

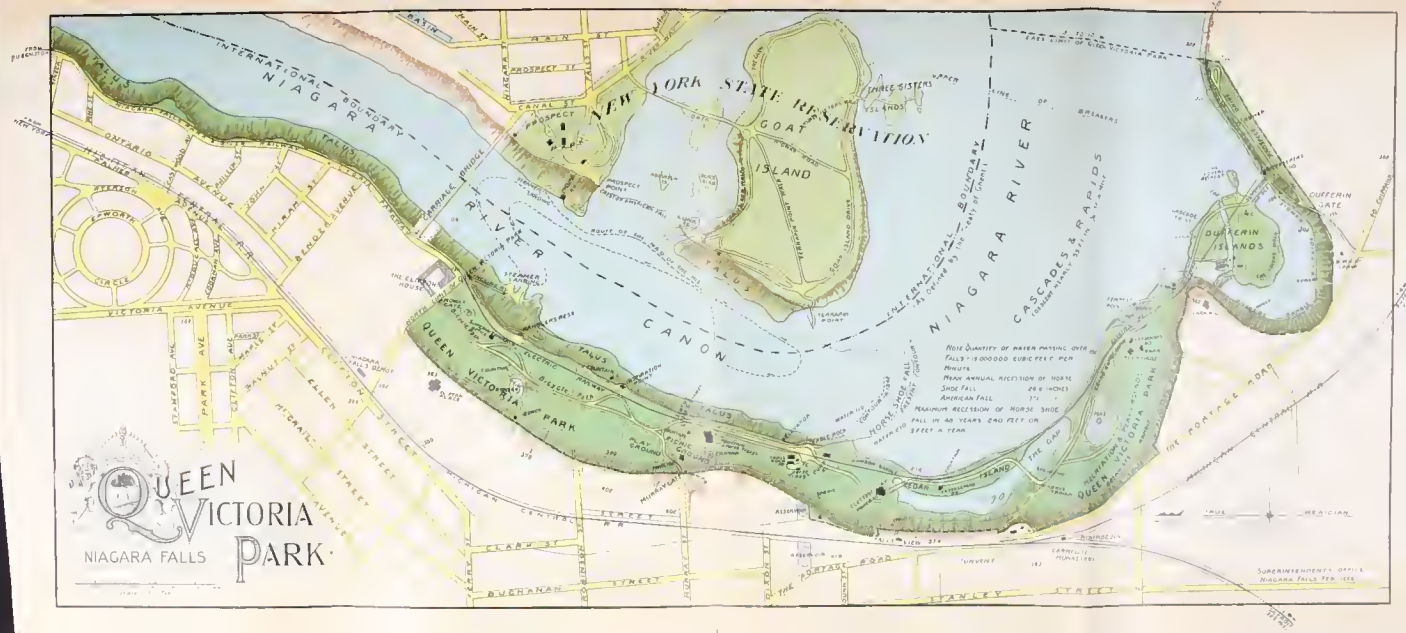
Map - Kingston - 1891

Map - Queen Victoria Park

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TENTH ANNUAL REPORT

OF THE

COMMISSIONERS

FOR THE

QUEEN VICTORIA NIAGARA FALLS PARK,

1895.

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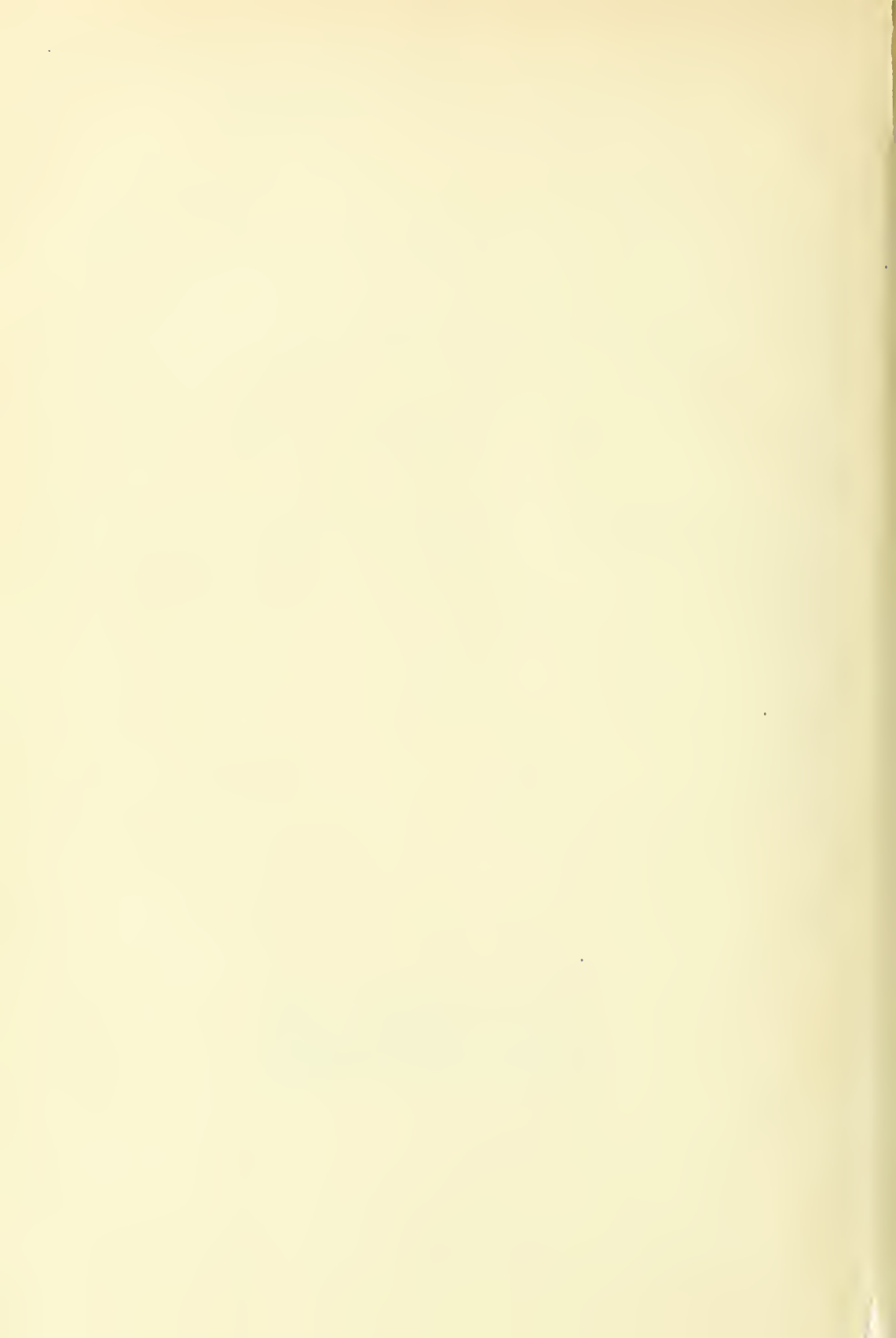
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TORONTO, 2nd March, 1896.

SIR,—I have the honor to transmit herewith to be presented to His Honor the Lieutenant-Governor, for the information of the Legislature, the Tenth Annual Report of the Commissioners for Queen Victoria Niagara Falls Park, being for the year ended 31st December, 1895.

I have the honor to be

Sir,

Your most obedient servant,

J. W. LANGMUIR,

Chairman.

The Honorable J. M. GIBSON,

Secretary for the Province of Ontario

TENTH ANNUAL REPORT
OF THE
COMMISSIONERS
FOR THE
QUEEN VICTORIA NIAGARA FALLS PARK.

To the Honorable GEORGE AIREY KIRKPATRICK,

Lieutenant-Governor of the Province of Ontario.

May it please your Honor:

Your Commissioners have much pleasure in submitting, as required by Statute, their Tenth Annual Report on the Queen Victoria Niagara Falls Park, being for the year ended 31st December, 1895.

In their preceding Annual and Supplementary Reports the Commissioners have confined themselves to recording, briefly, the more important incidents which marked the progress of their work during each year. As, however, ten years have now elapsed since the passing of the Act which called the Commission into existence, the Commissioners have thought it appropriate to mark the entry on the second decade of their work by taking in this report a rather wider range, and giving somewhat in detail a history of the development of the Park scheme from its first inception, or, rather, from its first suggestion, to the present time. Such a sketch it was hoped would not be uninteresting to the public at large, while it was felt to be quite within the purview of the duties of the Commission.

The first question which naturally arises in connection with the Park is to whom is the world (for it is a matter of interest to more than the inhabitants of this continent) indebted for the grand idea? There is no doubt that Lord Dufferin may be truly called "The father of the International Parks at Niagara Falls," for to him is unquestionably due the first suggestion and the first official movement in connection therewith. This fact is placed on record in an important official document given later on in this report *in extenso*. In that document (a

memorial signed by hundreds of the leading public men in the United States and Canada) it is mentioned as a well-known and admitted fact, that to Lord Dufferin is due the credit of originating the project. As there exists, however, some misapprehension on this head, and as it is but right that Lord Dufferin, and Canada, should not be deprived of the credit which is their due, it seems desirable to state somewhat in detail the facts of the case.

During his frequent visits to the Falls, while holding the high office of Governor-General of Canada from 1872 to 1878, Lord Dufferin was grieved, as he could not fail to be, to see how visitors to the Falls were annoyed, and their enjoyment of the glorious scene marred, by the hucksters, peddlers and sharpers who swarmed at all the points of interest as well as at all the approaches to the Falls on both sides of the river, levying tolls at every turn on the pleasure and the pockets of the unfortunate tourist. He accordingly took advantage of a casual meeting, in the summer of 1878, with the Honorable Lucius Robinson, then Lieutenant-Governor of the State of New York, to suggest joint action on the part of the Government of the State of New York and the Province of Ontario with a view to providing a remedy for these abuses. To effect this Lord Dufferin further suggested that the two Governments should obtain control of a sufficient quantity of land, on both sides of the Falls, for the free use of the public, where they would be protected from all the vexatious annoyances to which they had hitherto been exposed; each Government, of course, retaining jurisdiction over its own territory, but with a mutual understanding as to the general regulations to be enforced on both sides of the river. Lord Dufferin was not content with merely making the suggestion, but followed it up by making a strong appeal to the Ontario Government to take action on the lines which he had proposed to Governor Robinson, and in fact, made use of all the influence which his high office gave him to bring about the accomplishment of the object. In the course of that same year he took occasion, when making an address at the opening of the Provincial Exhibition at Toronto, to earnestly press the subject upon the attention of the Canadian public.

At the meeting of the Legislature of the State of New York in January, 1879, Governor Robinson, in his annual message, made a strong recommendation to the Legislature to give effect to the suggestions made by Lord Dufferin; and the Legislature responded by directing the Commissioners of the State Survey to report upon the project, and granted authority to them to confer with the representatives either of the Dominion of Canada or of the Province of Ontario, with a view to the accomplishment of the objects sought. These Commissioners entered on their work with much enthusiasm, and instructed Mr. James T. Gardiner, the Director of the State Survey, and Mr. Frederick Law Olmsted, an eminent landscape architect, to make an examination of the ground on both sides of the river and to prepare such plans and to formulate such suggestions as seemed

to them requisite for the carrying out of the scheme. After a thorough study of the subject Messrs. Gardiner and Olmsted submitted plans, having more particular reference to the American side, accompanied by very elaborate reports embodying their views on the scheme and indicating the extent and area of the lands to be acquired, and, generally, the scope of the works that should be undertaken. Their suggestions were adopted by the Board of Commissioners of the State Survey; and following the directions of the Legislature, the Commissioners held a conference by appointment with the members of the Ontario Cabinet in order to interchange views respecting the project. At this conference the maps showing the territory which it was proposed should be controlled by the State and Provincial Governments were submitted and generally approved. In this connection it may be stated that the territory in each case proposed to be acquired was generally the same as was ultimately selected by the respective boards of Park Commissioners, but that in respect to the American side the Reservation eventually decided on does not embrace all the lands at first intended to be taken, but excludes all the strip of territory lying between the high bank and the water's edge from the Upper Suspension Bridge down to the Railway Suspension Bridge.

At this conference the representatives of the Ontario Government expressed their entire sympathy with the park project; but it was pointed out that there were difficulties in the way of the undertaking, and the opinion was expressed that it was only reasonable that the cost of restoring the scenery on the Canadian side of the river should fall upon the Dominion Government, which claimed to have jurisdiction over a considerable portion of the lands proposed to be included in the Park, and was, therefore, in a much better position than the Province to take up the work.

In conformity with the opinion thus expressed, and in order to facilitate any action which the Government of Canada might be disposed to take in the premises, an Act was passed by the legislature of Ontario in March, 1880, (43 Victoria, chapter 13) entitled, "An Act respecting Niagara Falls and the adjacent territory," which conferred upon the Minister of Public Works of Canada, all the authority which the Provincial Government could give, to proceed with the execution of the project, should he so desire.

A very able report was drawn up by the Commissioners of the State Survey and presented to the New York State Legislature at its Session in 1880, together with the plans which had been so carefully considered; and it was recommended that the State should, by purchase, acquire a title to the lands required, and hold them in trust for her people for ever.

Throughout both the United States and Canada Lord Dufferin's earnest appeal, which it has been well said "was at first looked upon rather as an expression of philanthropic sentiment than as an earnest proposal of a practical meas-

ure" was now bearing fruit; and a strong current of public opinion in favor of the project was set in motion by the active exertions of many gentlemen in both countries. A joint memorial signed by nearly seven hundred of the leading literary and scientific men of Canada, the United States and England, was prepared under date 2nd March, 1880, and presented to the Governor-General of Canada and the Governor of New York State. The memorial was as follows:

MEMORIAL TO THE RIGHT HONORABLE THE MARQUIS OF LORNE, K.T., K.C.M.G.,
ETC., ETC., GOVERNOR-GENERAL OF CANADA.

