300,000 all told, and these widely scattered in small settlements without any means of rapid communication, with a long and exposed boundary, and with the mother country embroiled in European wars, is it at all surprising that the hearts of these sturdy pioneers were filled with misgivings as to the fate of these colonies? Did not the burden seem greater than they could bear? Had they not been strong in their allegiance to Great Britain and true to the principles of their forefathers these provinces would have been conquered and Britain would have been stripped of her colonial possessions in America. However, Providence had decreed otherwise, and we are now left to work out our destiny as part of that Greater Britain, "upon whose shores the sun never sets." May we then as Canadians be true to our country, loyal to that great Empire of which we form a part, and ever bear in mind that this is the

"Land of the beautiful and brave
The freeman's home—the martyr's grave,
The nursery of giant men,
Whose deeds have link'd with every glen,
And every hill and mountain stream
The romance of some warrior dream."

In the western province the situation was even more desperate than it was in the east. When the war broke out it was estimated that the population of Upper Canada did not exceed 80,000. These were grouped in small settlements along the frontier, and were exposed to attack both by land and water. The principal centres were along the northern banks of the St. Lawrence, at Kingston, around the Bay of Quinte, at York (now Toronto), around the head of Lake Ontario, and along the Niagara River, with a few settlements on Lake Erie and the River Detroit. When we consider the sparseness of the population, for it did not exceed that of the County of Wentworth and the City of Hamilton combined, and the long frontier they were called upon to defend, the outcome of the war is indeed gratifying. Nor was the want of population the only drawback. The means of communication between these widely separated settlements was particularly bad, for the country had been settled less than thirty years, and the roads in most cases were merely paths cut through the forests. This rendered the transportation of troops and supplies a long and arduous task. The rapid concentration of an army at a given point is essential to the successful defence of any country. In addition to these disadvantages the mother country was engaged in war on the Continent, and could not furnish the necessary troops to defend her colonies as she would have done had she been free from European entanglements.

The United States declared war against Great Britain on the 18th of June, 1812, exactly three years before the decisive battle of Waterloo. Some of the causes that led to the gradual estrangement of the good-will of the Young Republic from the mother country, and eventually led to the declaration of war, are to be found in the series of events that occurred in Europe during the six preceding years. Embittered by the memories of the terrible blow inflicted on his navy at Trafalgar and the Nile, Napoleon, when the Prussian Monarchy had been humbled at Jena, turned fiercely upon Great Britain, and attempted the destruction of her commerce by issuing the famous "Berlin Decree." This decree was formally promulgated on the 21st of November, 1806, from Berlin, the Prussian Capital. Although it did not extinguish British commerce, yet it inflicted serious damage upon it, and caused heavy loss to many of her merchants. The rigorous enforcement of this decree compelled the

British Ministry to adopt defensive measures. Accordingly, on the 7th of January, 1807, the first "Order-in-Council" was issued. At first this was well received in the United States, but afterwards it was made a pretext for war. In June, 1807, an unfortunate incident occurred in the too rigid enforcement of the "right of search." The American frigate Chesepeake had on board some deserters from the British Navy, whose return had been demanded by the British Consul at Norfolk, and by the captains of the vessels from which they had deserted. These demands were refused. Acting under instructions from Admiral Berkeley, Captain Humphries, of H. M. Ship Leopard, followed the Chesepeake to sea, and, coming up with her, intimated that he desired to send a message to the commander. A letter was sent asking that the deserters, whose names were given, be restored to the British. Commodore Barron, the commander of the Chesepeake, refused to comply with this request, whereupon the Leopard fired a broadside. A short skirmish ensued, which ended in the American vessel striking her colors, and restoring the deserters. This incident aroused a strong feeling of antipathy against Britain, which was greatly strengthened by the issue of an angry proclamation by the President on the 2nd of July following.

Events in Europe forced the British Ministry to issue a second "Order-in-Council," which was done on the 11th of November, 1807. Napoleon, on the 17th of the following December, issued the "Milan Decree" as an answer. Intelligence from Europe plainly indicated to the American authorities that the policy of France did not exempt the United States from the operations of the "Berlin Decree." Acting upon this information, Congress, on the 25th of December of that year, passed the "Embargo Act," which excluded all foreign vessels from sharing in the coasting trade.

Public opinion, which was constantly being fomented by demagogues and partizan politicians, steadily increased in its hostility towards Great Britain. To allay this feeling and to offer reparation for the affair of the Chesepeake, the British Ministry sent an envoy extraordinary to America. His mission failed, owing to the refusal of the President to withdraw his proclamation of the 2nd of July. The "Embargo Act" seriously injured American commerce, and was soon superseded by a "Non-Intercourse Act," which failed to satisfy either its promoters or the public, and was therefore repealed.

Another maritime encounter between the American 44-gun frigate President and the British 18-gun sloop Little Belt, which was destroyed on this occasion, added to the complications already existing. The American captain was tried by court-martial and acquitted. Great Britain accepted the official statement that no hostility was intended on the part of the American Government. The Americans had made an offer that if France would withdraw her decrees, or England the Orders-in-Council, she would prohibit her commerce from the other. Napoleon promised to revoke the "Berlin" and "Milan Decrees" if the Americans would carry out the policy of non-intercourse with Britain. This they did, but Napoleon failed to fulfil his promises.

The downfall of the Percival Ministry in Great Britain brought Lord Liverpool to the Premiership. With him was associated Lord Castlereagh, as Secretary of Foreign Affairs. Twelve days after this Ministry was formed the obnoxious "Orders-in-Council" were revoked. But it was too late; Congress had already declared war against Great Britain, and was massing her armies along the frontier of Canada.

From the tone of the President's message, and the tenor of the speeches delivered in Congress by some of the leading members of the Democratic party, it was clearly foreshadowed that Canada would be the objective point. They were quite confident of an easy conquest, as may be seen from the following extracts from speeches made in Congress prior to the declaration of war. Dr. Eustis, United States Secretary of War, said: "We can take Canada without soldiers; we have only to send officers into the Provinces, and the people, disaffected towards their own government, will rally round our standard." The Hon. Henry Clay, who in 1814 signed the treaty of peace as one of the Commissioners, expressed himself still more strongly: "It is absurd to suppose we shall not succeed in our enterprise against the enemy's provinces. We have the Canadas as much under our command as Great Britain has the ocean, and the way to conquer her on the ocean is to drive her from the land. We must take the continent from them. I wish never to see a peace till we do. God has given us the power and the means; we are to blame if we do not use them. If we get the continent she must allow us the freedom of the seas."

The Americans were ambitious of securing possession of and controlling the destinies of the whole of North America. Actuated by this motive, and taking advantage of the time when Britain was engaged in a fierce struggle with the First Napoleon, and when she was taxed to the utmost to maintain her supremacy, nay, even when her very existence as one of the great powers of Europe was threatened, the American Congress openly declared war. Their avowed object was to redress certain alleged grievances, notably some "Orders-in-Council" prohibiting all foreign vessels from trading with the French, and the "right of search" for deserters from her navy; but the real purpose, as shown by subsequent actions, was the acquisition of the Provinces of British North America. These "Orders-in-Council" as well as the "right of search," which formed the chief grounds of complaint were withdrawn by Britain, but the Americans still persisted in going on with the war.

The plan of campaign adopted by the Americans was to invade Canada by way of Lake Champlain in the east, by the Niagara River in the centre, and by the River Detroit in the west. Sir Isaac Brock, who was administrator during the absence of Sir Francis Gore, determined to make the first attack. Consequently he sent Captain Roberts to Fort Michillimackinac, which was surprised and taken. This confirmed the allegiance of the Northwest Indians and secured a valuable strategic point to the British. General Hull crossed the Detroit River at Sandwich, summoned the Canadians to lay down their arms and submit themselves to the Americans. This they bravely refused to do, and defied both him and his army. In the meantime General Brock issued a proclamation from his headquarters at Fort George, to allay the fears and to strengthen the hands of the people in the west. He also sent Colonel Proctor with a small force to aid the garrison at Amherstburg. General Hull was driven back to Detroit and forced to surrender, which he did with the best grace possible. Along the Niagara River the Americans were defeated at Queenston Heights, while at Rouse's point in the east, they retired after a slight skirmish. Doubtless the temper of the Canadian people was a disappointment to them, for they anticipated an easy victory. In this they were very much deceived, for instead of being welcomed with open arms they met with the most determined resistance. Thus ended the campaign of 1812, with the British successful at all points, but with the loss of their brave commander, Sir Isaac Brock.

"The mind that thought for Britain's weal,
The hand that grasped the victor's steel."

The Americans conducted the campaign of 1813 on lines somewhat similar to that of 1812, but instead of attempting the conquest of the whole of British North America, they concentrated their efforts on the Province of Upper Canada. The American forces had been greatly strengthened during the winter, both on Lake Ontario and along the Niagara frontier. Commodore Chauncey made an attack on York, the Capital of Upper Canada, and, on the 27th of April, succeeded in capturing it. Here they remained until the 2nd of May, destroying the public buildings and plundering the churches and library. They then made a descent upon Fort George at the mouth of the Niagara River, where General Vincent was stationed with an army numbering something less than 1,400 men. Being unable to hold his position against the superior forces concentrated upon it, he retreated towards Burlington Heights.

Affairs in Upper Canada were rapidly approaching a crisis that was to decide the fate of the Canadas. There were only some 2,100 British troops available for the defence of the Upper Province. These were assisted by a noble band of militia who were determined to contest every foot of ground. The American army on the Niagara frontier numbered fully 6,000, and this, with the superiority of the American fleet on Lake Ontario, rendered the conquest of this province extremely probable. After the capture of Niagara, and the retreat of General Vincent to Burlington Heights, the military authorities were so disheartened that they determined to disband the militia, and abandon the western portion of this province to its fate. Accordingly, on the 28th May the militia were disbanded, and told that they might go home if they chose to do so. Some few returned to their homes to protect their families, and look after their private interests, but the great majority followed the army to Burlington Heights, determined to do all in their power to drive out the invaders. The Hon. W. H. Merritt, in his journal of the war, says: "I strongly suspected from the indifferent manner in which the militia were treated, that the Upper Province was to be abandoned, which opinion was entertained by most people. * *

I felt in a sad dilemma. The thought of abandoning the country and leaving everything that was near and dear to me was most distressing.

Continuing his narrative of the events preceding the battle of Stony Creek, Mr. Merritt says:

"On the evening of the 29th of April I was deputed by Brigadier General Vincent to bring down all the boats from Burlington, which was accomplished in sixteen hours. The enemy, with their fleet, returned to Fort Niagara. From this time until the 27th of May every man was turned out at two o'clock in the morning, and remained under arms Some men were twelve nights in succession on guard. Our small force was formed into three divisions. Col. Myers, with 'Kings," and two companies of militia, defended the lake coast to the Four Mile Creek; Col. Harvey, with three companies of Newfoundlands and three companies of Glengarrys, one company of the 41st, one company of the 44th, and two of militia, up the river to Queenston; General Vincent, with the 49th regiment and militia, in rear of Fort George, to act as occasion might require. Col. Harvey and myself rode up and down the river during the night and slept at day. On the 25th the enemy commenced operations by cannonading Fort George, which they burned. For want of ammunition we were unable to return fire. On the 27th, at four in the morning, they were discovered under cover of a thick fog. They commenced to land at 9 a. m. Our right and left divisions were obliged to fall back on the reserve, which, numbering but 800 men, were forced to retire.

"After finding the boats commanded by Commodore Barclay, who was at Twenty Mile Creek with the light company of the Kings, and ordering the troops down, I returned with them as far as 'Shipman's,' where I was met by a message and ordered to go to De Cew's, to which place the army had retreated. Remaining all night, I took the party through the woods, arriving there next morning at 9 o'clock on the 28th of May.

"This day the militia were disbanded and the regulars marched to Grimsby on the way to Burlington Heights. Early on the 29th I returned to the Twelve, at Shipman's, where the enemy had its advance guards. I remained at my father's until midnight, when I returned to Grimsby to report. Here I was ordered to remain with the troops and a few militia until driven off by the enemy. Their appearance next day with a flag of truce, shortly followed by a party whose force caused me to retreat to Stony Creek on the 1st June. During the next week we had several skirmishes in which I lost some of my men."

Mr. Merritt had previously organized a company of dragoons, and with these he was detailed to protect the rear of the retreating army. Being well acquainted with this section of the country, he was able to do this work effectively, although it taxed his men to the utmost, as they had little rest and scarcely any sleep for six or eight days. His acquaintance with the people enabled him to keep well posted in all the movements of the invaders. He used this knowledge to the great advantage of the British, but the enemy with their large invading force drove the pickets of the rear guard across the big creek near the Red Hill, and as far west as Aikman's. This was the position of the British when the Americans encamped near Stony Creek late in the afternoon of the 5th of June. Mr. Merritt, continuing his narrative, says:

"A reconnoissance by Colonel Harvey and Cornet McKenney revealed the fact that the enemy were encamped for the night at Stony Creek, and that they had a party of 1,500 men on the lake shore. On the return of the party sometime near midnight when Mr. Merritt and a number of officers were lying on the grass fast asleep, a suggestion was made either by Cornet McKenney or Mr. George, an ensign in the militia, that it would be a good idea to attack the enemy in their camp, and probably surprise them before daylight shewed the real state of their numbers. Col. Harvey approved of the plan and proposed it to General Vincent, who after a little deliberation proceeded to carry it into effect, much to the joy of all who left their homes a few days ago in grief and sadness of heart.

"In the silence of a warm summer's night the order to advance was quietly given, and never were preparations for a deadly grapple with an invading foe more heartily received. It has been truly and eloquently said that the battle of Stony Creek was neither a Waterloo nor an Inkerman, but that the issues at stake for the men of the Niagara peninsula were, everything equal, as important in their results as the success of the most dearly won field that ever the conquerors rested upon."

J. B. Lossing, in his sketches of the war of 1812, asserts that the countersign "was obtained from a treacherous dweller near, who, by false pretenses, had procured and conveyed it to General Vincent."

There is a tradition that the statement made by Lossing is not wholly devoid of truth. The person referred to as "a treacherous dweller near," was Mr. Isaac Corman, who then lived on lot 22, in the 3rd concession of Saltfleet. It appears that when the advance pickets of the invading army approached Stony Creek on the afternoon of the 5th June, they saw a man setting gate posts at the end of the lane leading to his house. They took this man prisoner and marched him to the lake shore where some 1,500 of the Americans were encamped. He was left in charge of an officer who at first treated him with scant courtesy. Hearing this officer speak of Kentucky, he informed him that he too was a Kentuckian. This produced a great change in the bearing of the officer, who, after this declaration, treated him as a friend and not as a foe. They engaged freely in conversation when Corman told him that he was a cousin of General W. H. Harrison, then commanding the American army in the west, and as boys they had many a time played together at school. This established confidence, and the officer gave him permission to return to his home. Mr. Corman asked how he was to pass the sentries. The officer, placing the fullest confidence in his integrity, gave him the countersign, and he at once started on his way.

In the meantime Mrs. Corman had become very anxious as to the fate of her husband. While busy with her household cares, who should come in but her youngest brother William, then a young man of 19, and who was afterwards known as "Billy Green the scout." She informed him that her husband had been made a prisoner while at work, and was then in the hands of the Americans. They talked the matter over very earnestly, when young Green determined to make a search for his missing brother-in-law, and if possible find out where he was confined. He started in the direction of the lake shore and was fortunate enough to meet his brother-in-law at Davis' on his way home. Here Corman gave the countersign to young Green, who at once started for his home on the mountain. It was now getting quite dark. After several narrow escapes from being captured by the sentries he reached his home. It is said that on one occasion so completely was he hemmed in that he got down on all fours and trotted across the road like a dog, and made good his escape into the woods. When he reached home, he got a horse from his brother Levi, and followed the bush road by way of Mount Albion as far as the top of the mountain south of Hamilton, where he left his horse with a friend. He then proceeded on foot to Burlington Heights, where he met Col. Harvey and gave him the countersign. Col. Harvey consulted with General Vincent and his brother officers, when they decided to make a night attack on the enemy. Preparations were at once made, and the army began its march to Stony Creek. The weight of evidence fixes the time of this attack as about 2 o'clock in the morning of the 6th of June. It is said that he piloted Col. Harvey and his men on their march through the forests and led the advance at Stony Creek.

The American countersign used on this occasion, so tradition says, consisted of the first syllables of General W. H. Harrison's name, and was given in the following manner: Sentry to stranger—"Who goes there?" Stranger—"A friend." Sentry—"Approach, friend, and give the countersign." The sentry then takes the position of "charge," and presents the point of his bayonet to the breast of the stranger, and keeps it there until the countersign is given. Stranger at point of bayonet—"Will." Sentry—"Hen." Stranger—"Har." The sentry lowers his musket and allows the stranger to pass.

It seems quite evident that the British authorities had obtained the American countersign from some source, for they not only passed the sentries, but reached the centre of the camp before the Americans were aware of their presence.

Corman, after parting with young Green, continued his journey eastward to his own home. Hearing a noise behind him, he turned to discover the cause, when he was seized by three American soldiers who took him prisoner a second time. They accompanied him home and remained on guard at his house over night. Early next morning news came that the American army was in full retreat. On hearing this the guards forsook their posts and joined their retreating comrades. In their hurry to depart they left some sacks and a soldier's canteen. These articles were kept for many years by the Corman family as mementoes of this visit.

The reader will pardon a slight digression here in order that a brief account of the young man who carried the countersign to Col. Harvey may be given. "Billy Green the scout" was the youngest son of Adam Green, who emigrated from New Jersey to Canada in 1792, and settled on the mountain in Saltfleet, a little to the south of Stony Creek. As a boy he shunned companionship, and loved to wander in the woods alone. He was an expert climber, seemed to have no sense of danger, and was perfectly at home in the forests. It is said that he could climb almost any tree, run out on one of its branches, jump across to the limbs of another, and thus go from tree to tree much as a squirrel does. He was active in movement, quick in decision, very impulsive, and seldom thought of the consequences of any act. Hence he was well fitted for any daring adventure, and seemed to delight in danger of any kind. He differed from the other members of his father's family, and led quite an eventful life. He died in Saltfleet in the 89th year of his age.

Mr. Merritt gives the following description of this important battle:

"The order came to move forward: we had to march six miles before we came up to our pickets: our force consisted of only 500 men, with one field piece in the rear, which was of no manner of use. All my hopes depended on this bold enterprise, for had we not attacked them, they would have advanced next morning, and in all probability we should have retired without risking an action, as our force was not one-third of theirs. Proctor and the whole upper country would have fallen.

"On our arrival at Davis' we heard the report of a gun from their picket; the detachment halted, formed into sections, and the loading was drawn from each gun. The light companies of the 49th Kings were in advance; General Vincent and staff at the head of the column, in the rear. I was attached to him for the night. The enemy were encamped on Gage's fields, in a very advantageous position; 2000 of their men were on the hill to the right of the road (i. e., on the south side), and 500 in a lane on the left (the north side) in advance of their artillery, which was situated on a hill directly in front of the road that our troops must come; their pickets nearly half a mile in advance also in the woods. These we made prisoners without giving alarm. On our entering the clearing we were fired on by the second picket who were more alert. The 500 on our left were the first that were discovered.

"General Vincent ordered a charge, and our men set up a tremendous shout, which continued along the whole line, and was the cause of throwing the enemy into the greatest disorder and confusion imaginable. Our two light companies of the 49th routed the 500 men before the main body had time to come up. Cornet George was by my side, and told me the fight was over and the victory ours.

"I happened to cast my eyes around and discovered the fires of the main body, which I showed to him. Col. Harvey and the officers were using every exertion to get the men formed when the enemy opened a most tremendous fire on us from the hill, and likewise opened from their guns on the opposite side. Our men dispersed in every direction, and had not Colonel Penderlethe with 30 men, charged and captured their guns, we should have been completely defeated. I never heard so rapid a discharge of musketry; the hill was a continual sheet of fire. However, after capturing their artillery and both their generals, they thought proper to retreat from the field. At the appearance of daylight we followed their example, fearing that when they discovered our force they would renew the attack.

"After we left the field Col. Harvey desired me to return, and, if possible, find Major-General Vincent, supposed to be either dead or wounded. Not thinking of the enemy, I was challenged by a sentry under old Gage's house. I was on the point of surrendering as my pistols were both in my holsters, when I adopted the stratagem of enquiring, "Who placed him there?" and rode up to him. He, by my blue military coat, took me for one of his own party, and answered—"his captain, who had just gone into the house with a party of men." I then enquired if he had found the British General, and pulled out my pistol, which made him drop his gun. At that moment a man without any gun ran down the hill; I called him; he came, when I had the good fortune to secure both, and bring them off. This stratagem had succeeded once before, or I should not have thought of it.

"The enemy retreated next morning, followed by droves of Indians and militia, who, on hearing of the fight, gathered from all parts."

The defeat of the British at Moraviantown forced them to continue their retreat from the west. After a long and toilsome journey, during which they endured severe privations, and suffered greatly from the hardships incident to a march through an almost unbroken forest, they reached the village of Ancaster on the 17th of the same month. When the inhabitants of this quiet country place heard of the reverses in the west, and saw the straggling groups of soldiers as they entered the village, their minds were filled with grave apprehensions as to their own safety. It seemed to them inevitable that they should witness the destruction of their homes and property. The panic spread rapidly, but as no victorious army followed, quiet was soon restored. The remnant of Proctor's army reached Burlington Heights, where they met the Centre army on their retreat from Niagara, for Sir George Prevost had issued orders to General Vincent to evacuate all the British posts, and to retire to Kingston with the least possible delay. At Burlington Heights they held a council of war, when it was decided that the western part of the province should be defended at all hazards.