"The undersigned citizens of several countries and states address you by reason of the suggestion lately made by Lord Dufferin, that the State of New York and the Dominion of Canada should secure and hold, for the world's good, the lands adjacent to the Falls of Niagara.

"The Falls of Niagara are peculiarly exposed to disastrous injury. The heights of snow, the precipitous crags of great mountains, however they may be disfigured by man, can rarely be applied to uses which would destroy their sublimity. But should the islands and declivities of the Niagara River be stripped of their natural woods, and occupied for manufacturing and business purposes; should even the position, size and form of the constructions which the accommodation of visitors will call for, continue to be regulated solely by the pecuniary interests of numerous individual land owners, the loss to the world will be great and irreparable. The danger may be measured by what has already occurred. The river's banks are denuded of the noble forest by which they were originally covered; are degraded by incongruous and unworthy structures, made for advertising purposes, wilfully conspicuous and obtrusive, and the visitor's attention is diverted from scenes to the influence of which he would gladly surrender himself, by demands for tolls and fees, and the offer of services, most of which he would prefer to avoid. Objects of great natural beauty and grandeur are among the most valuable gifts which Providence has bestowed upon our race. The contemplation of them elevates and informs the human understanding. They are instruments of education. They conduce to the order of society. They address sentiments which are universal. They draw together men of all races, and thus contribute to the union and peace of nations.

"The suggestion, therefore, that an object of this class so unparalled as the Falls of Niagara, should be placed under the joint guardianship of the two Governments whose chief magistrates we have the honor to address, is a proper concern of the civilized world, and we respectfully ask that it may, by appropriate methods, be commended to the wise consideration of the Government of the Dominion of Canada."

A similar memorial was addressed to the Honorable Alonzo B. Cornell, Governor of the State of New York.



THE MOWAT GATE, QUEEN VICTORIA PARK.



THE DUFFERIN ISLANDS, FROM PROSPECT DRIVE, QUEEN VICTORIA PARK.

The hopes entertained by the Government of Ontario, that the Government of the Dominion would take up the work, were not destined to be speedily realized. In the meantime more definite progress was made in prosecuting the American portion of the scheme.

Bills to carry out the recommendations of the Commissioners of the State Survey were introduced in the Legislature of the State of New York in 1880 and 1881, but failed to secure passage. No legislative action was taken in the matter in 1882. On 30th January, 1883, however, a bill was introduced entitled :

“An Act to authorize the selection, location and appropriation of certain lands in the Village of Niagara Falls for a state reservation, and to preserve the scenery of the Falls of Niagara.”

The bill was passed, and on the 30th of April, 1883, received the approval of Governor Cleveland, and became law. Under the provisions of this Act a special Board of Commissioners was created to carry out the objects set out in the Act; and, as a result of their labors, 107 acres of land, embracing what was known as “Prospect Park,” together with Goat and Bath Islands, and the small islets adjacent thereto with a strip of land along the main shore to Port Day, was selected, appraised and acquired at a total cost, including arbitration and other incidental charges, of \$1,452,810.40.

On the 15th of July, 1885, the “State Reservation” was formally opened with appropriate ceremonies in the presence of a great assemblage of the citizens of New York State and Canada. Addresses were delivered by eminent men of both countries, including the Honorable John Beverley Robinson, then Lieutenant-Governor of the Province, and Sir Oliver Mowat, K.C.M.G.

After waiting for several years in the expectation that the Dominion Government would take action in the matter, and finding that there was but little prospect of this being done, the Ontario Government finally determined to assume the responsibility, and thereupon passed an Act on the 30th March, 1885 (43 Victoria, chapter 21), entitled “An Act for the preservation of the natural scenery about Niagara Falls.” Under the provisions of this Act authority was given to the Lieutenant-Governor to appoint a Board of Commissioners, whose duties were to select such lands in the vicinity of the Falls of Niagara as would in their opinion be proper to acquire for the purposes of restoring the scenery to its natural condition, and to preserve the same from further deterioration, as well as to afford to travellers and others facilities for observing the points of interest in the vicinity. Authority was also conferred upon them to prepare surveys of the lands so selected, and to report as to the best means of appropriating, improving and preserving these lands for the purposes of a public park. In pursuance of this Act, Colonel Gzowski, A.D.C., Messrs. John W. Langmuir, and J. Grant Macdonald were, on the 25th April, 1885, appointed Commissioners, and they immediately proceeded to the discharge of their duties. The greater portion of

the remainder of 1885 was spent in making a careful inspection and survey of all the territory which it was thought should form part of the proposed park. In this important work the Commissioners found that nature had marked out distinctly and by well defined features what should constitute the Ontario Park; and that in determining its boundaries these natural outlines could neither be ignored nor changed. The territory thus marked out may be described as follows: From the Clifton House southwards, following the general direction of the river, and at a distance of about 300 yards from the edge of the rocky wall of the gorge, there is a beautifully wooded escarpment rising over 100 feet above the general level of the plateau immediately adjacent to the gorge, and leading up to the general level of the table land between the two lakes. This escarpment is clearly defined up to and beyond the head of the rapids, and it was decided that a better boundary could not be chosen to delimit the territory reserved for a park. The intention of the Commissioners was at first to select a line embracing the whole of the escarpment, but it was found that the adjoining proprietors put a very high value on the land forming the very edge of the bluff, and in consequence a line a little below the top of the escarpment was chosen; thus securing to the park the slope with its wealth of foliage, while at the same time all commanding views obtained from the table land above were retained by the owners, and their demands for compensation for the portion taken below the table land made less onerous. The lands thus selected comprised a total area of some 154 acres and embrace all the land from the escarpment already described to the river, including Cedar Island, the Dufferin group of islands, and the talus under the cliff from the Clifton House southwards to the margin of the Horse Shoe Fall.

On the 18th of September, 1885, the Commissioners submitted to the Government, plans of the lands thus described, with a recommendation for their acquirement; and an Order in Council, approved by the Lieutenant-Governor, was passed on the 14th of December confirming the selection of the lands thus made.

Immediately following the approval of the selected properties the Commissioners were authorized to employ experts to value the lands, buildings, and improvements in order that they might, if possible, agree with the respective owners as to the price and terms of payment. This work was completed in January, 1886; but as the Commissioners were unable to arrange terms, except in two instances, reference was had to the Provincial Arbitrators, appointed under the provisions of the "Public Works Act of Ontario." Some delay arose in commencing the arbitrations, but they were finally entered upon and the nineteen cases, with respect to which arbitration proceedings became necessary, were practically completed before the close of 1886. The total amount of the awards, together with the costs of the arbitrations, amounted to \$436,813.24.

Having secured an appraisal of the lands in the manner prescribed by the Act, the Commissioners had then to devise a financial scheme for the payment of the same, and to provide funds for the improvement and maintenance of the park. The Act provided that, in case the report of the Commissioners so recommended, the Lieutenant-Governor in Council might invite proposals from companies willing to undertake the establishment and maintenance of the Park, subject to certain stringent conditions respecting the raising of revenue from tolls, etc., and in the event of any proposal being satisfactory might transfer to trustees, or to a company incorporated under the "Letters Patent Act," the right of acquiring, for the purpose of a park, the lands selected, at prices agreed upon or to be settled by arbitration, and subject to ratification by the Legislative Assembly. After the most careful and exhaustive consideration of the subject the Commissioners arrived at the conclusion that it was not in the public interest to have the Park and its franchise, under any conditions, controlled by a private company; and they strongly recommended the Government to establish and maintain the Park as the property of the province with its management entirely under provincial control. The Commissioners further recommended that in order to procure funds for the purchase of the lands selected, and for the preliminary works of reclamation and improvement, the Government should authorize the issue of forty-year bonds bearing four per cent. interest to the extent of \$525,000, principal and interest being guaranteed by the Province, and to form a charge against the revenues of the Park.

Acting on these recommendations of the Commissioners, the Government introduced and passed an Act at the session of 1887 entitled,

"An Act respecting the Niagara Falls Park (50 Victoria, chapter 13), which is as follows: "Whereas, in pursuance of the Niagara Falls Park Act, the Lieutenant-Governor in Council did approve of certain lands selected by the Commissioners for the purposes set out in the preamble of the said Act; and a map of the Park, showing the boundaries thereof and the lands taken, was submitted to the Lieutenant-Governor and approved in Council, and copies duly certified and authenticated were filed and deposited in the office of the Registrar for the County of Welland, and in the office of the Commissioner of Crown Lands; and whereas the prices to be paid for the said lands have been ascertained and determined and it is expedient to make provision for the payment thereof, and for the means required to establish, maintain, improve and develop the said lands, as and for a public park; therefore, Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario enacts as follows:

"1. The Park shall be called 'The Queen Victoria Niagara Falls Park,' and this Act may be cited as 'The Queen Victoria Niagara Falls Park Act, 1887.'

"2.—(1) From and after the commencement of this Act, Colonel Casimir Stanislaus Gzowski, of the City of Toronto, Aide-de-Camp to the Queen; John Woodburn Langmuir and James Grant Macdonald, both of the City of Toronto, Esquires, the persons forming the Board of Commissioners for Niagara Falls Park, and two other persons to be appointed by the Lieutenant-Governor-in-Council, if he thinks fit, shall be a corporation by the name of 'The Commissioners for the Queen Victoria Niagara Falls Park,' and shall continue to hold their respective offices as members of the said corporation during the pleasure of the Lieutenant-Governor-in-Council, and the Lieutenant-Governor-in-Council may, upon the death of any such persons respectively, or on their resignation or removal from office, and from time to time thereafter, appoint other persons to fill their places during pleasure as aforesaid.

"(2) The Commissioners shall receive no compensation except their actual disbursements in discharging their duties.

"3.—(1) The lands selected by the Commissioners of Niagara Falls Park, approved by the Lieutenant-Governor and marked upon the map and contained within a red verge line marked on the said map, with the exception hereinafter mentioned, are hereby vested in the said corporation as trustees for the Province, subject to the payment being made which is hereinafter mentioned. The amounts agreed to be paid or awarded are to be paid upon proper conveyances being executed to the said Commissioners, subject as hereinafter mentioned; or in case no proper conveyance is executed, the money may be paid into court, in accordance with and subject to the terms of 'The Niagara Falls Park Act' and 'The Revised Act respecting the Public Works of Ontario,' as incorporated in the Park Act.

"(2) The payment is to be made within fifteen days from the passing of this Act, with interest to be computed from 30th March, 1887, to the day of payment, at the rate of six per cent. per annum; and payment within such period shall be as effectual as if made within the period fixed for payment by 'The Niagara Falls Park Act.'

"(3) The costs which shall be payable under awards where amounts are paid into court, may be paid to such of the persons interested as appeared before the official arbitrators.

"(4) The land so excepted is the following :

"Excepting a strip of land lying between range number six, as laid down in the plan of the City of the Falls, in the Township of Stamford on the north, and by Street's Mill road and the lands held by the Carmelite monastery on the south, the easterly boundary whereof is at a distance of 130 feet east of the centre line of the Canada Southern Railway, and the westerly boundary whereof being the westerly line of the Park, as appears in the Park plan, filed and registered, between said range number six and Street's Mill road and monastery lands,

and approximately of the width of seventy-nine feet between said range number six and Street's Mill road, which said strip is by this Act excluded from the Park; and except, also, that until the municipal corporation otherwise orders by by-law, subject to section 546 of 'The Consolidated Municipal Act, 1883,' Robinson and Murray streets shall be public entrances to the Park for visitors by carriages or on horses or on foot.

"4.—(1) The Commissioners may agree with the person or persons, or association of persons, whether incorporated or not, who exercise, own or control the taking and collecting of tolls upon that portion of the gravel or macadamized road known as the St. Catharines, Thorold and Niagara Falls road, between Table Rock and the north boundary line of the Park on the aforesaid plan marked, as well as the title, interest and possessory right, which such person or persons as aforesaid have to the said road and the land whereon the same is laid out, together with the toll-house and appurtenances between the said points, for the price to be paid for the said rights to take tolls, and the title, interest and possessory rights, land, toll-house and appurtenances aforesaid.

"(2) And if the Commissioners and the said persons as aforesaid are unable to agree, the sums to be paid shall be determined by arbitration in the manner provided by 'The Niagara Falls Park Act;' and any party to the arbitration may appeal from the award in manner and according to the provisions of 'The Act respecting Awards under the Niagara Falls Park Act.'

"(3) The right and power which the persons aforesaid have to collect tolls over the residue of the road known as the St. Catharines, Thorold and Niagara Falls road shall not be affected by reason of the acquisition by the Commissioners of that portion between the Table Rock and the north boundary line of the Park on the aforesaid plan marked, except by reason of the diminution of mileage, although that part of the road held or retained by the said persons beyond the limits of the Park may be shortened to less than five miles in length.

"(4) In case of an arbitration the arbitrators shall take into account any depreciation, if such there may be, in the value to the persons aforesaid of the remainder of the road.

"(5) The arbitrators shall also determine the value of the whole road between the Table Rock and the point about five miles therefrom, in respect of which tolls are now collected, in order that the Commissioners may have the opportunity of paying to the persons aforesaid, if sanctioned by the Legislature at its next session, the difference between the value of the whole road between said points and the value of the part hereinbefore mentioned of the road aforesaid; and in case of such payment being sanctioned and made within fifteen days after the end of such session, that part of the road built upon the military reservation or ordinance property shall vest in the Commissioners, and the Park shall then extend over and include, as well the military reservation as the land lying between such reser-

vation and the Niagara river, as far as the limit between lots number 92 and 93 of Stamford, but not affecting or interfering with the rights of any companies having bridges over the Niagara river; and all the provisions of this Act and 'The Niagara Falls Park Act' shall apply to such extension of the Park as is included within the Park at the time of the passing of this Act, saving the reservation of a public way between the Clifton House and the limit between said lots 92 and 93, such public way being subject to reasonable tolls upon horses and carriages passing over the same.