A picture with true perspective gives to the eye an accurate representation of the scene which it depicts, so the placing of the battle of Stony Creek, and the council of war at Burlington Heights in their true historical perspective, enables us to form a more correct estimate of their importance. The time at which these events occurred was undoubtedly the crucial period of our history, and the loyalty and devotion of the people were tried as if by fire. The crisis of the war was safely passed, although unknown to the actors in the struggle. These two places are indeed historic ground, and as Canadians we should show our appreciation of their true worth by erecting some monument to commemorate these events.

> "Yet this 'battle' sways the future, and behind the dim unknown
> Standeth God within the shadow keeping watch above His own.
> We see dimly in the present what is small and what is great,
> Slow of faith, how weak an arm may turn the iron helm of fate."

CURATOR'S REPORT.

Donations to Hamilton Association Museum, 1896-97.

14 grains of wheat, said to have been taken from an Egyptian mummy of the time of Joseph.

A small Scarabæus from Egypt.

7 small silver coins, Mexican and Turkish.

A piece of Japanese brocaded silk, a hundred years old.

2 Bancos Japan-ware tea-pots.

3 brown social teapots.

2 small milk jugs.

1 cup and saucer of fine china.

1 Chinese sweet-pot.

1 Sandal-wood fan (Chinese).

1 Japan bath roller ball, used after taking a bath.

2 bean seeds.

2 Japanese children's dolls. These are highly prized, and are handed down from generation to generation.

A copy of the first Japanese newspaper, "The Japan Herald," September, 1896.

Donated by Mrs. S. J. Myles, Oakland, Cal., U. S.

A memorial from Balaclava: a small, round tobacco-box, found in the pocket of a dead soldier on the field of battle. Donated by Mrs. G. MacKelcan.

A piece of the steam-boat Victoria, wrecked in the river Thames, London, Ont., May 24th, 1881. Donated by Mrs. J. Allan, Hamilton.

A very large collection of shells, corals and Indian stone implements; Chinese and Japanese curiosities—a large collection; curious parrot fishes; old newspapers and books, etc.; a few mineral and fossil specimens. Loaned by Mrs. Carry, Hamilton.

ALEX. GAVILLER,
Curator.

HAMILTON ASSOCIATION.

Statement of Receipts and Disbursements for the Session 1896-97.

RECEIPTS.

Cash balance from 1896	$230 55
Government Grant	400 00
Anonymous Grant	20 00
Members' Subscriptions	124 00
	$774 55

DISBURSEMENTS.

Rent Museum and Dark Room	$170 50
Caretaker	42 00
Expenses Photographic Exhibits	63 93
Gas	10 35
Postage, Stationery, etc	26 00
Printing	31 00
Annual Reports	189 00
Grant to Photographic Section	74 39
Sundries	75 35
Balance on hand	92 03
	$774 55

We have examined the vouchers and found them correct.

H. P. BONNEY,
F. HANSEL, } *Auditors.*

FLORA OF HAMILTON DISTRICT.

BY J. M. DICKSON AND A. ALEXANDER, F. S. S.

In preparing this list we have followed the classification and nomenclature of Dr. Asa Gray's Manual of the Botany of the Northern United States, sixth edition, second issue.

We have endeavored to make it as complete and as free from errors as possible; doubtful specimens having been submitted to John Macoun, M. A., F. L. S., F. R. S. C., Dominion Botanist, for positive identification.

Names of plants followed by (Craigie), (Logie) or (Buchan) are simply copied from lists previously published by these gentlemen.

Dr. Craigie, *Canadian Journal*, 1852. (We have not been able to obtain an original copy of this list.)

Judge Logie—"Flora of Hamilton." List of plants found growing in the neighborhood of Hamilton during the years 1859-61, including plants collected by Miss Kate Crooks: *Annals of the Botanical Society of Canada.*

J. M. Buchan, M. A.—"Flora Hamiltonensis." *Proceedings of the Canadian Institute*, 1883-84

RANUNCULACEAE.

Clematis Virginiana—L.
" verticillaris—D. C.
Anemone cylindrica—Gray.
" Virginiana—L.
" Pennsylvanica—L.
" nemorosa—L.
" var. quinquefolia.
Hepatica triloba—Chaix.
" acutiloba—D. C.
Anemonella thalictroides—Spach.
Thalictrum dioicum—L.
" polygamum—Muhl.
" purpurascens—L.

Ranunculus aquatilis—L., var. trichophyllus—Gray.
" multifidus—Pursh.
" Flammula—L., var. reptans—E. Meyer.
" pusillus—Poir. (Logie.)
" abortivus—L.
" sceleratus—L.
" recurvatus—Poir.
" fascicularis—Muhl.
" repens—L.
" Pennsylvanicus—L. f.
" *bulbosus*—L.
" *acris*—L.
Caltha palustris—L.
Coptis trifolia—Salisb.
Aquilegia Canadensis—L.
Delphinium *Consolida*—L.
Cimicifuga racemosa—Nutt.
Actæa spicata—L., var. rubra—Ait.
" alba—Bigelow.

MAGNOLIACEAE.

Liriodendron Tulipifera—L.

MENISPERMACEAE.

Menispermum Canadense—L.

BERBERIDACEAE.

Berberis *vulgaris*—L.
Caulophyllum thalictroides—Michx.
Podophyllum peltatum—L.

NYMPHÆACEAE.

Nymphæa odorata—Ait. (Logie).
" reniformis—D. C.
Nuphar advena—Ait. f.

SARRACENIACEAE.

Sarracenia purpurea—L.

PAPAVERACEAE.

Sanguinaria Canadensis—L.

Chelidonium *majus*—L.
Papaver *Argemone*—L. (Buchan).

FUMARIACEAE.

Adlumia cirrhosa—Raf. (Logie).
Dicentra Cucullaria—D. C.
" Canadensis—D. C.
Corydalis glauca—Pursh.
Fumaria *officinalis*—L. (Logie).

CRUCIFERAE.

Dentaria diphylla—L.
" laciniata—Muhl.
" heterophylla—Nutt. (Buchan.)
Cardamine rhomboidea—D. C.
" " var. purpurea—Torr.
" rotundifolia—Michx.
" pratensis—L.
" hirsuta—L.
" Pennsylvanica—Muhl.
Arabis hirsuta—Scop.
" laevigata—Poir.
" Canadensis—L.
Draba Caroliniana—Walt.
Alyssum *calycinum*—L.
Camelina *sativa*—Crantz.
Nasturtium *officinale*—R. Br.
" *sylvestre*, R. Br. (Buchan.)
" palustre—D. C.
" " var. hispidum.
" *Armoracia*—Fries.
Barbarea vulgaris—R. Br. (Craigie.)
Erysimum cheiranthoides—L.
Sisymbrium canescens—Nutt.
" *officinale*—Scop.
Brassica *Sinapistrum*—Boiss.
" *nigra*—Koch.
Capsella *Bursa-pastoris*—Moench.
Thlaspi *arvense*—L.

Lepidium Virginicum—L.
" intermedium—Gray. (Logie.)
" *ruderale*—L.
" *campestre*—Br.
Cakile Americana—Nutt.
Raphanus *Raphanistrum*—L.

CAPPARIDACEAE.

Polanisia graveolens—Raf.

CISTACEÆ.

Helianthemum Canadense—Michx.
Lechea minor—L.

VIOLACEAE.

Viola palmata, var. cucullata—Gray.
" sagittata—Ait.
" Selkirkii—Pursh.
" palustris—L.
" blanda—Willd.
" " —var. renifolia—Gray.
" lanceolata—L.
" pubescens—Ait.
" Canadensis—L.
" striata—Ait. (Logie.)
" rostrata—Pursh.
" canina—L., var. Mühlenbergii—Gray.
" *tricolor*—L.
" " var. *arvensis*.

CARYOPHYLLACEAE.

Dianthus *barbatus*—L.
Saponaria *officinalis*, L.
" *Vaccaria*—L.
Silene *Cucubalus*—Wibel.
" antirrhina—L.
" *noctiflora*—L.
Lychnis *Githago*—Lam.
Arenaria *serpyllifolia*—L.
" Michauxii—Hook, f.
" lateriflora—L.

Stellaria *media*—Smith.
" longifolia—Muhl.
" longipes—Goldie. (Buchan).
Cerastium *viscosum*—L.
" *vulgatum*—L.
" nutans—Raf.
" arvense—L.
" " var. oblongifolium—Hall and Britt.

PORTULACACEAE.

Portulaca *oleracea*—L.
" *grandiflora*—Hook. (Buchan).
Claytonia Virginica—L.
" Caroliniana—Michx. (Logie).

HYPERICACEAE.

Hypericum Kalmianum—L. (Logie).
" ellipticum—Hook.
" *perforatum*—L.
" maculatum—Watt.
" mutilum—L. (Buchan).
" Canadense var. minimum—Chois.
Elodes campanulata—Pursh.

MALVACEAE.

Malva *rotundifolia*—L.
" *sylvestris*—L.
" *moschata*—L.
Callirrhoe digitata.—Nutt.
Abutilon *Avicennæ*—Gaertn.

TILIACEAE.

Tilia Americana—L.

LINACEAE.

Linum Virginianum—L.
" *usitatissimum*—L.

GERANIACEAE.

Geranium maculatum.—L.
" Robertianum—L.
" *pusillum*—L.

Erodium *cicutarium*—L'Her. (Logie & Buchan).
Oxalis corniculata var. stricta—Sav.
Impatiens pallida—Nutt.
" fulva.—Nutt.

RUTACEAE.

Xanthoxylum Americanum—Mill.

ILICINEAE.

Ilex verticillata—Gray.
Nemopanthes fascicularis—Raf.

CELASRTRACEAE.

Celastrus scandens—L.
Euonymus atropurpureus—Jacq. (introduced).
" Americanus, var. abovatus—Torr. & Gray.

RHAMNACEAE.

Rhamnus alnifolia—L'Her. (Logie).
Ceanothus Americanus—L.

VITACEAE.

Vitis Labrusca—L. (Buchan).
" cordifolia—Michx.
" riparia—Michx.
Ampelopsis quinquefolia—Michx.

SAPINDACEAE.

Aesculus *Hippocastanum*—L.
Acer spicatum—Lam.
" saccharinum—Wang.
" dasycarpum—Ehrh.
" rubrum—L.
Negundo aceroides—Moench. (introduced)
Staphylea trifolia—L.

ANACARDIACEAE.

Rhus typhina—L.
" Toxicodendron—L.

POLYGALACEAE.

Polygala paucifolia—Willd.
" polygama—Walter.

Polygala Senega—L.
" " " var. latifolia—Torr. & Gray.
" sanguinea—L. (Logie & Buchan).
" fastigiata—Nutt. (Craigie).
" verticillata—L.

LEGUMINOSAE.

Baptisia tinctoria—R. Br. (Craigie).
Lupinus perennis—L.
Trifolium *arvense*—L.
" *pratense*—L.
" repens—L.
" *hybridum*—L.
" *procumbens*—L.
" *incarnatum*.
Melilotus *officinalis*—Willd.
" *alba*—Lam.
Medicago *sativa*—L.
" *lupulina*—L.
Robinia Pseudacacia—L.
" viscosa—Vent.
Astragalus Canadensis—L.
" Cooperi—Gray.
Desmodium nudiflorum—D. C.
" acuminatum—D. C.
" rotundifolium—D. C.
" cuspidatum—Torr. & Gray.
" Dillenii—Darlingt. (Craigie.)
" paniculatum—D. C.
" Canadense—D. C.
Lespedeza procumbens—Michx. (Logie.)
" violacea—Pers.
" polystachya—Michx. (Logie.)
" capitata—Michx.
Vicia *sativa*—L.
" " var. *angustifolia*—Seringe.
" *hirsuta*—Koch. (Logie).
" Caroliniana—Walt.

Vicia Americana—Muhl. (Craigie).
" *sepium*—L.
Lathyrus maritimus—Bigelow.
" ochroleucus—Hook.
" palustris—L.
" " var. myrtifolius—Gray.
" *pratensis*—L. (Logie).
Apios tuberosa—Moench.
Strophostyles angulosa—Ell.
Amphicarpaea monoica—Nutt.
Gleditschia triacanthos—L.

ROSACEAE.

Prunus Americana—Marshall
" Pennsylvanica—L. f.
" Virginiana—L.
" serotina—Ehrh.
" *Cerasus*—L.
Spiraea salicifolia—L.
" tomentosa—L.
Physocarpus opulifolius—Maxim.
Gillenia trifoliata—Moench.
Rubus odoratus—L.
" triflorus—Richardson.
" strigosus—Michx.
" Occidentalis—L.
" villosus—Ait.
" Canadensis—L.
" hispidus—L. Aut.
Dalibarda repens—L.
Geum album—Gmelin.
" Virginianum—L. (Craigie).
" strictum—Ait.
" rivale—L.
Waldsteinia fragarioides—Tratt.
Fragaria Virginiana—Mill.
" " var. Illinoensis—Gray.
" vesca—L.

Potentilla arguta—Pursh.
" Norvegica—L.
" supina—L.
" *recta*—L.
" argentea—L.
" palustris—Scop.
" Anserina—L.
" Canadensis—L.
Agrimonia Eupatoria—L.
Poterium *Sanguisorba*—L.
Rosa blanda—Ait.
" Carolina—L.
" lucida—Ehrh.
" humilis—Marsh.
" *micrantha*—Smith. (Logie).
" *rubiginosa*—L.
" *cinnamomea*—L.
Pyrus *Malus*—L.
" *communis*—L.
" coronaria—L.
" arbutifolia var. melanocarpa—Hook.
" *aucuparia*—Gaertn.
Crataegus *oxyacantha*—L.
" coccinea—L.
" tomentosa—L.
" punctata—Jacq.
" Crus-galli—L.
Amelanchier Canadensis—Torr. & Gray.
" " var. oblongifolia—Torr. & Gray.

SAXIFRAGACEAE.

Saxifraga Virginiensis—Michx.
Tiarella cordifolia—L.
Mitella diphylla—L.
" nuda—L.
Chrysosplenium Americanum—Schwein.
Parnassia Caroliniana—Michx.
Ribes Cynosbati—L.

Ribes rotundifolium—Michx.
" oxyacanthoides—L. (Logie.)
" lacustre—Poir.
" prostratum—L'Her. (Logie.)
" floridum—H'Her.
" rubrum—L., var. subglandulosum—Maxim (Logie.)

CRASSULACEAE.

Penthorum sedoides—L.
Sedum *ternatum*—Michx. (Buchan.)
" *acre*—L.
" *Telephium*—L.

DROSERACEAE.

Drosera rotundifolia—L.

HAMAMELIDEAE.

Hamamelis Virginiana—L.

HALORAGEAE.

Myriophyllum spicatum—L. (Buchan.)
" verticillatum—L. (Logie.)
" heterophyllum—Michx. (Logie.)
" tenellum—Bigelow (Logie.)
Hippuris vulgaris—L.

LYTHRACEAE.

Decodon verticillatus—Ell.

ONAGRACEAE.

Epilobium angustifolium—L.
" *hirsutum*—L.
" lineare—Muhl.
" strictum—Muhl. (Logie).
" coloratum (?)—Muhl.
" adenocaulon—Haussk.
" palustre—L.
Oenothera biennis—L.
" " var. grandiflora—Lindl.
" pumila—L.

Circaea Lutetiana—L.
" alpina—L.

CUCURBITACEAE.

Sicyos angulatus—L. (Logie).
Echinocystis lobata—Torr. & Gray.

FICOIDEAE.

Mollugo *verticillata*—L.

UMBELLIFERAE.

Daucus *Carota*—L.
Angelica atropurpurea—L.
Conioselinum Canadense—Torr. & Gray.
Heracleum lanatum—Michx.
Pastinaca *sativa*—L.
Thaspium aureum—Nutt.
Pimpinella integerrima—Benth & Hook.
Cryptotaenia Canadensis—D. C.
Sium cicutaefolium—Gmelin.
Carum *Carui*—L.
Cicuta maculata—L.
" bulbifera—L.
Osmorrhiza brevistylis—D. C.
" longistylis—D C.
Hydrocotyle Americana—L.
Sanicula Marylandica—L.
" " var. Canadensis—Torr.

ARALIACEAE.

Aralia racemosa—L.
" nudicaulis—L.
" quinquefolia—Decsne. & Planch.
" trifolia—Decsne. & Planch.

CORNACEAE.

Cornus Canadensis—L.
" florida—L.
" circinata—L'Her.
" stolonifera—Michx.

Cornus paniculata—L'Her.
" alternifolia—L. f.

CAPRIFOLIACEAE.

Sambucus Canadensis—L.
" racemosa—L.
Viburnum Opulus—L.
" acerifolium—L.
" pubescens—Pursh.
" cassinoides—L.
" Lentago—L.
Triosteum perfoliatum—L.
Linnaea borealis—L.
Symphoricarpos occidentalis—Hook. (Logie).
" racemosus—Michx.
" " var. pauciflorus—Robbins.
Lonicera ciliata—Muhl.
" hirsuta—Eaton. (Buchan).
" Sullivantii—Gray. (Logie).
" glauca—Hill.
" *Tartarica*—L.
Diervilla trifida—Moench.

RUBIACEAE.

Cephalanthus occidentalis—L.
Mitchella repens—L.
Galium *verum*—L.
" Aparine—L.
" lanceolatum—Torr.
" boreale—L.
" trifidum—L.
" asprellum—Michx.
" triflorum—Michx.
Asperula *arvensis*—L.

DIPSACEAE.

Dipsacus *sylvestris*—Mill.

COMPOSITAE.

Eupatorium purpureum—L.
" perfoliatum—L.

Eupatorium ageratoides—L.
Liatris cylindracea—Michx.
Solidago squarrosa—Muhl.
" caesia—L.
" latifolia—L.
" bicolor—L.
" humilis—Pursh.
" stricta—Ait. (Logie).
" puberula—Nutt. (Craigie).
" speciosa—Nutt.
" odora—Ait. (Logie).
" patula—Muhl.
" rugosa—Mill.
" ulmifolia—Muhl (Buchan).
" arguta—Ait.
" juncea—Ait.
" " var. scabrella—Gray.
" serotina—Ait.
" " var. gigantea—Gray.
" Canadensis—L.
" " var. scabra.
" nemoralis—Ait.
" rigida—L.
" lanceolata—L.
Aster corymbosus—Ait.
" macrophyllus—L.
" Novae-Angliae—L.
" patens—Ait. (Craigie).
" azureus—Lindl.
" undulatus—L.
" cordifolius—L.
" sagittifolius—Willd.
" laevis—L.
" multiflorus—Ait.
" dumosus—L. (Craigie).
" diffusus—Ait.
" Tradescanti—L.
" paniculatus—Lam.

Aster salicifolius—Ait. (Buchan).
" Novi-Belgii—L. (Craigie).
" prenanthoides—Muhl. (Craigie).
" puniceus—L.
" umbellatus—Mill.
" ptarmicoides—Torr. & Gray.
" acuminatus—Michx. (Craigie).
" tenuifolius—L.
Erigeron Canadensis—L.
" annuus—Pers.
" strigosus—Muhl.
" hyssopifolius—Michx.
" bellidifolius—Muhl.
" Philadelphicus—L.
Antennaria plantaginifolia—Hook.
Anaphalis margaritacea—Benth & Hook.
Gnaphalium polycephalum—Michx.
" decurrens—Ives.
" uliginosum—L.
Inula *Helenium*—L.
Polymnia Canadensis—L.
Ambrosia artemisiaefolia—L.
Xanthium *spinosum*—L.
" *strumarium*—L. (Logie).
" Canadense—Mill.
Heliopsis laevis—Pers.
" scabra—Dunal.
Rudbeckia laciniata—L.
" hirta—L.
Helianthus giganteus—L.
" divaricatus—L.
" strumosus—L.
" decapetalus—L.
Bidens frondosa—L.
" connata—Muhl.
" cernua—L.
" chrysanthemoides—Michx.
" Beckii—Torr.

Helenium autumnale—L. (Logie).
Anthemis *Cotula*—D. C.
Achillea Millefolium—L.
Chrysanthemum *Leucanthemum*—L.
" *Balsamitae*—L.
Tanacetum *vulgare*—L.
Artemisia Canadensis—Michx.
" Ludoviciana—Nutt. (Craigie).
" *Abrotinum*—L.
" *vulgaris*—L.
" biennis—Willd.
" A*bsinthium*—L.
Petasites palmata—Gray.
Senecio *vulgaris*—L.
" lobatus—Pers. (Logie).
" palustris (?)—Hook. (Logie).
" aureus—L.
" *Jacobaea*—L.
Erechtites hieracifolia—Raf.
Arctium *Lappa*—L.
Cnicus *lanceolatus*—Hoffm.
" altissimus var. discolor—Gray.
" muticus—Pursh.
" *arvensis*—Hoffm.
Onopordon *Acanthium*—L.
Centaurea *Cyanus*—L.
" *nigra*—L.
Lampsana *communis*—L. (Logie.)
Cichorium *Intybus*—L.
Tragopogon *porrifolius*—L.
Leontodon *autumnalis*—L.
Hieracium *aurantiacum*—L.
" *murorum*—L.
" Canadense—Michx.
" paniculatum—L.
" venosum—L.
" scabrum—Michx.
" Gronovii—L.