"(6) All costs in respect of the matters in this section contained shall be in the discretion of the arbitrators.

"(7) Upon the acquisition by the Commissioners of the interests and rights in that portion of the said road within the Park as now limited, all rights to take and collect tolls, as well as the public rights in the said portion of the road shall be extinguished.

"(8) Nothing in this section is intended to extend to or affect any right or title of the Dominion of Canada to any property known as the military reservation or ordnance property.

"5. The Lieutenant-Governor-in-Council may at any time, or from time to time, vest in the Commissioners, to be held for the purposes of the Park, and subject to any conditions which may be imposed by Order in Council, any part or portion of the Crown Lands, the property of Ontario, lying along the bank of the Niagara river, and not included in the original survey of lots laid out in the Townships of Stamford and Niagara, which lands so vested shall thenceforth form part of the Park and be subject to the control of the Commissioners like the other lands aforesaid.

"6. The provisions hereinbefore and in the former Act contained for authorizing the Commissioners to take, use or acquire, and authorizing all persons to sell and convey, lands, hereditaments or rights, shall extend to any lands, hereditaments and rights which the Commissioners, with the consent of the Lieutenant-Governor-in-Council shall hereafter think proper or expedient to be acquired for the purpose of making, forming and completing any new roads, avenues or approaches to the Park; but nothing in this section contained shall authorize the Commissioners to take any lands for the purpose aforesaid, against the consent of the parties interested therein.

"7.—(1) The Commissioners may raise, for the purposes and objects intended to be secured by 'The Niagara Falls Park Act' and this Act, the sum of \$525,000 and no more by the issue of debentures. The appropriation and application of the money shall be assured to the satisfaction of the Lieutenant-Governor.

"(2) The debentures shall be under the corporate seal and the hands of two of the Commissioners, and shall be countersigned by the Treasurer of the Province, and the same shall be for such respective amounts payable on the 1st of January,

1927, and at such rate of interest not higher than four per cent. per annum, and shall be disposed of at such prices and on such terms as may be determined by the Commissioners and approved by the Lieutenant-Governor-in-Council. The interest shall be paid half yearly on such days as shall be mentioned in the debentures.

“(3) The debentures shall, equally and without preference of one over the other, be a charge on all the revenues of the corporation, and the Lieutenant-Governor by Order-in-Council may also guarantee payment of the same.

“(4) The debentures so issued and countersigned shall become conclusive of the same having been issued in pursuance of this Act and of the same being guaranteed by the Province of Ontario.

“(5) The debentures shall be transferable by delivery, and the coupons for interest annexed thereto shall also pass by delivery.

“(6) The moneys to be raised by means of the said debentures shall be applied in paying the purchase moneys of the lands to be acquired, in making necessary improvements, contructions and appliances to be used in connection with the Park, in recouping the province for expenses incurred by it with reference thereto, and in paying current expenses of the Park and interest on the said debentures until a sufficient revenue for the said purposes is obtained from the fees charged.

“8. (1) Subject to any direction of the Lieutenant-Governor in Council, the Commissioners may construct and operate inclined planes and hydraulic or other lifts to be worked by any powers ; and may build and operate boats or vessels to be used in connection with the Park.

“(2) Subject as aforesaid, the Commissioners may pull down all houses and other erections and buildings on lands acquired and purchased by virtue of this Act, or such of them, or such part thereof as they shall think proper to be pulled down and may level and clear the ground whereon the same stand in such manner as they think proper, and sell, or cause to be sold, the materials of the houses and other buildings to be taken down and removed ; and the moneys to be produced by the sale thereof, after deducting expenses, and also the rents and profit to which they may be entitled meantime, shall be applied and disposed of for or towards the purposes of this Act.

“(3) Subject as aforesaid, the Commissioners shall lay out, plant and enclose the Park in such manner as they think fit, and improve and develop the same in accordance with the objects of the Niagara Falls Park Act.

“(4) Subject as aforesaid, the Commissioners shall have power to take and collect tolls for the use of works, appliances, vessels, or works required to afford facilities to visitors to reach and view the points of interest within the park, and involving the expenditure of money in construction and maintenance, as well as for services to be rendered for the convenience or accommodation of visitors.

“(5) Subject as aforesaid, the Commissioners may from time to time make orders and regulations for opening and closing the gates and entrances of the park or any of them, at such hours as they may think fit. This is not intended to interfere with or affect, an agreement which has been heretofore entered into between the Commissioners and the Canada Southern Railway.

“9. The plans of all works proposed, and all tariffs of tolls or payments for the use of works, vessels or services, as well as all by-laws, shall require the approval of the Lieutenant-Governor-in Council before being acted upon.

“10. The park grounds shall be open to the public, subject to any rules and regulations as to management approved by the Lieutenant-Governor in Council.

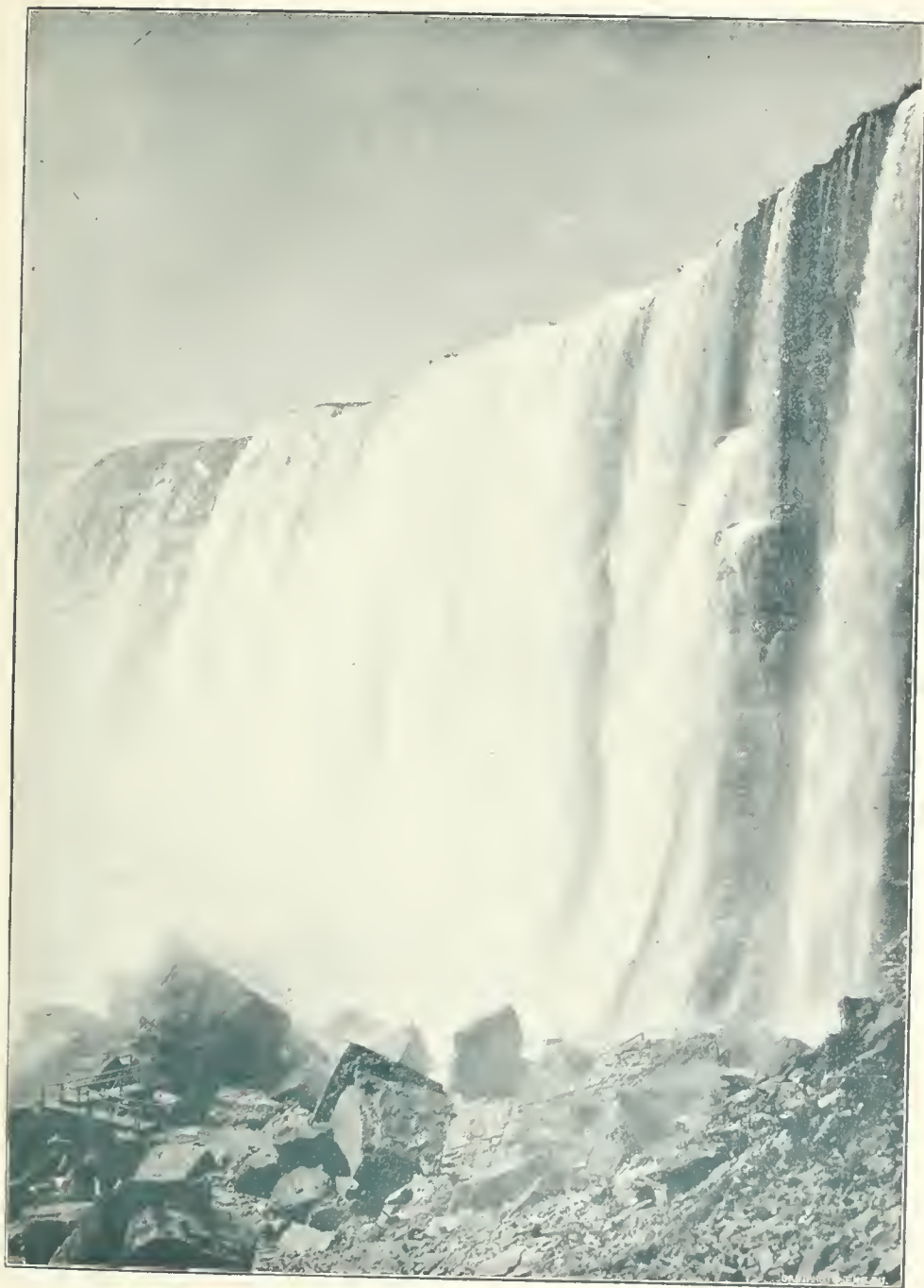
“11. (1) The Commissioners may make by-laws, to be approved by the Lieutenant-Governor-in-Council, for the use, government, control or management of the park, and for the protection and preservation of all works from injury of the same, and of the trees, shrubs, walks, seats, gates, fences, and palings, and all other parts thereof, and for the exclusion of improper persons from the same, and may alter or revoke any such by-laws and shall appoint a penalty not exceeding twenty dollars for any breach of a by-law.

“(2) The Commissioners may from time to time appoint such officers as may be required for the superintendence and management of the Park, and may also appoint park keepers and other officers to preserve order in the Park, and may from time to time dismiss any persons so appointed; the appointments or dismissals being subject to the approval of the Lieutenant-Governor; and the salaries of such officer shall be payable out of any funds in the hands of the Commissioners.

“(3) Any person entrusted by the Commissioners with the custody or control of moneys by virtue of his employment, shall give security in the manner and form provided by ‘The Act respecting public officers.’

“(4) The Commissioners may from time to time employ gardeners and workmen as they deem necessary, and may from time to time dismiss or dispense with the services of such persons subject to any directions of the Lieutenant-Governor in Council.

“(5) The Commissioners shall cause books to be provided and kept and true and regular accounts to be entered therein, of all sums of money received and paid, and of the several purposes for which the same were received and paid; which books shall at all times be open to the inspection of any of the Commissioners, and of the Treasurer of Ontario, and of any person appointed by the Commissioners or Treasurer for that purpose, and of any other person appointed by the Lieutenant-Governor; and the Commissioners and persons aforesaid may take copies of or extracts from the said books.



UNDER TABLE ROCK, QUEEN VICTORIA PARK.



CAN. PHOTO-ENG. BUL.

AMERICAN FALLS, FROM INSPIRATION POINT, QUEEN VICTORIA PARK.

"12. The revenue to be received from the sources authorized by this Act shall be applied as follows :

1. To the necessary outgoing expenses of all works necessary to the preservation, improvement and maintenance of the Park, and to the payment of the salaries of officers and others employed by the Commissioners, and other incidental expenses.

"2. To the payment half-yearly of the interest payable on the debentures authorized to be issued by the Commissioners.

"3. To pay a sinking fund at the rate of one per cent. per annum on the entire amount of the debentures authorized to be issued as aforesaid.

"13. (1) The annual sums for the sinking fund shall be remitted by the Commissioners to the Treasurer of Ontario by half yearly payments in such manner as the Lieutenant-Governor-in-Council from time to time directs, for the investment and accumulation thereof under the direction of the Lieutenant-Governor in Council.

"(2) The sinking fund shall be invested in such securities as the Lieutenant-Governor in Council from time to time thinks proper, and shall, whether invested or not, be applied from time to time under the direction of the Lieutenant-Governor in Council, in discharging the principal and the interest thereon of the debentures.

"14. The Commissioners shall make an annual report for the information of the Legislature, setting forth the receipts and expenditure of the year, and such other matters as may appear to them to be of public interest in relation to the park, or as the Lieutenant-Governor in Council may direct.

15. "Sections 24 to 27 of 'The Act to provide for the better auditing of the public accounts of the Province' shall apply to the accounts of the Commissioners in respect of receipts and expenditures."

16. "Sections 12, 13, 14 and 15 of 'The Niagara Falls Park Act' are hereby repealed."

When the foregoing Act received the assent of the Lieutenant-Governor, the number of Commissioners was increased to four by the appointment of Mr. John A. Orchard, of the Village of Niagara Falls, and the Board immediately appointed Mr. James Wilson, Civil Engineer, to be Superintendent of the Park.

Under the provisions of clause 7 of the Act, the Commissioners invited offers for the purchase of the bonds which they were authorized to issue, and the whole issue of \$525,000 was disposed of for \$534,667.14, whereupon the awards made in respect of the lands covered by the Park were paid and possession of the several properties taken early in the summer of 1887.

The work of reclamation was immediately begun. The many unsightly structures on the highway along the river bank were removed, cellars filled up, fences and outbuildings cleared away, bridges strengthened and repaired, new

roads and paths constructed, and work on a new hydraulic elevator, to enable visitors to go under the Falls with comfort, was begun. These and many other works essential to a beginning of the general plan of improvement were proceeded with and on the 24th of May, 1888, the park was in fit condition to be thrown open to the public. Shortly after this the citizens of the town of Niagara Falls expressed a desire to manifest their appreciation of the establishment of the park, and taking advantage of the troops being in camp at Niagara-on-the-Lake, a grand civil and military display was held in honor of the event on 21st of June, when no fewer than 13,000 visitors witnessed the imposing military pageant and games, and greatly enjoyed, under the improved conditions, the beautiful grounds which had become the property of the Province.

Power having been conferred upon the Commissioners by the Park Act of 1887 to acquire that part of the St. Catharines, Thorold and Niagara Falls macadamized road which extends along the High bank of the river from Table Rock northwards to the Grand Trunk Suspension Bridge, arbitration proceedings were instituted to determine the value of the property, resulting in the acquirement of the road by the Commissioners, together with all rights of the Company to collect tolls etc. The Commissioners, at the request of the Town of Niagara Falls, extinguished the tolls, and made the road which forms the front street of the town, and which is the principal avenue of access to the Park, entirely free to the public.

Recognizing the propriety of making the park system as complete as possible, the Ontario Government passed an Order-in-Council on the 15th of July, 1887, which was confirmed by a grant under the Great Seal of the Province dated 20th April, 1888, vesting in the Commissioners, for park purposes, all the land upon the top of the high bank of the river, and in the talus below, lying between the surveyed lots and the water's edge, and extending from the north boundary of the Park at the Clifton House down to the lands forming the Military Reserve at Queenston Heights. This addition to the park domain of the whole reach of the magnificent gorge on the Canadian side and bounding the mighty river in all its diversified phases of still water, eddy, current, rapids and whirlpool for over seven miles, while materially increasing the labors of the Commissioners, opened up new fields for the prosecution of the work of preservation and restoration to which they had set their hands.

It soon, however, became apparent that the Dominion Government claimed title to a portion of these lands, locally known as the Chain Reserve, and that an important franchise had been given by that Government, without the knowledge of the Commissioners, for the construction of a carriage road and tramway along the foot of the talus near the water's edge in front of the town, from the ferry landing to the Cantilever Bridge, and with rights for elevators or inclines to connect with the top of the bank at either extremity, the southern one being located

within the limits of the park as defined by the Act. As the operation of such a franchise by individuals acting independently of the Commissioners and partly within the territory under their jurisdiction, could not fail to cause confusion and disorder, the Commissioners took prompt action to test the validity of the title under which the franchise was given, and *inter alia* to set at rest the conflict of authority which had arisen between the Dominion and Provincial Governments, with respect to the ownership of the so-called chain reserve along the bank of the Niagara River. Apparently the chief question at issue was as to whether the reserve forms a part of the Ordnance lands which passed to the Dominion under the British North America Act, or still constitutes a portion of the township of Stamford which became vested in the Province of Ontario at the time of Confederation. After protracted delays the case went to trial in June, 1892, before His Lordship Chancellor Boyd, and was concluded in October of the same year. The learned Chancellor gave a very elaborate judgment in the case, which was altogether in favor of the Commissioners, and upheld the title of the Province to all the lands in question; and the lessees under the Dominion Government were perpetually restrained from going on with their works or in any way interfering with the property vested in the Commissioners under the Park Act. The judgment was appealed from by the Government of Canada, and was tried in October last before their Lordships the Honorable Chief Justice Haggerty and Justices McLennan Osler and Burton, but up to the present date judgment has not been delivered.*

Notwithstanding the action above referred to, the Commissioners received many assurances of the friendly attitude of the Dominion Government to the Park project. Application was therefore made for the formal cession to the Commissioners for Park purposes of whatever rights the Dominion Government had, or claimed to have, in and to the so-called Chain Reserve, as well as any other rights which might attach to any portion of the lands or premises coming within the scope of the suit which had been instituted. After a full consideration of the application a patent, under the Great Seal of Canada, was issued on the 4th of November, 1890, by which all the right, title or claim which the Dominion Government had in respect to any of these lands was surrendered to the Commissioners. As, however, the grant was made subject to any leases, sales, or licenses which had been entered into previous to that date by the Government of Canada, affecting any part of the lands in question, the Commissioners were compelled to prosecute the action then in the Courts in order to determine their status in respect to any such rights leased or granted. Many delays occurred in these proceedings and it was considered inadvisable, until the case is finally disposed of, to undertake works of improvement involving much outlay in this portion of the Park.

* NOTE.—Since writing this Report a unanimous judgment was rendered in favour of the Commissioners, sustaining in all particulars the decision of Chancellor Boyd.

During the progress of the preliminary works of reclamation and prior to the opening of the property to the public, the Commissioners carefully considered the by-laws and regulations for the government of the Park. It was deemed advisable to follow the suggestion, in this particular, of Lord Dufferin, and make them correspond as closely as possible to the regulations adopted by the Commissioners of the New York State Reservation, which had been in force in their park from the time of its opening in 1885; accordingly the rules adopted for the preservation of order, and the measure of authority given the executive officers of the two Parks, were made to conform as closely as the conditions of the cases would admit.

It may be well to state here that when the Government of Ontario had the Park scheme under consideration there were two important general principles which they regarded as indispensable conditions. These were:—

1. That the Park should not entail a permanent financial burden upon the Province, but that it should become, as soon as possible, entirely self-sustaining.
2. That as far as possible the Niagara Falls Park on the Canadian side should be as free to the public as the corresponding reservation on the United States' side of the river.

The preparation of the measures necessary to give effect to these general principles proved no small or unimportant part of the task which the Government laid upon the shoulders of the Commissioners on their appointment in 1887; and from the outset the question of deriving a sufficient revenue from the Park occupied their most serious attention. From the most reliable data obtainable from railway and other sources respecting the stream of travel to Niagara, it was ascertained that in the years immediately preceding 1887, from 200,000 to 250,000 persons annually visited Niagara, and that of these a large percentage visited all the points of interest in and around the Falls on each side of the river. From a very careful estimate, based upon the returns of revenue, as shown in the evidence taken at the official arbitration proceedings in connection with the various properties required for the Park systems, it appeared that on an average the total cost to each visitor to the various points of interest, under the methods existing prior to the establishment of the Parks, was not less than \$1.50. As it was essential, in order to give effect to the second of the general principles referred to, that the charges, while not bearing unduly upon the poorer classes of visitors, should produce sufficient revenue to meet the annual interest on the bonds and the cost of works of improvements and maintenance, the Commissioners proposed that the Park should be absolutely free to all who entered it, in order to enjoy its natural attractions, and obtain the views afforded without artificial aid, but that a fee should be charged, not exceeding fifty cents, to all who might avail themselves of the structural appliances and guides in order to view the Falls to better advantage.

This course, it was considered, was substantially in harmony with that pursued on the United States side, where charges are made for the use of the inclined railway and for visiting the "Cave of the Winds." In any comparison made with the American portion of the Park system it should be borne in mind that the conditions under which the New York State Reservation was acquired differed very materially from those which prevailed in the acquisition of the Canadian Park. In the former the cost of the lands expropriated became a charge against the revenue of the State of New York, and all the lands were practically handed over to the Board of Commissioners as a gift from the State for the purposes of a Park, and in addition the Legislature authorized the payment to the Commissioners of an annual appropriation of \$20,000 from the funds of the State for the maintenance of the Reservation, which amount was increased subsequently to \$25,000.

In the case of Ontario, as has been shown, the lands were not acquired by moneys provided by the Province, but by the sale of bonds issued on the security of the Park property, the principal and interest, however, being guaranteed by the Province. From the first it has been considered a *sine qua non* that the interest and the sinking fund, as well as the cost of protection and maintenance of the property should be provided for out of revenues to be obtained from visitors to the Park. The necessity, therefore, to collect tolls in the Ontario Park became more imperative than in the New York Reservation. In preparing a tariff of tolls, the Commissioners were guided by the following considerations:—(1) To raise the required revenues exclusively from tolls for the use of artificial constructions and appliances, or as compensation for the services of guides required to better enable visitors to view and enjoy certain points of special interest; (2) To assimilate as far as practicable the system of levying tolls to that prevailing in the New York Reservation, and (3) To give full effect to the policy that the Park grounds, with all the privileges thereof (except especial appliances or guides, before referred to) should be open and free to the public without charge.

The amount of revenue which had to be collected annually, in order to meet the financial requirement, was estimated to be as follows:—

Four per cent. on \$525,000 bond issue	\$21,000
Sinking fund of one per cent. per annum	5,250
Cost of protecting and maintaining the property	15,000
	<hr/>
	\$41,250

Based upon the estimated number of visitors that would enter the Park these tolls would amount to an average charge of from sixteen to twenty cents for each visitor.

Believing that the general public would appreciate the efforts of the Commissioners to reduce to the lowest possible figure the cost of seeing the varied natural attractions at the Falls, and would cordially respond, by a largely increased patronage, to the effort to realize from the moderate charges proposed sufficient revenue for all the necessary purposes of the Park, the Commissioners framed the following tariff of tolls, which was duly approved by an Order in Council :—

1. Entrance of carriages and persons on foot.....	Free.
2. Pedestrians on islands	10 cents.
3. Carriage drawn by two horses over islands	50 “
4. “ one “	25 “
5. Each visitor under the Falls supplied with dress.....	50 “
6. “ “ without dress	25 “

Of these tolls the only one that has been adversely criticised, and the only one, therefore, which calls for special explanation, is that made for the use of the bridges connecting the islands in the south half of the Park. In justification of this charge, it may be stated that the Park might have been terminated at the south end of Cedar Island, a few hundred yards above Table Rock, thus effecting a saving in the capital outlay for the acquirement of land of considerably over \$100,000, with a corresponding reduction in the cost of maintenance. In order, however, to afford visitors perfect views of the American and Horse Shoe Falls, and of their unrivalled setting from every possible coign of vantage on the Canadian side, and at the same time provide in full view of the Falls sufficient area for the picnic and pleasure grounds essential for the enjoyment and recreation of the vast numbers of visitors, the Commissioners decided to acquire the additional territory including the Dufferin Islands.

It must be admitted by every discerning and appreciative visitor to Niagara that for the elements of tranquil beauty, charming variety of land and water scape and extraordinary wealth of rare flora the Dufferin Islands are simply unrivalled. The impressions borne in on the mind by contemplating from these islands, the grandeur and power of the river in its wild descent from smooth water to the verge of the Fall have been thus eloquently described by the Duke of Argyle :—

“ When we stand at any point near the edge of the river and look up at the course of the stream the foaming waters of the rapids constitute the sky line. No indication of land is visible, nothing to express the fact that we are looking at a river. The crests of the breakers, the leaping and the rushing of the waters, are still seen against the clouds as they are seen in the ocean when the ship from which we look is in the trough of the sea. It is impossible to resist the effect on the imagination. It is as if the fountains of the great deep were being broken up and that a new deluge were coming on the world. The impression is rather

increased than diminished by the perspective of the low wooded banks on either shore running down to a vanishing point and seeming to be lost in the advancing waters. An apparently shoreless sea tumbling toward one is a very grand and a very awful sight. Forgetting then what one knows, and giving oneself to what one only sees, I do not know that there is anything in nature more majestic than the view of the rapids above the Falls of Niagara."

Reverting to the question of revenue, it was soon found on the opening of the Park, that although the number of visitors entering the gates was considerably in excess of the number previously estimated, the amount of the revenues received under the tolls above referred to did not exceed on the average two and one-half cents for each visitor. The smallness of this revenue, and its utter insufficiency for the purposes intended, was a matter of regret to the Commissioners, and at first seemed almost inexplicable. It appeared, however, that a somewhat similar experience had followed the opening of the New York State Reservation; and the cause was doubtless largely due to the methods of doing business that prevailed with the owners of bazaars and other attractions allied with the hack and livery men. Under this combination, visitors were induced to go to those establishments, in preference to, and if possible, before entering the Park; the hackmen being paid large commissions on the sales of fancy goods and for the patronage they brought to the owners of the bazaars and other attractions. It was found that fully one-half of the visitors to the Canadian Park entered the gates in carriages, and might fairly be assumed to be generally of the classes in more or less comfortable circumstances, who could be reasonably expected to pay the trifling fees exacted for the use of the appliances provided for seeing and enjoying to the utmost the infinite beauty and grandeur of the Falls and the varying loveliness of the upper reaches of the Park, especially when it is borne in mind that from these classes very large revenues were collected by the owners of the property prior to the establishment of the Park.

After two years' experience of these most unlooked for results, the Commissioners were forced to admit that, even under improved conditions, the sources from which the revenues were drawn would prove altogether inadequate to meet even the annual cost of maintaining the Park, without taking into account the amount required for the payment of annual interest and sinking fund on the debentures. It, therefore, became imperative that new sources of revenue should be devised, unless the cost of maintenance and improvement was to be, to a large extent, assumed by the Province. The Superintendent was, therefore, authorized to make a survey of the river bank, with a view to locating a line of electric railway which would connect, at Queenston, with the steamers of the Niagara Navigation Company for Toronto and points on Lake Ontario, and on the south, with navigation on the upper reach of the Niagara River between Chippawa, the

City of Buffalo and Lake Erie points ; and connecting with the Grand Trunk Railway at the Suspension Bridge. The Commissioners believed that a line of electric railway forming connections with these main avenues of travel and opening up to visitors near views of the whole course of the river, with all its unrivalled wealth of scenic effect, would be a most valuable franchise which capitalists would pay something to secure.

Apart altogether from the question of revenue, it became apparent from the first opening of the Park that more convenient transport should be provided to all parts of the grounds from the Grand Trunk Railway Depot, at which nearly all the large excursions to the Falls from points in Canada disembarked. The street railway of the town did not approach nearer than a mile to the Falls at any point where entrance could be had to the Park ; and its equipment, at best, was quite inadequate for handling the large excursions coming from all parts of Canada and the United States. The number of cabs was too limited, and to most of the excursionists, too expensive. The distance from the Grand Trunk Depot to Table Rock is two and a half miles, and to the Dufferin Islands three and a half miles, and as excursionists are generally accompanied by a large number of children and are also frequently encumbered with baskets, walking such a distance was attended with great fatigue and discomfort ; and one trial was usually sufficient to deter them from attempting another expedition in the same manner.