Hieracium longipilum—Torr. (Craigie & Logie.)
Prenanthes alba—L.
" serpentaria—Pursh.
" altissima—L.
Taraxacum *officinale*—Weber.
Lactuca *sativa*—L.
" Canadensis—L.
" Floridana—Gaertn. (Logie.)
" leucophaea—Gray.
Sonchus *oleraceus*—L.
" *asper*—Vill.
" *arvensis*—L.

LOBELIACEAE.

Lobelia cardinalis—L.
" syphilitica—L.
" puberula—Michx (Craigie.)
" spicata—Lam.
" inflata—L.
" Dortmanna—L.

CAMPANULACEAE.

Specularia perfoliata—A. DC.
Campanula *rapunculoides*—L.
" rotundifolia—L.
" aparinoides—Pursh.
" Americana—L.

ERICACEAE.

Gaylussacia resinosa—Torr. & Gray.
Vaccinium stamineum—L.
" Pennsylvanicum—Lam.
" vacillans—Solander.
" corymbosum—L.
" macrocarpon—Ait.
Chiogenes serpyllifolia—Salisb.
Gaultheria procumbens—L.
Cassandra calyculata—Don.
Kalmia glauca—Ait.
Ledum latifolium—Ait.

Chimaphila umbellata—Nutt.
" maculata—Pursh. (Craigie).
Moneses grandiflora—Salisb.
Pyrola secunda—L.
" elliptica—Nutt.
" rotundifolia—L.
" " var. asarifolia—Hook.
" " " uliginosa—Gray
" " " incarnata—DC.
Pterospora Andromedea—Nutt. (Logie).
Monotropa uniflora—L.
" Hypopitys—L. (Logie).

PRIMULACEAE.

Trientalis Americana—Pursh.
Steironema ciliatum—Raf.
Lysimachia quadrifolia—L.
" stricta—Ait.
" thyrsiflora—L.
Anagallis *arvensis*—L.
Samolus Valerandi—L., var. Americanus—Gray (Buchan.)

OLEACEAE.

Fraxinus Americana—L.
" sambucifolia—Lam.
Ligustrum *vulgare*—L.

APOCYNACEAE.

Apocynum androsaemifolium—L.
" cannabinum—L.

ASCLEPIADACEAE.

Asclepias tuberosa—L.
" incarnata—L.
" Cornuti—Decaisne.
" phytolaccoides—Pursh.
" variegata (?)—L. (Logie).
" quadrifolia—L.

GENTIANACEAE.

Gentiana crinita—Froel.

Gentiana Amarella—L. (Logie).
" quinqueflora—Lam. (Craigie)
" Andrewsii—Griseb.
" alba—Muhl.
Frasera Carolinensis—Walt.
Halenia deflexa—Grisebach.
Menyanthes trifoliata—L.

POLEMONIACEAE.

Phlox divaricata—L.

HYDROPHYLLACEAE.

Hydrophyllum Virginicum—L.
" Canadense—L.
" appendiculatum—Michx.

BORRAGINACEAE.

Cynoglossum *officinale*—L.
Echinospermum Virginicum—Lehm.
" *Lappula*—Lehm.
Myosotis *palustris*—Withering.
" laxa—Lehm.
" arvensis—Hoffmn.
" verna—Nutt.
Lithospermum *arvense*—L.
" canescens—Lehn.
" angustifolium—Michx.
Onosmodium Carolinianum—DC.
Symphytum *officinale*—L.
Echium *vulgare*—L.

CONVOLVULACEAE.

Convolvulus spithamaeus—L.
" sepium—L.
" " var. repens—Gray.
" *arvensis*—L.
Cuscuta Gronovii—Willd.

SOLANACEAE.

Solanum *Dulcamara*—L.
" nigrum—L.

Physalis Virginiana—Mill.
Nicandra *physaloides*—Gaertn.
Lycium *vulgare*—Dunal.
Datura *Stramonium*—L.
" *Tatula*—L.
Nicotiana *rustica*—L.

SCROPHULARIACEAE.

Verbascum *Thapsus*—L.
" *Blattaria*—L.
Linaria *vulgaris*—Mill.
Scrophularia nodosa—L., var. Marilandica—Gray.
Chelone glabra—L.
Pentstemon pubescens—Solander.
Mimulus ringens—L.
Gratiola Virginiana—L.
" aurea—Muhl.
Ilysanthes riparia—Raf (Buchan).
Veronica Anagallis—L.
" Americana—Schweinitz.
" scutellata—L.
" officinalis—L.
" serpyllifolia—L.
" peregrina—L.
" *arvensis*—L.
" *Buxbaumii*—Tenore.
Gerardia pedicularia—L.
" flava—L.
" quercifolia—Pursh.
" laevigata—Raf. (Logie).
" purpurea—L. (Logie).
" tenuifolia—Vahl., var. asperula—Gray.
Castilleia coccinea—Spreng.
Pedicularis Canadensis—L.
Melampyrum Americanum—Michx.

OROBANCHACEAE.

Epiphegus Virginiana—Bart.
Conopholis Americana—Wallroth (Logie).

Aphyllon uniflorum—Gray.

LENTIBULARIACEAE.

Utricularia vulgaris—L.
" intermedia—Hayne.

PEDALIACEAE.

Martynia proboscidea—Glox.

VERBENACEAE.

Verbena urticaefolia—L.
" hastata—L.
Phryma Leptostachya—L.

LABIATAE.

Teucrium Canadense—L.
" occidentale—Gray.
Ajuga *reptans*—L.
Collinsonia Canadensis—L.
Mentha *viridis*—L.
" *piperita*—L.
" Canadensis—L.
Lycopus Virginicus—L.
" sinuatus—Ell.
Pycnanthemum muticum—Pers.
* " incanum (?)—Mich. (Craigie & Logie.)
Satureia *hortensis*—L.
Calamintha Clinopodium—Benth.
Hedeoma pulegioides—Pers.
Salvia *officinalis*—L.
Monarda didyma—L.
" fistulosa—L.
" " var. mollis—Benth.
" punctata—L. (Logie.)
Lophanthus nepetoides—Benth.
Nepeta *Cataria*—L.
" *Glechoma*—Benth.
Scutellaria lateriflora—L.
" parvula—Michx.
" galericulata—L.

*Doubtful; probably refers to muticum.

Brunella vulgaris—L.
Marrubium *vulgare*—L.
Leonurus *Cardiaca*—L.
Lamium *amplexicaule*—L. (Logie).
" *album*—L.
Galeopsis *Tetrahit*—L.
Stachys palustris—L.
" aspera—Michx.

PLANTAGINACEAE.

Plantago major—L.
" Rugelii—Decaisne.
" *lanceolata*—L.
" *media*—L.

AMARANTACEAE.

Amarantus *hypochondriacus*—L.
" *paniculatus*—L.
" *retroflexus*—L.
" albus—L.

CHENOPODIACEAE.

Chenopodium *album*—L.
" *urbicum*—L. (Craigie).
" hybridum—L.
" *glaucum*—L.
" *Bonus-Henricus*—L.
" capitatum—Watson.
" *Botrys*—L.
" *ambrosioides*—L.
Atriplex patulum—L.
" " var. hastatum—Gray.
" " " littorale—Gray.

PHYTOLACCACEAE.

Phytolacca decandra—L.

POLYGONACEAE.

Rumex Britannica—L.
" verticillatus—L.
" *crispus*—L.

Rumex *obtusifolius*—L. (Buchan.)
" *Acetosella*—L.
" *Acetosa*—L.
Polygonum aviculare—L.
" erectum—L.
" tenue—Michx.
" lapathifolium—L., var. incarnatum—Watson.
" Pennsylvanicum—L.
" amphibium—L.
" Muhlenbergii—Watson (Buchan).
" *Persicaria*—L.
" hydropiperoides—Michx.
" Hydropiper—L.
" acre—H B K.
" Virginianum—L.
" arifolium—L.
" sagittatum—L.
" *Convolvulus*—L.
" dumetorum—L., var. scandens—Gray.
Fagopyrum *esculentum*—Moench.

ARISTOLOCHIACEAE.

Asarum Canadense—L.

LAURACEAE.

Sassafras officinale—Nees.
Lindera Benzoin—Blume.

THYMELAEACEAE.

Dirca palustris—L.

ELAEAGNACEAE.

Shepherdia Canadensis—Nutt.

SANTALACEAE.

Comandra umbellata—Nutt.

EUPHORBIACEAE.

Euphorbia polygonifolia—L.
" maculata—L.
" Preslii—Guss. (L. & B.)
" corollata—L. (Craigie).

Euphorbia obtusata—Pursh. (Logie).
" *platyphylla*—L.
" *Helioscopia*—L.
" *Cyparissias*—L.
" *Peplus*—L.
Acalypha Virginica—L.

URTICACEAE.

Ulmus fulva—Michx.
" Americana—L.
" racemosa—Thomas.
Cannabis *sativa*—L.
Humulus Lupulus—L.
Urtica gracilis—Ait.
Laportea Canadensis—Gaud.
Pilea pumila—Gray.
Boehmeria cylindrica—Willd.

PLATANACEAE.

Platanus occidentalis—L.

JUGLANDACEAE.

Juglans cinerea—L.
" nigra—L.
Carya alba—Nutt.
" porcina—Nutt.
" amara—Nutt.

MYRICACEAE.

Myrica Gale—L.
" asplenifolia—Endl.

CUPULIFERAE.

Betula lenta—L.
" lutea—Michx. f.
" papyrifera—Marshall.
Alnus incana—Willd.
Corylus rostrata—Ait.
Ostrya Virginica—Willd.
Carpinus Caroliniana—Walter.

Quercus alba—L.
" macrocarpa—Michx.
" Muhlenbergii—Engelm.
" rubra—L.
" coccinea, var. tinctoria—Gray.
Castanea sativa—Mill, var. Americana.
Fagus ferruginea—Ait.

SALICACEAE.

Salix nigra—Marsh.
" " var. falcata—Torr.
" lucida—Muhl.
" *alba*—L.
" longifolia—Muhl.
" rostrata—Richardson.
" discolor—Muhl.
" humilis—Marsh.
" tristis—Ait. (Logie).
" *viminalis*—L.
" cordata—Muhl.
Populus *alba*—L.
" tremuloides—Michx.
" grandidentata—Michx.
" balsamifera—L.
" monilifera—Ait.

CERATOPHYLLACEAE.

Ceratophyllum demersum—L.

CONIFERAE.

Pinus Strobus—L.
Picea nigra—Link.
" alba—Link.
Tsuga Canadensis—Carr.
Abies balsamea—Miller.
Larix Americana—Michx.
Thuya occidentalis—L.
Juniperus communis—L.
" Virginiana—L.
Taxus Canadensis—Willd.

HYDROCHARIDACEAE.

Elodea Canadensis—Michx.
Vallisneria spiralis—L.

ORCHIDACEAE.

Calypso borealis—Salisb. (Logie).
Aplectrum hiemale—Nutt.
Corallorhiza innata—R. Br.
" odontorhiza—Nutt. (Buchan).
" multiflora—Nutt.
Spiranthes cernua—Richard.
Goodyera repens—R. Br.
" pubescens—R. Br.
" Menziesii—Lindl.
Pogonia ophioglossoides—Nutt (Logie).
Orchis spectabilis—L.
Habenaria tridentata—Hook.
" virescens—Spreng.
" bracteata—R. Br.
" hyperborea—R. Br.
" dilatata—Gray (Logie).
" Hookeri—Torr.
" orbiculata—Torr.
" leucophaea—Gray.
" lacera—R. Br.
" psycodes—Gray.
" fimbriata—R. Br. (Logie)
Cypripedium parviflorum—Salisb.
" pubescens—Willd.
" spectabile—Salisb.
" acaule—Ait.

IRIDACEAE.

Iris versicolor—L.
Sisyrinchium angustifolium—Mill.
" anceps—Cav.

AMARYLLIDACEAE.

Hypoxis erecta—L.

DIOSCOREACEAE.

Dioscorea villosa—L.

LILIACEAE.

Smilax herbacea—L.
" hispida—Muhl.
Allium tricoccum—Ait.
Muscari *botryoides*—Mill.
Hemerocallis *fulva*—L.
Polygonatum biflorum—Ell.
" giganteum—Dietrich.
Asparagus *officinalis*—L.
Smilacina racemosa—Desf.
" stellata—Desf.
" trifolia—Desf.
Maianthemum Canadense—Desf.
Streptopus roseus—Michx.
" amplexifolius—DC.
Disporum lanuginosum—Benth. & Hook.
Clintonia borealis—Raf.
Uvularia perfoliata—L.
" grandiflora—Smith.
Erythronium Americanum—Ker.
Lilium Philadelphicum—L.
" superbum—L.
" Canadense—L.
Medeola Virginiana—L.
Trillium erectum—L.
" grandiflorum—Salisb.
" " var. (?) viridescens—Peck.
" cernuum—L.
Tofieldia pubens—Ait. (Craigie.)

PONTEDERIACEAE.

Pontederia cordata—L.
Heteranthera graminea—Vahl.

JUNCACEAE.

Juncus effusus—L.
" Balticus—Dethard, var. littoralis—Engelm.

Juncus tenuis—Willd.
" bufonius—L.
" alpinus—Villars, var. insignis—Fries.
" acuminatus—Michx.
" nodosus—L.
" " var. megacephalus—Torr.
Luzula vernalis—DC.
" campestris—DC.

TYPHACEAE.

Typha latifolia—L.
Sparganium eurycarpum—Engelm.
" simplex—Huds.
" " var. angustifolium—Engelm.

ARACEAE.

Arisaema triphyllum—Torr.
Calla palustris—L.
Symplocarpus foetidus—Salisb.
Acorus Calamus—L.

LEMNACEAE.

Spirodela polyrrhiza—Schleid.
Lemna trisulca—L.
" minor—L.
Wolffia Columbiana—Karsten.
" Brasiliensis—Weddell.

ALISMACEAE.

Alisma Plantago—L.
Sagittaria variabilis—Engelm.
" graminea, Michx.

NAIADACEAE.

Potamogeton natans—L.
" amplifolius—Tuckerrn..
" heterophyllus—Schreb.
" Zizii—Mert & Koch.
" lucens—L. (Logie).
" perfoliatus—L.
" zosteraefolius—Schum.

Potamogeton pauciflorus—Pursh.
" pectinatus—L.

ERIOCAULEAE.

Eriocaulon septangulare—Withering.

CYPERACEAE.

Cyperus diandrus—Torr.
" Schweinitzii—Torr.
" filiculmis—Vahl.
" strigosus—L.
Dulichium spathaceum—Pers.
Eleocharis ovata—R. Br.
" palustris—R. Br.
" tenuis—Schultes
" acicularis—R. Br.
Scirpus pungens—Vahl.
" lacustris—L.
" fluviatilis—Gray.
" atrovirens—Muhl.
Eriophorum cyperinum—L.
" Virginicum—L.
" polystachyon—L.
" gracile—Koch.
Carex intumescens—Rudge.
" lupulina—Muhl.
" " " var pedunculata—Dewey.
" Tuckermani—Dewey.
" retrorsa—Schwein.
" lurida—Wahl.
" Schweinitzii—Dewey.
" hystricina—Muhl.
" Pseudo-Cyperus—L. var. Americana—Hochst.
" scabrata—Schwein.
" riparia—W. Curtis.
" stricta—Lam.
" prasina—Wahl.
" crinita—Lam.
" gracillima—Schwein.

Carex granularis—Muhl.
" laxiflora—Lam.
" " " var. striatula—Carey (Buchan).
" " " " latifolia—Boott.
" " " " patulifolia—Carey (Buchan)
" digitalis—Willd,
" laxiculmis—Schwein.
" platyphylla—Carey.
" plantaginea—Lam.
" Saltuensis—Bailey.
" aurea—Nutt.
" pedunculata—Muhl.
" varia—Muhl.
" Novae-Angliae—Schwein (Buchan).
" Pennsylvanica—Lam.
" polytrichoides—Muhl.
" stipata—Muhl.
" teretiuscula—Gooden.
" vulpinoidea—Michx.
" tenella—Schk.
" rosea—Schk.
" sparganioides—Muhl.
" cephalophora—Muhl.
" echinata—Murray, var. microstachys—Boeckl.
" trisperma—Dewey.
" bromoides—Schk.
" tribuloides—Wahl.
" " var. cristata—Bailey.
" scoparia—Schk.
" straminea—Willd.

GRAMINEAE.

Panicum *glabrum*—Gaudin.
" *sanguinale*—L.
" capillare—L.
" xanthophysum—Gray.
" latifolium—L.
" depauperatum—Muhl.

Panicum dichotomum—L.
" Crus-galli—L.
" " var. hispidum.
Setaria *verticillata*—Beauv.
" *glauca*—Beauv.
" *viridis*—Beauv.
" *Italica*—Kunth.
Cenchrus tribuloides—L.
Leersia Virginica—Willd.
" oryzoides—Swartz.
Zizania aquatica—L.
Andropogon furcatus—Muhl.
" scoparius—Michx.
Chrysopogon nutans—Benth.
Phalaris *Canariensis*—L.
" arundinacea—L.
Anthoxanthum *odoratum*—L. (Logie.)
Oryzopsis melanocarpa—Muhl.
" asperifolia—Michx.
Milium effusum—L.
Muhlenbergia glomerata—Trin.
" Mexicana—Trin.
" sylvatica—Torr. and Gray.
" diffusa—Schreber (Logie).
Brachyelytrum aristatum—Beauv.
Phleum *pratense*—L.
Alopecurus *geniculatus*—L., var. aristulatus—Torr.
Sporobulus asper—Kunth.
" vaginaeflorus—Vasey.
" cryptandrus—Gray.
Agrostis *alba*—L.
" " var. *vulgaris*—Thurb.
" perennans—Tuckerm.
" scabra—Willd.
Cinna arundinacea—L.
Calamagrostis Canadensis—Beauv.
" confinis—Nutt.
Holcus *lanatus*—L.

Deschampsia flexuosa—Trin.
Avena striata—Michx.
" *fatua*—L.
Danthonia spicata—Beauv.
Cynodon *Dactylon*—Pers.
Bouteloua oligostachya—Torr.
Eleusine *Indica*—Gaertn (Logie).
Phragmites communis—Trin.
Munroa squarrosa—Torr.
Eatonia Pennsylvanica—Gray.
Eragrostis *minor*—Host.
Dactylis *glomerata*—L.
Poa *annua*—L.
" *compressa*—L.
" nemoralis—L.
" serotina—Ehrhart.
" pratensis—L.
" debilis—Torr.
Glyceria Canadensis—Trin.
" elongata—Trin.
" nervata—Trin.
" pallida—Trin.
" grandis—Watson.
" fluitans—R. Br
Festuca tenella—Willd.
" ovina—L.
" nutans—Willd.
" *elatior*—L., var. *pratensis*—Gray.
Bromus Kalmii—Gray.
" *secalinus*—L.
" ciliatus—L.
Lolium *perenne*—L.
Agropyrum repens—Beauv.
" caninum—R. & S.
Elymus Virginicus—L.
" Canadensis—L.
" " var. glaucifolius—Gray.
" striatus—Willd.

Asprella Hystrix—Willd.

EQUISETACEAE.

Equisetum arvense—L.
" pratense—Ehrh.
" sylvaticum—L.
" palustre—L.
" limosum—L.
" hyemale—L.
" variegatum—Schleicher.
" scirpoides—Michx.

FILICES.

Polypodium vŭlgare—L.
Adiantum pedatum—L.
Pteris aquilina—L.
Pellaea gracilis—Hook.
" atropurpurea—Link.
Woodwardia Virginica—Smith.
Asplenium Trichomanes—L.
" thelypteroides—Michx.
" Filix foemina—Bernh.
Camptosorus rhizophyllus—Link.
Phegopteris hexagonoptera—Fee.
" Dryopteris—Fee.
Aspidium Thelypteris—Swartz.
" Noveboracense—Swartz.
" spinulosum—Swartz.
" " " var. intermedium—D. C Eaton.
" " " " dilatatum—Hook (Logie).
" Boottii—Tuckerm.
" cristatum—Swartz.
" " " var. Clintonianum
" Goldianum—Hook.
" marginale—Swartz.
" acrostichoides—Swartz.
Cystopteris bulbifera—Bernh.
" fragilis—Bernh.

Onoclea sensibilis—L.
" Struthiopteris—Hoffman.
Dicksonia pilosiuscula—Willd.
Osmunda regalis—L.
" Claytoniana—L.
" cinnamomea—L.

OPHIOGLOSSACEAE.

Botrychium ternatum—Swartz, var. lunarioides—(Buchan).
" " " " obliquum.
" Virginianum—Swartz.

LYCOPODIACEAE.

Lycopodium lucidulum—Michx.
" annotinum—L.
" obscurum—L.
" clavatum—L.
" complanatum—L.

SELAGINELLACEAE.

Selaginella apus—Spring.