It was also found that organized efforts were made by the owners of bazaars, and other attractions on the American side, to capture any excursions booked for the Canadian Park. Agents were invariably sent to meet the special trains conveying these excursions for the purpose of selling coupon tickets for admission to a number of the so-called points of interest, including bazaars and restaurants. In addition, substantial inducements were freely offered to the promoters of the excursion to entice the whole party to the American side. The large profits made on the sales to members of these excursion parties enabled the owners of these places to subscribe liberally to the funds advanced for this purpose. Even those crossing Lake Ontario by steamer from Toronto, or elsewhere, found it much more convenient to take the observation trains of the New York Central Railway, at Lewiston, which afforded partial views of the lower reach of the gorge, and landed the excursionists within a few minutes' walk of the Park and river on the American side. For these and other reasons it was found to be in every way most desirable that the electric railway should be built, and immediate attention was, therefore, given to the project ; and as the first step, the right of way was secured where the lands vested in the Commissioners were not sufficient for the proposed road. After several offers had been made to dispose of the franchise, a contract was ultimately entered into with Messrs. Osler, Hammond, Hendrie and Angus, on behalf of a number of prominent Canadian capitalists, for the construction and



THE DUFFERIN ISLANDS, QUEEN VICTORIA PARK.



RIVERSIDE RAMBLE, DUFFERIN ISLANDS, QUEEN VICTORIA PARK.

operation of a line of electric railway through the Park and to Queenston and Chippawa, the Commissioners providing the right of way over nearly the whole of the distance, and furnishing all the water power necessary for the developing of the electricity to operate the line.

Under the terms of the agreement entered into with these capitalists, the sum of \$10,000 a year is secured for the Park revenue by way of rental. Early in 1892 the construction of the line was begun, and the work was sufficiently advanced to permit of the opening of the road, as a single track railway, on the 24th of May, 1893. The construction throughout is of a very substantial character, and the electrical and rolling stock equipment fully up to the requirements of the agreement. The success which attended the operating of the line from the first, convinced the Company that safety and convenience required them to double track the road throughout. To that end negotiations were entered into with the Commissioners, and after very careful consideration of all the circumstances governing the case, an agreement was ultimately arrived at by which, in consideration of certain specific works to be performed by the Company, the laying of a second track was authorized, and the Company was able to have the work completed in time for the heavy midsummer travel of 1894. By the opening up of this route abundant provision has been made for the convenience of the visiting public of all classes; and the sublime panorama of Niagara in all its diversified scenic aspects, along its entire length, is opened up to view with every possible convenience for the tourist and at a trifling expense.

In addition to the electric railway, the Commissioners sought other means of raising revenue. They accordingly obtained the sanction of the Government to the granting of a franchise for the use of a portion of the enormous water power of the Falls for commercial purposes. It has been estimated that the total amount of power represented by the waters of Niagara falling over the cataract into the gorge below is equivalent to over four and a half millions of horse power, and the Commissioners considered that a small portion of this enormous power could be taken for commercial purposes without perceptibly affecting the flow of water over the face of the Fall, or necessarily interposing any objectionable features upon the landscape. This course appeared to them to be the more justifiable as operations had been begun by an association of wealthy capitalists on the American side, having in view the taking of the waters of the river on a large scale for generating electric and water power for use in the town, and for carrying it to Buffalo and other places to supply users at a distance.

After negotiations with well known engineers and capitalists in both New York and London, England, extending over a considerable period, an agreement was ultimately entered into on the 7th of April, 1892, by which Messrs. Shaw, Stetson and Rankine, all of New York State—undertook, on behalf of themselves

and others, to carry out the work ; and, as a guarantee of good faith, paid the Commissioners an amount, equivalent to two years' rental, in advance. This agreement was approved by the Government and confirmed by an Act of the Legislature, (Chapter 8, Vic. 55) under the terms of which the Company is authorized to take water from the Niagara River at the south end of Cedar Island through the extension of the natural channel forming the island, and to utilize the same for generating electric or pneumatic power, in buildings to be constructed at the foot of the high bank bounding the park—the spent water to be taken off by means of tunnels cut through the rock to a portal situated in the gorge near the foot of the Falls, substantially as is done by the Company operating on the American side.

The plans of all works required in the carrying out of the enterprise are to be submitted to, and approved by, the Commissioners before being authorized ; and all the power generated is to be transmitted for the use of customers without the park, and to points more or less remote. The agreement is for a period of twenty years, with the right of renewal for four further periods of twenty years, or one hundred years in all. For these privileges the Commissioners are to be paid \$25,000 per annum by way of rental for the first ten years, the amount increasing \$1,000 each year during the second period of ten years, and then continuing at the rate of \$35,000 per annum until the end of the period for which the franchise is granted. The Company has the right of terminating the lease at any time during the first period of twenty years by giving three months' notice. Work is to be commenced on or before the 1st of May, 1897, and to have proceeded so far that by the 1st of November, 1898, there will have been completed, water connections for the development of 25,000 horse power, and have actually ready for use 10,000 developed horse power of electric or pneumatic power. Every precaution has been taken in the agreement to conserve to the utmost the natural features of the park ; and advantage will be taken of the changes in configuration necessitated by the carrying out of the work to improve and develop this hitherto neglected portion of the park property. The approval of the Commissioners has been given to the preliminary plans submitted by the Company ; but up to the present time the actual works of construction have not commenced.

As a third source of revenue the Commissioners decided to have the large stone building, which, prior to the establishment of the park, was used as a museum, fitted up as a restaurant, and also to provide much needed shelter during inclement weather for the largely increased number of visitors brought to the Park by the electric railway. It was also decided to combine with the restaurant franchise, the business of conducting visitors " Under the Falls " which had been carried on by the park staff for some years, and also the photo privileges in connection therewith, which had been under lease for some years. Upon

advertising for tenders the offer of Messrs. Zybach and Brundage was accepted; and an agreement entered into by which the work of repairing and fitting up the restaurant building and Table Rock House was put under way. This agreement provides for the payment of a rental of \$8,200 per annum and extends over a period of ten years from the 1st of June, 1893, with the right of renewal for another ten years at a rental to be agreed upon, or settled by arbitration.

Owing to the unavoidable delays incurred in connection with the closing of these three important revenue-producing undertakings, and having regard to the continued inadequacy of the park receipts to meet the large expenditures necessarily incurred in providing for the interest on bonds, the maintenance of the Park and the works of improvement, as well as to provide funds for the purchase of properties found to be essential to the completion of the park system, it was found expedient to make a further issue of bonds to the extent of \$75,000, making the total bonded indebtedness of the property \$600,000.

Reference has already been made to the Chain Reserve along the west margin of the Niagara River, part of which, lying in the townships of Stamford and Niagara was granted to the Commissioners in April, 1888. In addition to this reserve, there is a strip of one chain, or 66 feet in width, from the high water mark reserved in nearly all the original patents granted by the Crown to lands fronting on the Niagara River in the Townships of Bertie and Willoughby, and extending from the Military Reserve at Fort Erie down to the mouth of the Welland River at Chippawa, a distance of nearly sixteen miles. A similar reservation was also made in all patents to lots fronting on the river in the township of Niagara from the Military Reserve at Queenston to the Military Reserve at Niagara on the Lake, a distance of nearly six miles. These several reserves were vested in the Commissioners by grant under the Great Seal of Ontario on 20th October, 1891. This very extensive addition of territory still further enlarged the scope of the duties of the Commissioners; and in order to obtain data on which to base a policy for its incorporation and maintenance, as a part of the park domain, the superintendent was instructed to make an examination and to report on the whole subject of the Chain Reserve. His report was as follows:—

“J. W. Langmuir, Esq., Chairman of the Park Commission :

“Sir. Acting under your instructions I have made an examination of the Chain Reserve along the west bank of the Niagara River, through the townships of Bertie, Willoughby, Stamford and Niagara, and beg to make the following report thereon :

“This property was vested in the Commissioners by the Government of Ontario under the authority of the Legislature, by the following acts, viz :

“A. Order-in-Council, approved on the 15th day of July, 1887.

“B. Grant under the Great Seal of the Province, dated 26th April, 1888.

" C. Grant under the Great Seal, dated 26th October, 1891.

" For convenient reference the full text of these documents is embodied herein.

A

" Copy of an Order-in-Council, approved by His Honor the Lieutenant-Governor, the 15th day of July, 1887.

" The Committee of Council have the honor to report for the information of your Honor, that by the ' Queen Victoria, Niagara Falls Park Act, 1887, it was provided that the Lieutenant-Governor in Council may vest in the Commissioners, to be held for the purposes of the park, any part or portions of the Crown Lands, the property of Ontario, lying along the bank of the Niagara River, and not included in the original survey of lands laid out in the townships of Stamford and Niagara, and that the Commissioners have applied for a grant to be made to them accordingly of the following Crown Lands, the property of Ontario, viz :

" The land beginning at the north boundary of the Park, opposite the Clifton House, and lying in front of lots numbers 129, 128, 111, 110, and 93, in the Township of Stamford, subject to the Military Reservation of one chain in width on the edge of the cliff.

" Also the land in the said Township lying in front of lots 92, 75, and broken front of 74, and broken front of 59, and the land in the front of numbers 41, 40, 21, 20 and 1, and the land lying between number 1 and the Township of Niagara, known as the Gore or cross concession in Stamford.

" Also the land in front of lots 1, 2 and part of 3, fronting on the Niagara River in the Township of Niagara, as far down as Queenston.

" The Committee recommend that Your Honor do vest the said lands in the said Commissioners, as prayed to be held for the purposes of the said Park, and subject to the condition that compensation shall be made to any persons legally or equitably entitled thereto, in respect of any of the lands so vested.

" Certified,

" (Signed) J. LONSDALE CAPREOL,

" Assist. Clerk Executive Council."

B.

" Copy of Grant under the Great Seal of the Province of Ontario, dated 26th day of April, 1888.

" A. CAMPBELL, Province of Ontario."

" Victoria by the Grace of God of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, etc., etc., etc.

To all to whom these presents shall come :

" GREETING : Know ye that we, of our special grace, certain knowledge and mere motion have given and granted, and by these presents do give and grant unto the Commissioners for the Queen Victoria Niagara Falls Park, in fee simple,

all those parcels or tracts of land situate in the Township of Stamford in the County of Welland, and in the Township of Niagara in the County of Lincoln, in our said Province, being composed of all these pieces or strips of land which lie along the bank of the Niagara River, in the Township of Stamford and County of Welland between the lots hereinafter mentioned and the river. Beginning at the north boundary of the Park opposite the Clifton House, and lying in front of lots number 129 and broken front of 129, and numbers 128, 111, 110, 93, 92, 75, broken front of 74, broken front of 59, number 58, broken front of 58, broken front in front of number 41, numbers 40, 21, 20 and 1 of the said Township of Stamford, and the cross concession or Gore in Stamford, and those pieces or strips of land which lie along the bank of the River Niagara, in the Township of Niagara in the County of Lincoln, in front of surveyed lands in front of lots numbers 1, 2, and 3 of the said Township as far as the Town of Queenston.

“Given under the Great Seal of our Province of Ontario.

“Witness the Honorable Sir Alexander Campbell, Knight Commander of our Most Distinguished Order of St. Michael and St. George, a Member of our Privy Council of Canada, Lieutenant-Governor of our said Province of Ontario.

“At Toronto, this twenty-sixth day of April, in the year of our Lord one thousand eight hundred and eighty-eight, and in the fifty-first year of our reign.

“By command of our Lieutenant-Governor in Council.

“(Signed) ARTHUR S. HARDY,	(Signed) AUBREY WHITE,
“Secretary.	Assist. Com. Crown Lands.”

C.

“Copy of a grant under the Great Seal of Ontario, dated the 26th day of October, 1891.

“A. CAMPBELL, Province of Ontario.”

“Victoria, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, etc., etc., etc.

To all to whom these presents shall come :

“GREETING: Known ye that we of our special grace, certain knowledge and mere motion have given and granted and by these presents do give and grant unto the Commissioners of the Queen Victoria Niagara Falls Park, all those parcels of land in the Townships of Bertie and Willoughby in the County of Welland, and in the Township of Niagara in the County of Lincoln.

“First, Being composed of all those pieces or strips of land which lie along the bank of the Niagara River, situate in the Townships of Bertie and Willoughby and County of Welland in the Province of Ontario, being composed of those portions of land fronting on the Niagara River, and extending from the Garrison

Road in the Village of Fort Erie to and including lot number 22 in the second concession of the Township of Willoughby, lying between those portions of lots heretofore granted by Letters Patent from the Crown and the water's edge of the River Niagara.

"Second, All those pieces or strips of land which lie along the bank of the Niagara River and County of Lincoln in said Province of Ontario, being composed of those portions of land fronting on the River Niagara, commencing at the intersection of the northerly angle of the Military Reservation at Queenston on lot number 5, broken front concession in the Township of Niagara with a point within one chain of the waters of the Niagara River, as referred to in the Letters Patent to Elijah Phelps, bearing date the 1st day of July in the year of our Lord one thousand seven hundred and ninety-nine, to and including a certain tract above Navy Hall, patented to Wm. McClellan on the 10th day of June, in the year of our Lord one thousand eight hundred and one, lying between those portions of the lots heretofore granted by Letters Patent from the Crown and the water's edge of the Niagara River.

"Given under the Great Seal of our Province of Ontario.

"Witness the Honorable Sir Alexander Campbell, Knight Commander of our Most Distinguished Order of St. Michael and St. George, a Member of our Privy Council of Canada, Lieutenant-Governor of our said Province of Ontario.

"At Toronto this 26th day of October, in the year of our Lord one thousand eight hundred and ninety-one, and in the fifty-fifth year of our reign.

"By command of the Lieutenant-Governor in Council.

"(Signed) J. M. GIBSON,

"Secretary.

(Signed) ARTHUR S. HARDY,

Commissioner of Crown Lands."

"The Chain Reserve referred to in these several documents consists of a strip of land one chain in width, which was, with some exceptions, reserved in all the patents issued by the Crown for lands fronting on the Niagara River, and was doubtless intended originally for a convenient roadway or portage to the broken water travel from Lake Ontario to Lake Erie, and also to form a suitable and direct means of communication between the various Military Reserves along the river, including Fort Erie, Chippawa, Queenston and Niagara. In fact, such a roadway exists along the water's edge in front of Bertie and Willoughby Townships, or from Fort Erie down to Chippawa.

"In Stamford Township the reserve was made along the edge of the river down to the brink of the Falls, and below the Falls is described as extending from the edge of the cliff or upper bank of the river, leaving a talus or slope of considerable width between the chain reserved in the patents and the edge of the water.

“Along the Chain Reserve proper a road way has been constructed for a considerable distance, chiefly in front of the Town of Niagara Falls; but with the exception of this reach, and of some short pieces within the limits of the Queen Victoria Niagara Falls Park grounds, there is now no roadway in existence. Early in the century a roadway was made upon the river bank from the old Chippawa Military Reserve northwards for some distance, but it was abandoned many years ago, and the fee simple of the Chain Reserve over this portion disposed of to private parties.

“In Niagara Township and in the Gore of Stamford the reserve is described in the original patents as ‘A chain in width from the water’s edge’ or ‘from the river.’ Owing to the height and sloping character of the river bank, this reach is practically useless for the purposes of a road way.

“In the accompanying maps I have indicated by green coloring all the property which has been vested in the Park Commissioners; and by a reference thereto and also to the enlarged plans of those portions to which I desire to make more particular reference, a good general conception may be had of the character and extent of the territory in question.

“Beginning at the southerly limit of township lot 2 in the front concession of Bertie, the patents reserve an unbroken strip one chain wide throughout the whole of the township, upon which, as before stated, there is a travelled roadway.

“In front of the Village of Fort Erie there has been an accretion to the Chain Reserve of considerable extent, doubtless owing, in a measure, to the railway companies filling in the fore shore for depot purposes. This accretion has evidently caused a good deal of confusion, as both the Dominion and Provincial authorities have exercised jurisdiction and granted titles to portions thereof since the Confederation of the Provinces in 1867.

“On reference to plan ‘A’ it will be seen that a large part of this made ground has been disposed of by the Dominion Government to various parties, *vide* reference numbers 3, 4, 5 and 9, and a lease made the 29th May, 1885, for twenty-one years for parcel numbered 6 to the village of Fort Erie, while the Crown has, at various times, disposed of parcels 1, 2, 7, 8 and 10. It will be observed that parcel 8, patented by the Crown in 1865, was included in a sale by the Dominion Government as Ordnance property in 1888. The Erie and Niagara Railway Company, patentees under the Dominion Government, afterwards (23rd May, 1888) secured title to parcel 8 from the patentees under the Crown.

“The right of the Dominion Government to deal with this property may well be questioned, especially since the decision of Chancellor Boyd in the case of the Park Commissioners *vs.* Howard.

"It is greatly to be regretted that in granting titles to these properties the Dominion Government did not reserve therefrom the extensions of the village streets, so as to afford to the public free and untrammelled access to the water-way at these points. Should it be deemed necessary to grant new titles under proper authority, instead of the existing ones, I would respectfully suggest that such reservation be made therein

"A short distance down stream from the village of Fort Erie, where the International Bridge crosses the river, there are three properties which have been disposed of by the Crown Lands Department. These are shown on plan 'B,' and do not call for extended comment. The west abutment of the International Bridge was built upon the original Chain Reserve, and some filling in done on the river side to pass around it. When the patent for water lot was afterwards issued, it does not appear that the railway company was required to fully compensate for the encroachment by grading out a chain in width in front of the abutments.

"A water frontage was disposed of in 1861 in front of parts of township lots 8 and 9 of Bertie, comprising 1 9-10 acres, which is not shown on the plan. An old wharf exists at the spot, which is memorable as being the principal landing place of the Fenian invasion of 1866.

"There are two natural-gas pipe lines which have been granted a license of occupation upon the Chain Reserve—one being the Provincial Natural Gas and Fuel Company, dated August 31st, 1891, and the other on the same date to William E. Carroll and Samuel Carroll. These licenses are during the pleasure of the Crown, and each one authorizes the laying of gas pipes in a strip of land five feet in width upon or over the Chain Reserve in front of lots 5, 6, 7, 8, 9 in first concession of the township of Bertie.

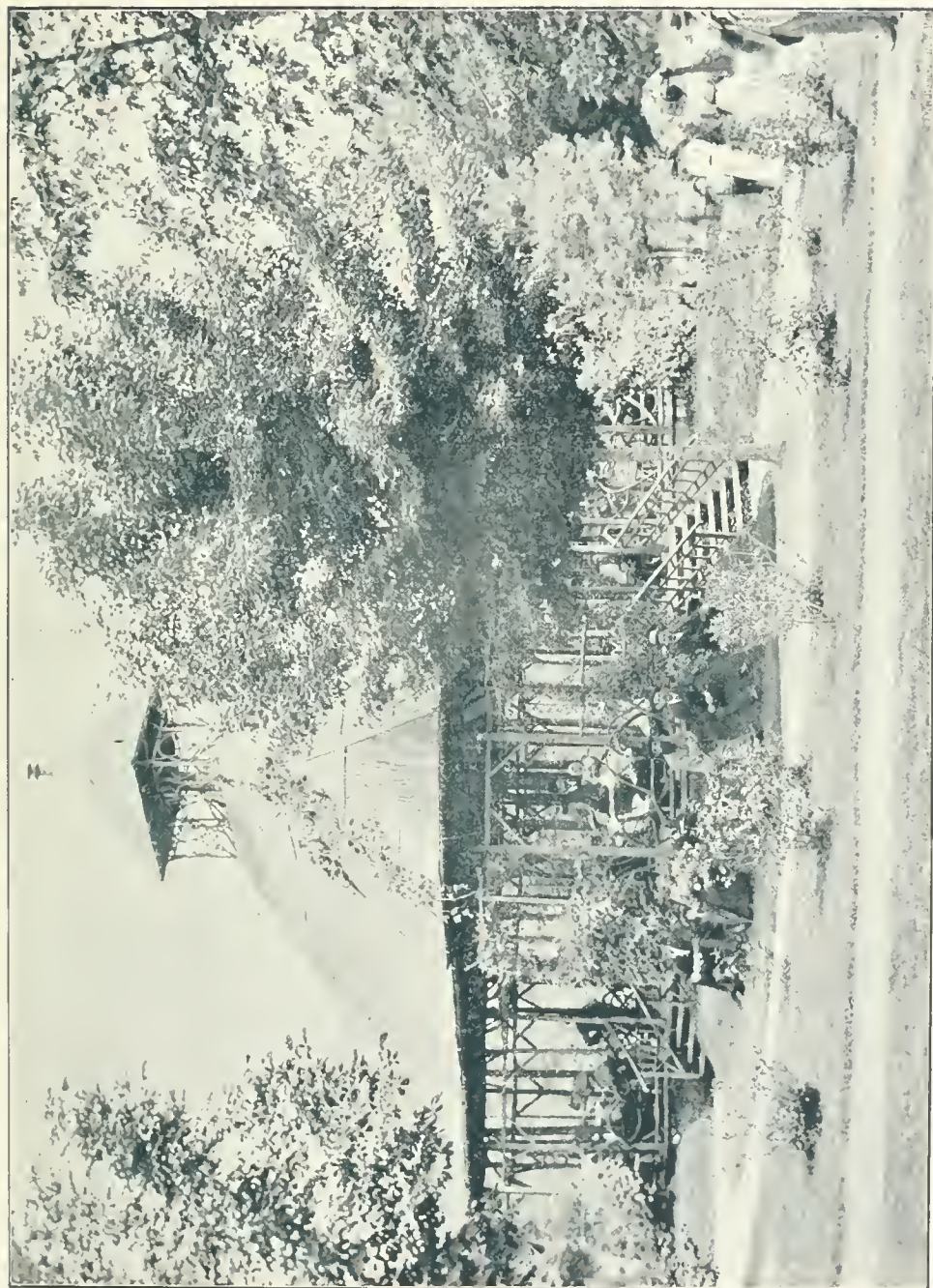
"The above described properties apparently embrace all of the Chain Reserve or of the water frontage thereof within the township of Bertie that has been dealt with or disposed of by the Crown or by the Dominion Government.

"About a mile and a half up stream from the southerly extremity of the lands now appertaining to the Commissioners and within the corporate limits of the village of Fort Erie, stands the ruins of the old fort, which played such an important part in the war of 1812.

"About twelve years previous to the American revolution, or over 130 years ago. General Bradstreet built a substantial block house and barracks on the lake shore, near to the site of the present ruins, for the protection of the traffic of the upper lakes, as it was the place where the King's and merchant vessels assembled to take in and discharge their lading. These buildings appear to have remained intact until the spring of 1779, when a severe storm on the lake undermined the foundations to such an extent as to imperil their safety. After many attempts at repair and successive damage by storms, these works were aban-



PICNIC GROUNDS, WITH STATUE OF SIR CASSIMER GZOWSKI, QUEEN VICTORIA PARK.



PICNIC GROUNDS PAVILION, QUEEN VICTORIA PARK.

doned. The Imperial authorities in 1804 gave instructions for the commencement of masonry works in a more secure situation, and these were completed and occupied before the breaking out of hostilities in 1812.

" On 27th May, 1813, the fort was dismantled and abandoned by the British forces and taken possession of by a detachment of United States troops under Colonel Preston and held until the 9th of June of the same year. On 3rd July, 1814, it was again surrendered to the American forces, who held it until November 5th, when it was finally blown up and evacuated.

" Since that time the works have been given over to spoliation. Large quantities of stone have been taken away by all and sundry, and many of the foundation walls of buildings in the vicinity are built of these stones. Year by year the ruins are being searched for relics of the battles fought for its possession, and excavations have been made in many places for a treasure traditionally supposed to be buried at some point within the enclosure.

" Some years ago the village authorities secured a lease of the grounds from the Militia Department, but nothing whatever has been done to enclose them or to put a stop to the operations of the despoiler.

" Originally the reserve contained about 1,000 acres, but all of this has been disposed of with the exception of seventeen and a half acres contained in a sector-shaped parcel about the site of the fort.

" It is not right that one of the defences of our country in time of danger should be so utterly neglected when a comparatively small outlay from year to year would effect its preservation, and I take the liberty of suggesting that application be made to the Dominion Government for the vesting of this interesting piece of property in the Commissioners.

" In the township of Willoughby, adjoining Bertie on the north, the Chain Reserve does not extend all the way, but is broken at several places, as shown by uncolored spaces on the plan. At these breaks there is no Chain Reserve, patents from the Crown conveying in some cases the land down to the edge of the water.

" There is a roadway in existence along the water's edge, even where the land is so deeded, but it cannot be considered as part of the lands vested in the Commissioners. There does not appear to be any transactions on record alienating or otherwise affecting any portions of the lands which were originally reserved in the township of Willoughby.

" Throughout almost the whole course of the river in Bertie and Willoughby townships there has been a serious erosion of the shore, chiefly caused by high water during storms scouring away the clay banks of the river. This erosion has been going on from year to year, and at the present time the fences on the westerly side of the roadway are within a few feet of the water's edge—in fact, so close in many places that two vehicles can barely pass each other, and for

long reaches the fences have been moved back from time to time on to the lands of the adjoining proprietor, so as to have a margin of ground along the shore that travel might be carried on.

"Many of the farmers complain that they have been obliged to move their fences back frequently, in order to leave a roadway at all, and an examination of the ground clearly shows this to be the case, evidences of the fence lines at successive periods being quite visible at certain points which are now encroached on by the roadway. Some of these land owners claim that the recession of the river has been fully four rods, or one chain, during their occupation of their farm, and they feel sorely on the subject. Attempts have been made to stay the erosive action by building low retaining walls of stone along the water's edge. Planting trees has also been tried, and in each case with a certain amount of success; but it is claimed that it is the duty of the Government to afford relief, as it is the Government property which is principally concerned. Some proprietors state that they will not continue the moving-back process, but call upon the owners of the roadway to protect themselves.

"Certainly something should be done, and that on a comprehensive scale, to confine the river to its present limits. A large sum would not be required in order to test the expediency of any measure of protection proposed. In one or two instances the proprietors have tried to obtain compensation for the land lost in front by exacting an equal amount at the rear of their properties; but it is needless to say that such a course did not meet with the approval of their neighbors whose land was thus sought to be appropriated.

"I would respectfully suggest that it may be worthy of consideration whether or not it would be advisable to acquire by purchase or otherwise those portions of the Chain in width along the margin of the river which were not reserved in the original patents from the Crown, and thus secure for all time the ownership of the whole of the frontage on the river between Fort Erie and the mouth of the Chippawa.

"On a reference to the plan accompanying this report, it will be seen that the outline of the river, and consequently the Chain Reserve, appears to cover land not specifically mentioned in the patent to the Commissioners of the Reserve in Willoughby township. The original map of this township does not show correctly the lands near the mouth of the Chippawa Creek or Welland River, and some confusion has resulted in consequence. The discrepancy may be more clearly seen in reference to plan 'C,' where the lot lines as indicated in the original township map are shown in contra-distinction to the existing shore line of the river, which, indeed, appears to be very considerably outside of the limits covered by the original map, and as it is wholly improbable that an accretion to the land has taken place at this point since the original surveys, it would seem to be a clear case of gross inaccuracy in the official map.

“The original patents granted for the lands in question described by metes and bounds the outline of the property as now existing, and they contain a clause reserving one chain along the whole of the river frontage to the mouth of the Chippawa.

“From an inspection of the map accompanying this report it will be observed that there is no reserve shown along the bank of Niagara north of Chippawa Creek (or Welland River) for a considerable distance, in fact until the Queen Victoria Niagara Falls Park is reached. In the original patents there was a chain reserve along this portion, but in 1816 it was granted in fee simple to one Colonel Thomas Clark, and the roadway then upon it was diverted some distance inland, and carried in a straight line from the old Bridgewater Mills to the Village of Chippawa.