SALVINIACEAE.

Azolla Caroliniana—Willd. (Buchan.)*

MARCHANTIACEAE.

Marchantia polymorpha—L.

Note error in local *additions* : Lithospermum angustifolium—Michx. (L. longiflorum—Spreng.) was reported by Judge Logie.

*LIST OF LOCAL FOSSILS NOT PREVIOUSLY REPORTED IN THE JOURNAL OF PROCEEDINGS.

PREPARED BY COL. C. C. GRANT.

NIAGARA FOSSILS.

SPONGIDAE.

Genera and Species.	*Authority and Reference.*
Stromatopora concentrica	Goldfuss, 1820, Germ. Pet.
Caunopora Walkeri	Spencer, 1882, Niag. Fossils
" mirabilis	" " "
Cornostoma constellatum	Hall, 1852, Pal. N. Y.
" botryordea	Spencer, 1882, Niag. Fossils
Dictyostoma reticulata	" " "
Astylospongia præmorsa	Goldfuss, 1880, Germ. Pet.
" (species.)	
Aulocopina Granti	Billings, 1875, Can. Nat.

Large numbers undetermined yet, sent to Dr. Head and Prof. Rauff, who named a few.

HYDROZOA.

Phyllograptus dubius	Spencer, 1882, Niag. Fossils
Dendrograptus ramosus	" "
" simplex	" "
" Dawsoni	" "
" frondosus	" "
" prægracilis	" "
" spinosus	" "
Callograptus Granti	" "
" Niagarensis	" "
" (Dendrograptus) multicaulis	" "
" minutus	" "

* The Association purpose preparing, during the coming session, a list of all palæontological specimens contained in the museum.

Genera and Species.	*Authority and Reference.*
Dictyonema retiforme	Hall, 1852, Pal. N. Y.
" gracilis	" "
" Websteri	Dawson, 1868, Acad. Geol.
" tenellum	Spencer, 1878, Can. Nat.
Calyptograptus cyatheformis	" "
" subretiformis	" "
" micronematodes	Spencer, 1882, Can. Nat.
" radiatus	
Rhizograptus bulbosus	Spencer, 1878, Can. Nat.
Acanthograptus Granti	" "
" pulcher	1882
Inocaulis plumulosa	Hall, 1852, Pal. N. Y.
" bella	Hall and Whitfield, 1874, Pal. Ohio
" Walkeri	Spencer, 1882, Niag. Foss.
" problematica	" " "
" diffusa	" " "
" ramulosa	" " "
" Corsicornis	" " "
" phyordes	" " "
Thamnograptus Bartonensis	
" multiformis	
Ptilograptus foliaceous	Spencer, 1878, Can. Nat.
Cyclograptus rotadentatus	" " "

About 400 specimens in Washington, sent to Dr. Gurley for description, including several new species.

ACTINOZOA.

Favosites Niagarensis	Hall, 1852, Pal. N. Y , Vol. II.
" favosa	Goldfuss, 1826, Germ. Pet.
Astrocerium constrictum	Hall, 1852, Pal. N. Y., Vol. II.
Syringolites nuronensis	Hinde, 1879, Geol. Mag.
Cladopora multipora	Hall, 1852, Pal. N. Y., Vol. II.
Striatopora flexuosa	" " "
Halysites Catenularia	Linn, 1767, Sys. Nat.
Syringopora verticillata	Goldfuss, 1826, Germ. Pet.
" rugosa	" "
Cyathophyllum radiculum	Rominger, 1876

Genera and Species.	*Authority and Reference.*
Omphyma Stokesi	Milne Edwards, 1876
Petræa Streptelasma Calycula	Hall, 1852, Pal. N. Y., Vol. II.
Asteroidea Petraster bellulus	Billings, 1865

TABULATA.

Chonophyllum Niagarensis	Hall, Pal. N. Y., Vol. II., Niag. Gp.

ECHINODERMATA.

Crinoidea and Cystoidea	
Lyriocrinus Dactylus	Hall, 1852, Pal. N. Y., Vol. II.
Thysanocrinus lilliformis	" " "
Eucalyptocrinus decorus	Phillips, 1829, Murch. Sil. Fossils
Stephanocrinus angulatus	Conrad, 1842
Caryocrinus ornatus	Say, 1825
Eucalyptocrinus Crassus	Hall, 1863, Vol. IV., Niag. Group.

POLYZOA.

Ceramopora foliacea	Hall, Pal. N. Y., 1852, Vol. II.
Fenestella elegans	" " "
Lichenalia concentrica	" " "
Trematopora ostiolata	" " "
Clathropora gracilis	Spencer, 1882, Niag. Fossils
Polypora Fenestella Albionensis	" 1880, "

BRYOZOA AND POLYZOA.

Retepora asperatostriata	Hall, 1852, Pal. N. Y., Vol. II.
Lichenalia	Hall (many species undescribed yet)
Cladopora	" " "
Saganella elegans	Hall

BRACHIOPODA.

SPIRIFERA.

Crispa	Hisinger, 1826, Acad. Nat. Sc.
Niagarensis	Conrad, 1842, Jour. Nat. Sc.
Radiata	Hisinger, 1857, Pet.
Sulcata	Sowerby, 1825, Min. Conch.
Plicitella, var. radiata	Hall, 1867, 20th Report, N. Y.
Atrypa Reticularis	Linn, 1767, Sys. Nat.
Athyris Meristina nitida	Hall, 1852, Pal. N. Y., Vol. II.

RHYNCHONELLIDÆ.

Genera and Species.	*Authority and Reference.*
R. neglecta	Hall, Pal. N. Y., Vol. II.
obtusiplicata	" " " "
var	" " " "
rugosa	" " " "
Pentamerus oblongus	Vannuxen, 1842, Pal. N. Y.
Stricklandinia Canadensis	Billings, 1859, Can. Nat.
R. pesum	Hall and Whitefield, 1875, Ohio Pal., Vol. II.
Indianensis	Hall, Vol. 4, Niag. group
Whitii	Hall (pre-occupied)
cuneata	Dolman, 1827
acinus	Hall, 1863, Niag. group, Vol. 4
Eichwoldia reticulata	Billings, 1858
Retzia (not R. evax.)	

STROPHOMENIDÆ.

Strophomena profundi	Hall, 1852, Pal. N. Y., Vol. II.
" rhomboidalis	Wallenburg, 1821
Stropodonta semifosciata	Hall, 1863
Striptorynchus tenuis	" 1859
Leptæna transversalis	Dolman, 1827
Orthis elegantula	"
" flabellum	Hall, 1843
" porcata	McCoy, 1846, Sil. Foss.
Strophomena Leda	Billings, Can. Geol., Vol. V.
Stroph. subplana	Conrad, 1842, Vol. VIII.
Strophodonta Striata	Hall, 1843

CRANIDÆ.

Crania Anna	Spencer, 1882, Niag. Foss.
Crania Siluriana	Hall

2 Crania—undescribed.

DISCINIDÆ.

Discina tenuilamellata	Hall, 1852, Pal. N. Y., Vol. II.
" clara	Spencer, 1882, Niag. Foss.

LINGULIDÆ.

Lingula ingens	Spencer, 1882, Niag. Foss.

Genera and Species. *Authority and Reference.*

Lingula ingens oblonga..........Conrad, 1839, Ann. Rep. N. Y.
" lamellata.........Hall, 1852, Pal. N. Y., Vol. II.

LAMELLIBRANCHIATA.

Avicula emacerata..................Conrad, 1849, Jour. Nat. Sc.
Pterinea brisa.....................Hall, 1867, 20th Rep, N. Y.
Posidonomya rhomboidea........Hall, 1852, Pal. N. Y., Vol. II.
Modiolopsis subulata............ " " "
Avicula undata..
" subplana..

GASTEROPODA.

Platyostoma Niagarensis.........................Hall, 1852
Loxonema leda...................Hall, 1867, 20 Rep. N. Y.
Pleurotomaria clipeiformis...........Spencer, 1882, Niag. Fossils
Platyostoma plebea.................Hall, 28th Rep. Pal. N. Y.
Pleurotomaria solarioides..Hall, 1852, Pal. N.Y., Barton and Guelph
Murchisonia.......................................3 species

PTEROPODA.

Conularia Niagarensis............Hall, 1852, Pal. N. Y., Vol. II.
" magnifica..................Spencer, 1879, Can. Nat.
" rugosa.................... " 1852, Niag. Foss.

CEPHALOPODA.

Orthoceras virgatum...............Sow., 1839, Murch. Sil. Syst.
" annulatum..................Sow., 1818, Min. Conch.
" simulator..........Hall, 1876, 28th Rep., Pal. N. Y.
" crebescens .... " 1867, 20th, " "
" Bartonense.............Spencer, 1882, Niag. Fossils
Cyrtoceras reversum............... " " "
Lituites Niagarensis............... " " "
Cyrtoceras..............................3 not determined yet

ANNELIDA.

Cornulitus flexuosus............ Hall, 1852, Pal. N. Y., Vol. II.
" bellastriata...................................Hall
" species, allied to Styliola spica................ "
" Species undetermined..............................

CRUSTACEA.

TRILOBATA.

Genera and Species.	*Authority and Reference.*
Illænus barriensis	Murch., 1838, Sil. Syst.
Encrinurus ornatus	Hall, 1852
Sphærexochus Vomingeri	Hall, 1867, 20th Rep., Pal. N. Y.
Calymene Blumenbachii	Brogniart, 1822, Nat. His.
Homalonotus delphinocephalus	Green, 1832
Dalmanites limulurus	" "
Lichas Boltoni	Bigsby, 1825, Jour. Nat. Sc.
Acidaspis Halli	Spencer, 1880, Niag. Foss.
Dalmania Verrucosa	Hall
Dalmania vigilans	
Acidaspis—3 species	

EURIPTERIDÆ.

Pterygotus Canadensis	Dawson, 1879, Can. Nat.

PLANTS.

Buthotrephis Granti	Dawson

Three others undescribed—two from Barton and one from Pentamerus bed, Hamilton.

CLINTON FOSSILS, HAMILTON, ONT.