“The construction of the line of electric railway between the park and Chippawa necessitated the acquiring of a right of way for the roadbed, and a strip of land twenty-eight feet wide was secured by the railway company for this purpose; and as the railway is located parallel with the shore, and not far from it, an excellent view of the river is afforded to its patrons. As the proprietors of the lands adjoining contemplate the opening of a driveway alongside of the railway, doubtless this may be considered a sufficient approximation to the public ownership of a reserve, and at the same time harmonize with the desire for an open thoroughfare.

“The park proper embraces the shore line for some two and a half miles, and of course covers the Chain Reserve over this distance, although a considerable portion of it has been alienated by the sale to Colonel Clark before alluded to. The whole extent of the park proper, including the chain along the margin of the river and that portion of the talus which lies south of the Clifton House is 154 acres. These lands were vested in the Commissioners as trustees for the Province by Act of the Legislature of Ontario, 50 Victoria, chapter 13.

“Several important franchises have been granted since the establishment of the park by the Commissioners, all of them having to do with the original Chain Reserve, at one point or another within the park limits. It will not be necessary in this report to enlarge upon the rights created under the agreements covering these franchises, as they are all familiar to the Commissioners and are well understood. They may, however, be enumerated, and in order of precedence are as follows, viz.:

“A. The perpetual right granted Sutherland Macklem, under his deed, of pumping water for household and general use at Clark Hill, together with the intakes, flumes, drainage, machinery and lands required and at present used for that purpose. This right is without compensation.

"B. A lease to the Town of Niagara Falls for ten years from 1st September, 1889 (renewable for a second period of ten years under certain conditions), of the right to take water from the river for town purposes, with certain defined stipulations as to buildings, flumes, tunnels, etc. The consideration is a pepper corn rental of five cents a year.

"C. The railway franchise executed on December 4th, 1891, and approved of by Act of the Legislature of Ontario, April 14th, 1892. This franchise covers the right to construct a first-class electric railway with single or double tracks, as may be agreed upon by the Commissioners and the Company, in and through the park proper, from its southern to its northern boundary, and on over the Chain Reserve or other lands of the Commissioners to Queenston, together with the right to all necessary erections, tunnels, etc., etc., for motive power, machinery and appliances.

"The compensation to be paid for the franchise, which covers the extension of the line to Queenston, is ten thousand dollars per annum, and the agreement is for a period of forty years from September 1st, 1892, with certain rights of renewal for a further period of twenty years. Attached to this agreement is a provision for the construction of a line of railway along the water's edge in the gorge below the Falls, from the Park to Queenston, if agreed upon between the Commissioners and the railway company within five years from the date of agreement. The additional rental to be paid for this privilege is seven thousand five hundred dollars per annum, and the period to run concurrently with the high level line.

"A single track railway with crossings has been built through the park and to Chippawa and Queenston, upon the Chain Reserve. This was opened for traffic on the 24th of May, 1893. The Commissioners have not called upon the railway company to construct the low level line under the terms of the agreement.

"D. The franchise granted the Canadian Niagara Power Company under agreement dated 7th April, 1892, and approved by Act of the Legislature, 14th April, 1892.

"This is a license to take water from the Niagara River to supply works for the generating of electricity or pneumatic power on a large scale, and provides for all necessary buildings and appliances for that purpose. The license is for twenty years from 1st May, 1892, renewable for four additional periods of twenty years at the option of the company. The company may also terminate the lease at any time during the first period of twenty years on giving three months' notice.

"The rental payable under the agreement is \$25,000 per annum, for the first ten years, computing from 1st November, 1892, and increasing by an additional sum of \$1,000 per annum for the second period of ten years, and \$35,000 per annum thereafter, work to be commenced on or before the 1st May, 1897. Nothing has been done by the company up to date.

"E. Zyback & Co.'s lease of the elevator and 'Under the Falls' business, together with certain restaurant privileges. This agreement bears date 6th June, 1893, and is for a term of ten years, at a rental of \$8,200 per annum, renewable for another period of ten years at an amount to be agreed upon or fixed by arbitration.

"In addition to these franchises the 'Maid of the Mist' Steamboat Company holds a portion of the shore and talus at the ferry landing, and within the original park limits, under tenure from the Town of Niagara Falls, which in turn holds by virtue of a Dominion License of Occupation, and, it is claimed, under a provincial license as well. This case appears to be a somewhat intricate one, and presents difficulties which I am unable to determine with any degree of assurance. The facts appear to be as follow:

"On the 27th May, 1862, the Commissioner of Crown lands for the Province of Upper Canada issued a license of occupation to the municipal council of the Town of Niagara Falls of the Chain Reserve and the strip of land lying between the reserve and the water's edge of the river in front of the town, reserving therefrom the macadamized road of the toll road company and certain privileges previously granted near the Table Rock. Under this license of occupation the town authorities sub-let on June 14th, 1884, to Messrs. Carter and LeBlond, the owners of the little steamer 'Maid of the Mist,' a strip of land lying between the eastern edge of the macadamized road and the water's edge, and extending southerly along the bank a distance of sixteen hundred feet from the upper Suspension Bridge.

"On March 27th, 1885, the town authorities, evidently concluding that the property held under this license was not the property of the Province but was Ordnance lands, took a lease from the Dominion Government, and on the 27th April, 1887, executed a new sub-lease to Carter and LeBlond, confirming the one of June 24th, 1884, but restricting the land leased to about one acre only, at the ferry landing, as shown on Plan D herewith.

"On the 4th November, 1890, the Dominion surrendered whatever rights it had or claimed to these lands, with others, to the Park Commissioners, and as its lease to the town (27th March, 1885) was during pleasure only, presumably the Commissioners have, under the surrender, full powers to deal with the case. The license of 1862, from the Commissioner of Crown lands, does not appear to have been formally cancelled, but the town by its action practically renounced the authority of the Province in the premises; and therefore it cannot well be revived in their favor. In either case the Park Commissioners would appear to have full powers, and it might be well, in order to remove all misapprehension, to consider the granting of a new lease under such terms as may be deemed just and reasonable in the circumstances.

"North of the park proper the Chain Reserve follows in general the line of the high rocky wall forming the bank of the river. For over two miles the Chain Reserve lies within the limits of the Town of Niagara Falls, and forms the frontage thereof. Between the reserve and river there is a talus sloping down to the water's edge, averaging some two hundred feet in width, forming part of the reserve. North of the Park the line of the electric railway is located upon the Chain Reserve, as near to the edge of the bank or easterly side of the reserve as could be; due regard being had to safety and to the alignment of the railway. Under the agreement with the railway company right of way for a double track is provided, and in order to furnish room for an additional line of rails, and at the same time have abundance of space for vehicular and pedestrian travel over the roadway on the reserve, it becomes necessary to examine carefully into the question of encroachments.

"There has been a general tendency manifested by property owners in the town, whose limits extend to the reserve, to 'crowd' over the fences on the west side, and in the case of the 'Clifton House' the encroachment is very apparent. In fact this is one of the most objectionable of the many cases which come up for consideration, as it is in the line of the greatest travel, viz., between the upper Suspension Bridge and the Park. Not only does the large promenade verandah, which runs along the east side of the hotel, extend out on to the Reserve at the north end, but nearly fourteen feet of the building itself is at one point projected out beyond the correct line. This encroachment seriously narrows in the driveway at this point, and steps should be taken without delay to afford at least some measure of relief to the carriage travel. The shed for omnibuses also encroaches very considerably.

"The case of the Upper Suspension Bridge requires explanation. On the 28th January, 1873, Letters' Patent were issued by the Dominion Government to the Clifton Suspension Bridge Company, for a piece of land two hundred feet in length along the Reserve, and including a portion of the Reserve and the talus down to the river. The lands of the Reserve were required for the straining piers of the bridge, and over thirty-five feet of the sixty-six were patented. The patent describes the lands conveyed by metes and bounds, and these are well defined. The existing bridge structure over-reaches beyond the limits patented, the two corner posts of each of the steel towers and the stone wall enclosing them being about ten feet outside of the proper line. There is therefore very little of the 'Chain' left at this point.

"The sum of forty dollars was paid as purchase money for the lands thus patented.

"Should it be decided that title to this property must issue from the Commissioners, I would respectfully suggest that right of way for the projected Low Level Railway be reserved therein. Compensation in kind for the lands of the

Chain Reserve taken in excess of what is patented might be required from the Bridge Company on the west side of the Reserve. I may say that the holding down guys of this suspension bridge are fastened to the rocks below far outside of the lands patented, and in some instances fully 250 feet therefrom.

"Beyond this suspension bridge there are several property encroachments on the west, and one building, the bazaar of Mr. Edward Davis, is erected partly on the Reserve.

"For a considerable distance below Davis' the property is not improved, and the fences not in place, but much of the frontage is under offer for sale, and doubtless will soon pass into many hands for building purposes. It will therefore be desirable to have the limits of the Reserve properly defined in case of new structures or boundary fences being put up, as the land along the Reserve is becoming valuable, and in all probability the same process of 'crowding' will be attempted by contiguous owners.

"From Simcoe street northwards to Park street there is a continuous encroachment varying from a few feet to over twenty. Throughout the whole of this distance the rights of the property owners, as defined in the original plans of the town, appear to conform generally to the line of the Chain Reserve, as laid down in the map 'E' herewith attached, and presumably their deeds tally with the original and official plans.

"I would suggest therefore that this matter be made the subject of careful investigation, and the precise standing of the Commissioners, as regards the lands thus indicated be ascertained.

"The Cantilever bridge, officially known as the Niagara Peninsula Bridge Company, secured from the Government of Canada a license of occupation for the whole width of the Chain Reserve at the site of their bridge and down to the water's edge. The license of occupation bears date the 13th April, 1883, and requires the payment of fifty dollars a year. The description given of the lands so leased is very faulty. The quantity of land is described as three hundred and seventy-five thousand two hundred and seventy-two square feet, or equivalent to 8 60-100 acres; while the metes and bounds enclose only some 87-100 of an acre and the land as described in the patent does not embrace all the ground on which one of the main piers of the bridge is constructed. I have shown on the plan herewith the land doubtless intended to be conveyed under the agreement, and as shown on a map purporting to cover these lands, made by D. W. Gossage, D. L. S., in 1889. The area of the lands shown would be about $1\frac{1}{8}$ acres. I understand that application has been made to the Commissioners for a confirmatory title to these lands, by this Bridge Company, and I would therefore draw attention to the desirability of reserving therein the right of way needed for the Low Level Railway.

"There does not appear to be any title on file covering the occupancy of the Railway Suspension Bridge, whose towers and offices occupy nearly the whole width of the Chain Reserve at the site of their bridge; and the only reference bearing on the question of title which appears to have been discovered thus far is an entry in a book dated November, 1856, purporting to give a list of Ordnance reserves transferred to Old Canada, and which is in custody of the Crown Lands Department at Toronto. It reads:—

‘Suspension Bridge Company.’

"No lease executed, 3 ac. 8 per. were authorized B.O. 28, August, 1850, to be leased to the company at £1 currency per annum. Plan and description for the lease were forwarded to the President of Company 24th July, 1851, but never returned.

The quantity of land referred to above, viz., 3 ac. 8 per would comprise a long reach of both the Chain Reserve and the talus between the Reserve and the water's edge, not less than 500 feet, and although the holding down guys securing the structure against undue vibration reach out to and beyond this distance, yet it would certainly be inadvisable to embrace such a large territory in any documentary title which the Commissioners may consider it advisable to grant.

"The £1 per year rental alluded to has not been paid.

"This bridge was first opened for ordinary traffic in August, 1848, and was replaced by the permanent structure and opened for railway and general traffic on March 25th, 1855, the steel towers and truss being substituted for stone and wood respectively some ten years since.

"A short distance below the Railway Suspension Bridge there is a brick building standing upon the edge of the bank. This was erected about 1880, by G. H. Howard and others for a flouring mill, and in connection therewith a water wheel and appliances for generating power and conducting it to the top of the bank were erected on the lands below the cliff, and at the water's edge.

"The works below were carried away by high water shortly after they were put in, but the building on the top remains, although it has not been used for many years. It is now occupied temporarily by the Electric Railway Company as a store house for materials. No title was ever had for the lands thus occupied, and the building should be removed.

"Immediately below this brick building the Grand Trunk Railway Company have had for some years a steam pumping station, the machinery of which is contained in a wood building situate at the water's edge, a rough coal box shute leading thereto from the top of the cliff above. The Grand Trunk Railway has no title to the land thus occupied. This pumping station is at present unused, as the railway receives its water supply through the town mains, and the Commissioners might consider the advisability of ordering its speedy removal.



THE LOVERS' WALK, DUFFERIN ISLANDS, QUEEN VICTORIA PARK.



THE LOVERS' WALK, DUFFERIN ISLANDS, QUEEN VICTORIA PARK.

" A short distance below this the Whirlpool Rapids' incline is situated, with buildings for offices and a fancy goods store, and a drive shed on top. There is also a long promenade platform skirting the edge of the mighty rapids below, with frame buildings at either end. This property, with its appurtenances, is covered by the Electric Railway Company's agreement, and is now under their possession and management.

" The distance from the park proper at the Clifton House to the northerly limits of the town of Niagara Falls is some two and one-fifth miles. Over the whole of this distance there is a roadway built upon the Chain Reserve, much used for driving purposes by tourists and others; and as it is an important avenue leading to the Park and at the same time the principal thoroughfare for pleasure travel in the town, this roadway should be maintained in first-class condition and made an attractive feature of the locality, as it commands a magnificent view of the river gorge and of the Falls. It is now in wretched order and quite unfit for driving purposes.

" To put this road in proper condition will entail a considerable outlay, as it requires to be macadamized the entire distance. Its subsequent maintenance, after being once properly repaired, will then be a comparatively inexpensive matter, as the travel is chiefly of a light character.