Genera and Species.	*Reference.*
Buthotrephis gracilis	Hall, Pal. N. Y., 1852
" var. crassa	" " " "
" var. palmata	" " " "
Roots, various Algæ	" " " "
Stromatopora Sp.	
Conophyllum Niagarense	" " " "
Zaphrentis bilateralis	" " " "
Graptolithus Clintonensis	" " " "
Reteolites venosus	" " " "
Helopora fragilis	" " " "
Clathropora frondosa	" " " "
Polypora incepta	" " " "

Genera and Species.	*Reference.*
Retepora angulata	Hall, Pal. N. Y., 1852
Trematopora tuberculosa	" " " "
Merista cylindrica	" " " "
Athyris (Meristella) naviformis	" " " "
Lingula oblata	" " " "
Posidonia alata	" " " "
Posidonomya rhomboidea	" " " "
Platyostoma Niagarensis	" " " "
Orthoceras claratum	" " " "
Oncoceras subrectum	" " " "
Conularia Niagarensis	" " " "
Tentaculites distans	" " " "
Rusignites bilobatus	" " " "
Monticulipora lycoperdon	Say 1847
Palæaster Granti	Spencer Niag. Fossils, 1847
Fenestella bicomis	" " " "
Rhinopora vanosa	" " " "
Eucalyptocrinus decorus	Phillips, 1839
Fenestella prisca	Lonsdale, 1839
Strophomena rhomboidalis	Wahlenberg, 1821
Orthis elegantula	Dolman, 1837
Lingula oblonga	Conrad, 1839

Ichnites—4 undetermined species.

Arthrophycus Harlani.

Rusophycus (Hall) = Rusignitis (Dawson); Buthotrephis (Hall). Main stem absent (may be detached branches).

STAR FISHES.

Two or three (if Prof. Elliott's proves to be a new species, as we think it is).

CYSTOIDÆA CRINOIDÆA.

A Cystid, recently sent to G. S. C., Ottawa.

A Crinoid, since obtained, not differing much from a Lower Silurian, one described by the late E. Billings (a new genus, perhaps). It bears a close resemblance to another Crinoid (much smaller), I sent to Prof. Billings many years since.

Glyptocrinus plumulosus.

GASTEROPODA.

Pleurotomaria—new species, probably—undescribed.
Murchisonia—2 species—undescribed.

LAMELLIBRANCHIATA.

Tellinomya curta (Hall).
" elliptica (Hall).
Pterinea brisa (Hall).

BRACHIOPODS.

Streptorynchus tenuis (Hall).
Orthis calligramma var. Davidsoni (Hall)
" sp. (with finer Striæ), undescribed perhaps.
Lingula perovata.
" new species (Hall); var. L. oblata (Dawson).
Crania—undescribed, probably.
Tentaculites neglectus (Nicholson).
Ichnites—several described and figured by Dawson.
Arthroclema—new species, probably.

MEDINA FOSSILS, HAMILTON, ONT.

Genera and Species. *Reference.*

Arthrophycus Harlani....Hall, 1853, Pal. N. Y., Vol. II. Locality Grimsby.

Palæophycus species....................Hamilton and Grimsby

Zaphrentis bilateralis....Hall, Pal. N. Y., Vol. II., 1852. Hamilton and Grimsby.

Atrypa oblata........Hall, 1852, Pal. N. Y., Vol. II. Hamilton and Grimsby.

Modiolopsis orthonota..Conrad, Ann. Report, N.Y., 1839. Hamilton
" species.............Dundas, Hamilton and Grimsby

Murchisonia subulata ....Conrad, 1842, Nat. Science Journal Hamilton.

Murchisonia conoidea...Hall, 1852, Pal. N. Y., Vol. II. Locality Hamilton and Grimsby.

Pleurotomaria litorea.....Hall, 1852, Pal. N. Y., Vol. II. Locality Hamilton and Grimsby.

Genera and Species.	*Reference.*
Pleurotomaria pervetusta	Conrad, 1838, Ann. Rep. Locality Hamilton and Grimsby.
Ichnites (several species). Hamilton and Grimsby.	
Stromatopora species	Hamilton
Athyris "	"
Lingula cuneata	Conrad, 1839, Report N. Y.
Modiolopsis primigenea	" 1838, "
Orthoceras species	Hamilton
Favosites Niagarensis (or closely allied)	"
Tentaculites, 2 species	"
Crinoid Stems.	
Halopea	Grimsby

Six or seven Fucuoids, (Hamilton), omitted in Spencer's list; also some undescribed Bucannella trilobata—Conrad, 1838, Ann. Rep., N. Y.

NOTE.—Since the catalogues of local fossils were prepared, Dr. Jas. Hall, Director-general of the New York State Survey, has figured and described "Lingulops Granti," Niagara beds, and "Lingula Lingulata," Clinton, from Hamilton, Ont., Silurian rocks. A few others, also, were lately obtained, not yet named.

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1881 Clark, Chas. K., M. D., Kingston.
1881 VanWagner, Lieut.-Col. P. S., Stoney Creek.
1881 Spencer, J. W., B. Sc., Ph. D., F. G. S., Savannah, Ga.
1882 Lawson, A. C., M. A., California.
1884 Bull, Rev. Geo. A., M. A., Niagara Falls South.
1885 Frood, T., Sudbury.
1889 Yates, Wm., Hatchley.
1889 Kennedy, Wm., Austin, Tex.
1891 Hanham, A. W., Quebec.
1892 Woolverton, L., M. A., Grimsby.

LIFE.

1885 Proudfoot, Hon. Wm., Q. C , Toronto.

LIST OF EXCHANGES.

I.—AMERICA.

(1) CANADA.

Astronomical and Physical Society	Toronto.
Canadian Institute	"
Natural History Society of Toronto	"
Department of Agriculture	"
Library of the University	"
Public Library	"
Geological Survey of Canada	Ottawa.
Ottawa Field Naturalists' Club	"
Ottawa Literary and Scientific Society	"
Royal Society of Canada	"
Department of Agriculture	"
Entomological Society	London.
Kentville Naturalists' Club	Kentville, N. S.
Murchison Scientific Society	Belleville.
Natural History Society	Montreal.
Library of McGill University	"
Nova Scotia Institute of Natural Science	Halifax.
Literary and Historical Society of Quebec	Quebec.
L'Institut Canadien de Quebec	"
Natural History Society of New Brunswick	St. John.
Manitoba Historical and Scientific Society	Winnipeg.
Guelph Scientific Association	Guelph.
Queen's University	Kingston.

(2) UNITED STATES.

Kansas Academy of Science	Topeka, Kan.
Kansas University Quarterly	Lawrence, Kan.
Psyche	Cambridge, Mass.
American Academy of Arts and Sciences	Boston, Mass.
Library of Oberlin College	Oberlin, Ohio.

American Association for Advancement of Science	Salem, Mass.
National Academy of Sciences	Cambridge, Mass.
Museum of Comparative Zoology	" "
American Dialect Society	" "
United States Department of Agriculture	Washington, D. C.
Biological Society of Washington	" "
Philosophical Society of Washington	" "
Smithsonian Institution	" "
United States Geological Survey	" "
American Society of Microscopists	Buffalo, N. Y.
Buffalo Society of Natural Sciences	" "
California Academy of Sciences	SanFrancisco, Cal.
California State Geological Society	" "
Santa Barbara Society of Natural History	" "
University of California	Berkley, Cal.
Minnesota Academy of Natural Sciences	Minneapolis, Minn.
Academy of Natural Sciences	Philadelphia, Pa.
Academy of Sciences	St. Louis, Mo.
Missouri Botanical Gardens	" "
American Chemical Society	New York City.
New York Microscopical Society	" "
The Linnean Society	" "
American Astronomical Society	" "
American Geographical Society	" "
New York Academy of Sciences	" "
Terry Botanical Club	" "
Central Park Menagerie	" "
Cornell Natural History Society	Ithaca, N. Y.
Johns Hopkins University	Baltimore, Md.
Kansas City Scientist	Kansas City, Mo.
Wisconsin Academy of Science, Arts and Letters	Madison, Wis.
Society of Alaskan Natural History and Ethnology	Sitka, Alaska.
University of Penn	Philadelphia, Pa.
Franklin Institute	" "
War Department	Washington.
Field Columbian Museum	Chicago.
Academy of Sciences	Chicago.
Agricultural College	Lansing, Mich.

Colorado Scientific Society .... Denver, Col.
Museum of Natural History .... Albany, N. Y.
Rochester Academy of Sciences .... Rochester, N Y.

(3) WEST INDIES.

Institute of Jamaica .... Kingston, Jamaica.

(4) SOUTH AMERICA.

The Royal Agricultural and Commercial Society
of British Guiana .... Georgetown.

II.—EUROPE.

(1) GREAT BRITAIN AND IRELAND.

England.

Bristol Naturalists' Club .... Bristol.
Literary and Philosophical Society of Leeds ...... Leeds.
Conchological Society .... "
Royal Society .... London.
Royal Colonial Institute .... "
Society of Science, Literature and Art .... "
Geological Society .... "
Manchester Geological Society .... Manchester.
Mining Association and Institute of Cornwall ..... Camborne.
Cardiff Photographic Society .... Cardiff.

Scotland.

Glasgow Geographical Society .... Glasgow.
Philosophical Society .... "

Ireland.

Royal Irish Academy .... Dublin.
Royal Geological Society of Ireland .... "
Naturalists' Field Club .... Belfast.

(2) AUSTRIA-HUNGARY.

Anthropologische Gesellschaft .... Vienna.
K. K. Geologische Reichsanstalt .... "
Trentschin Scientific Society .... Trentschin.

(3) BELGIUM.

Société Géologique de Belgique.............Liége.

(4) DENMARK.

Société Royal des Antiquaires du Nord..........Copenhagen.

(5) FRANCE.

Académie Nationale des Sciences, Belles Lettres
et Arts..................................Bordeaux.
Académié Nationale des Sciences, Arts et Belles-
Lettres.......................... ......Caen.
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(6) GERMANY.

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Naturwissenschaftlicher Verein................Carlsruhe.

(7) RUSSIA.

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Rüssich-Kaiserliche Mineralogische Gesellschaft.. "

III.—ASIA.

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Asiatic Societies of Bombay and Ceylon.
Asiatic Society of Bengal.....................Calcutta.
Geological Survey of India.................. "

(2) STRAITS SETTLEMENTS.

The Straits Branch of the Royal Asiatic Society..Singapore.

(3) JAPAN.

Asiatic Society of Japan......................Tokyo.

IV.—AFRICA.

(1) CAPE COLONY.

South African Philosophical Society...........Cape Town.

V.—AUSTRALIA.

(1) AUSTRALIA.

The Australian Museum......................Sydney.
Royal Society of New South Wales............. "
Linnean Society of New South Wales.......... "
Australian Natural History Museum...........Melbourne.
Public Library of Victoria..................... "
Royal Society of Queensland.................Brisbane.

(2) NEW ZEALAND.

New Zealand Institute.........................Wellington.

(3) TASMANIA.

Royal Society of Tasmania....................Hobartown.

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Treasurer.

P. L. SCRIVEN.

Curator.

ALEX. GAVILLER.

Asst. Curator.

H. S. MOORE.

Council.

W. H. ELLIOTT, B. A.
THOS. MORRIS, Jr.
ROBT. CAMPBELL.
J. R. MOODIE.
WM. WHITE.

Auditors.

H. P. BONNEY.
F. HANSEL, D. D. S.