" For many years a portion of this roadway was in the hands of a toll road company, and tolls were exacted from all vehicles passing over it. In the year 1888 the rights of the proprietors in this toll road were purchased by the Commissioners; and the tolls charged for use of the road, upon a petition of the residents of the town made to the Commissioners, were by them abolished and the road made free to all. As the residents of the town were chiefly benefited by the removal of the tolls, it would appear to be but right that the town should bear some portion of the costs of repair and maintenance of the road, more especially as it is the only direct means of access from the business portion of the town to the Park.

" Until the revenues at the command of the Commissioners are sufficiently large to provide for the requirements of the Park proper and have something over for extensions of the work, it might be well to secure the co-operation of the town in caring for this roadway.

" At various points along the Reserve in front of the town the owners of land on the west side have put drains across the roadway in order to provide sewerage for their properties; and at several places where there are streets abutting on the Reserve the town has put in large tile pipe sewers to the edge of the cliff, where they empty their contents over the bank, the liquid matter to seek the river by running down the steep talus, and the solid to lodge on stones and trees and create offensive odors, which are wafted up to the roadway above by every east wind that blows.

" Muddy Run Creek, which acts as an open sewer for part of the town, spills over the brink at the Whirlpool Rapids, and is very offensive at all times, but particularly in hot weather, to the many thousands who go down to the water's edge to view the Rapids.

" If the town authorities are to be allowed to drain into the river the outlets should be confined to two, or perhaps three, main sewers, and these should be led unbroken down to the waters of the river below.

" Beyond the limits of the town the reserved land follows the edge of the rocky precipice on broken front lot number 74 to Colt's Point, which is at the beginning of the Whirlpool. Around the southerly side of the Whirlpool the Chain Reserve takes the high ground as far as the concession line, where it comes to an abrupt termination, the patents to the lands in the second concession not reserving any ground along the bank of the great Whirlpool ravine.

" The Dominion Government, through its agent, Dr. Douglas of Fort Erie, made a sale of the talus in front of the Chain Reserve over this (B.F.) lot 74, to one Samuel Colt, in December, 1868, receiving therefor the sum of two hundred and fifty dollars. Colt improved the premises and collected tolls from persons using his improvements and going upon the premises to see the Whirlpool. In August, 1887, Colt was served with a notice to surrender possession of the Chain Reserve which he occupied, and of the talus where his improvements chiefly lay, by the Park Commissioners, who disputed the title under which Colt claimed. A long litigation followed, and the judgment rendered by the Hon. Justice Rose was entirely in favor of the Commissioners' claims to the property, a reference being required to determine the value of the improvements made by Colt. The railway company having in the meantime, under their agreement, secured the right to acquire and operate the works referred to, have now pending the question of payment for improvements made, and the extinguishing of all Colt's interest in the premises.

" To provide lands for a favorable location of the electric railway, the Commissioners purchased a strip along the high ground on both sides of the Whirlpool ravine and across the same in the second concession of Stamford. The lands thus secured form a connecting link between the lands of the Chain Reserve south and north of the Whirlpool. The broken lands between lots 58 and 74, in first concession, were never alienated from the Crown until they were vested in the Commissioners.

" The lands under the high bank and between the Chain Reserve proper and the river, in front of lots 58 and 41, were sold by the agent of the Dominion Government in December, 1868, to one John Thompson, the owner of the lots above mentioned. Before title was passed, however, it was ascertained that the fee to these lands did not lie in the Dominion Government, and that therefore the sale was irregular. Mr. Thompson, on learning that title could not

be had from the Dominion Government, applied to the Provincial Government for a patent, but without success. The heirs have registered the receipts given for the money paid, some \$250, and claim that the purchase money agreed upon was paid over by the Dominion to the Provincial authorities, and they are therefore entitled to the lands in question.

"The case is in some respects similar to that of Colt, before mentioned which was decided by Hon. Justice Rose in favor of the Commissioners, and presumably the Commissioners have title in and to these lands, which embrace a part of Foster's Flats.

"The lands below the bank in front of lots 40 and 21 were sold before Confederation to one John Lawrence, and have passed to Charles Murray. There is said to be about fifty-three acres in this piece, and as it is the only break in the ownership of the talus from the Suspension Bridge to Queenston Heights, with the exception of a small piece in front of Sir David Macpherson's land, it should be acquired; and I understand measures are being taken to bring it under the control of the Commissioners. An extra piece of land has been secured at 'Wintergreen Flats,' immediately opposite 'Foster's Flats,' but on the top of the bank. This land was considered a desirable purchase, as from it magnificent views of the river and rapids are obtained, and it was considered inadvisable to allow it to fall into an ownership which might be inimical to the plans of the Commissioners.

"The Chain Reserve on the top of the bank ended at lot 1, Stamford, but was continued along the water's edge in front of the gore and throughout the township of Niagara. This left a large part of the talus and all the lands above the bank in private ownership; and it became necessary, in order to provide right of way for the electric railway, to secure land on the top of the bank. The whole of the slope, therefore, and a strip along the top of the bank was acquired, extending down to the Military Reserve at Queenston Heights, excepting only the small part of the slope above referred to and fronting on Sir D. Macpherson's lands. This property is shown on plan 'G,' attached hereto. Right-of-way for the railway across the Macpherson land was secured some distance back from the edge of the bank so as to admit of a practicable grade leading down to the Heights.

"The Military Reserve at Queenston formerly extended along the water front a distance of 3,000 feet, and included all the lands about the escarpment and down to the old military landing place, near which there was a considerable space of nearly level ground. For some reason part of the lands on the level near the river, and even embracing some of the water frontage, was disposed of by the Government of Canada some years ago; all the remainder, including the heights, sloping ground and roadways, etc., is still the property of Canada."

"On the summit of Queenston Heights stands the magnificent monument erected in memory of General Brock. The monument and the grounds surrounding it are cared for by the Government of Ontario, and any expenditure for repairs, etc., are provided for by the Legislature. There does not appear to be any valid reason why the whole of the Military Reserve lands at this point, including the monument and grounds, should not be put in charge of the Park Commissioners. Queenston Heights forms one end of the long panorama of natural wonders of which the park is the other, and the Commissioners control the whole of the intervening ground along the river bank. Then why not make their task complete by having control given them of the northern end? The grounds around the monument are in need of better attention than they now receive; and the balance of the Reserve is but wild lands, receiving no attention whatever."

"There is at present a charge of twenty-five cents made for ascending the monument. This charge must yield a considerable revenue, which would doubtless go a long way towards keeping up the premises; but even though a certain small sum was annually needed to carry out improvements, doubtless the Government would be willing to assist in order to have this historic ground, so near to the hearts of all true Canadians, maintained in a creditable manner."

"Immediately below or north of the boundary of the Military Reserve, a water lot has been patented by the Dominion Government to the Niagara Navigation Company (Limited). It extends 846 feet along the river adjoining the Chain Reserve, and extends 100 feet out into the water. The document bears date 17th July, 1882, the consideration being \$200."

"There are some fishing privileges leased at and below Queenston, which I presume is not a matter of interest to the Commissioners. The leases are from year to year, and are issued by Mr. Kerr, Dominion Inspector, of Hamilton, Ontario, and the total revenue for this year was some \$50."

"Above and below the Military Reserve and throughout the Township of Niagara, the chain reserved in the patents from the Crown is along the shore line of the river, and not upon the top of the high bank. As the general level of the lands from Queenston to Niagara is from forty to eighty feet above the water surface, and the slopes are more or less steep, it follows that the reserved lands are not at all suited for a roadway, nor are they ever likely to be used for railway purposes, as level lands above can be obtained and a line of railway constructed at small cost."

"There is not much to note respecting the Reserve below Queenston. A license of occupation during the pleasure of the Crown was issued in February, 1867, by Andrew Russell, Assistant Commissioner of Crown Lands, to George Durand, covering the right to occupy one and three-fourth acres of the Chain Reservation in front of part of lot fifteen of Niagara. The Crown Lands

Department also issued a license in March, 1864, for twenty-one years, at \$9 per year, of a small water lot in front of part of lot fourteen, Niagara, for the purpose of a wharf. There is no wharf in existence, and the license does not appear to have been extended. Other than this I can find nothing of note, excepting a rather curious and interesting license issued in March, 1866, by the Commissioner of Crown Lands, to the Erie and Niagara Mining Company. The lease was for twenty-five years, and gave the right to explore the bed of the river from Queenston to Niagara, and out to the boundary line of the Province, for ores, metals, minerals or mineral substances, reserving a royalty of two and one-half per cent. upon the value of all such products. The document also stipulated that if the company found it necessary to use any part of the Chain Reserve between Queenston and Niagara for their operations, the Commissioner of Crown Lands would give a license of occupation to the company for such portion thereof as might be in his opinion necessary, and upon such terms as might be agreed upon. The document is signed by William A. Thompson, the President of the Company."

The extent of the territory which has been placed under the jurisdiction of the Commissioners is shown by the following tables, viz :

Frontage on the Niagara River of the several properties :

Locality.	Total frontage.	Frontage vested in the Commissioners.
Township of Bertie.....	5.75 miles	5.75 miles
Township of Willoughby	10.10 "	7.50 "
Township of Stamford	9.10 "	7.40 "
Township of Niagara.....	8.00 "	6.25 "
Totals	32.95 miles	26.90 miles

Approximate quantity of land vested in the Commissioners :

	ACRES.	ACRES.
Chain Reserve in front of—		
Township of Bertie.....	46	..
Township of Willoughby	60	..
Township of Stamford and north of Queen		
Victoria Niagara Falls Park.....	44	..
Township of Niagara	50	..
	—	200
The Queen Victoria Niagara Falls Park ..		154

Lands below the high bank, or talus :	ACRES.	ACRES.
In Stamford and Niagara Townships	220	..
Less Murray's rights on Foster's Flats not yet re-conveyed	53	..
	—	167
Additional lands secured for Electric Railway and other purposes		56
		—
Total now vested in the Commissioners		577

"The quantity in Willoughby Township which was not reserved in patents is about twenty-five acres."

"Of all this very valuable property only the small portion embraced within the limits of the park proper, or say ten per cent. of the frontage owned is now maintained in good order and condition. A comparatively small additional expenditure would permit of many simple works of reclamation or improvement being done at points along the river which would enhance very materially the enjoyments of the many visitors who now view the property year by year. Especially should the existing foliage along the high bank from the park to Queenston be kept trimmed and neat and suitable planting of trees or shrubs might be done with advantage at points where there is sufficient depth of soil to permit it."

"Without doubt the whole extent of the property will become more and more valuable year by year, especially if a reasonable amount of attention can be given to its protection and developement. I would, therefore, respectfully urge the early consideration of this important question upon the attention of the Commissioners."

"The whole respectfully submitted,

JAMES WILSON,
Superintendent."

Niagara Falls, July 28th, 1893.

Since the date of the foregoing report some further additions have been made to the lands under the jurisdiction of the Commissioners, notably the portion of Foster's Flats acquired under arbitration proceedings from Charles Murray and embracing some fifty-five acres. This purchase completed the title of the Commissioners to the land below the bank along the whole reach of the river between the Falls and the Military Reserve at Queenston, with the exception of the upper portion of a small piece immediately adjoining the Reserve, and another piece at the head of the Whirlpool, west of the concession line.

In the case of the two suspension bridges referred to in the Superintendent's report, agreements have since been made by which additional lands have been secured to widen the highway at these congested points, and arrangements have also been made by which a right of way for the projected Low Level Railway across the lands under these bridges is provided for. The lease of the Cantilever Bridge Company has not yet been dealt with.

Some small pieces of land required to widen the highway at narrow points in front of the town have also been obtained.

Under the conditions of the agreement made with the Electric Railway Company, authorizing the laying of a second line of rails on the Chain Reserve in front of the town, the even grading of the highway throughout was secured, and the surface made to correspond with the level of the tracks. The proper macadamizing of the road was also provided for, and with the exception of a small portion at the north end of the town, to be completed this spring, the whole of the roadway is now in excellent order. Arrangements have also been made for the future maintenance of this roadway at the joint expense of the Commissioners and the Town of Niagara Falls.

Public attention having from time to time been directed to the lands forming the Military Reserve at Queenston Heights, representations were made to the Government suggesting the desirability of having all these lands vested in the Park Commissioners to be maintained as a part of the Park system.

The lands in question comprise a large territory, extending along the face of the mountain westwards for about a mile from where the Niagara River in years past has cut its deep channel through the limestone rocks; the width of this reserve varying from about one hundred yards at its narrowest part to nearly one thousand yards at the water's edge. The area originally embraced 136 acres, but from time to time portions have been disposed of, so that at present there remain only some 100 acres in the Reserve proper, including Portage Road leading from the river to the southern limits of the Reserve.

Upon the summit of the heights, in a most commanding position, stands the noble shaft erected by the Province in 1856 to the memory of Major-General Sir Isaac Brock, and at the base of the escarpment, immediately under this monumental column—but strange to say, on lands which do not seem to be vested in the Crown—is the cenotaph placed by the Prince of Wales in 1860 to mark the spot where Brock fell. For many years the monument and twelve acres of land adjacent have been under the jurisdiction of the Provincial Government, and all repairs to the shaft or its foundation required from time to time have been made at the expense of the Province. The grounds, however, were not maintained in a

manner worthy of the monument, or of the hero whom it commemorates. The remaining lands, which are still in the hands of the Dominion Government, have been entirely neglected, and for a number of years have presented a very discreditable appearance, not at all in harmony with an enlightened spirit of patriotism.

At the request of the Government the Park Superintendent was directed to examine into and report on the desirability of vesting the twelve acres immediately surrounding the monument, heretofore under the jurisdiction of the Government of Ontario, in the Commissioners; and also on the probable cost of improving and maintaining this part of the property. The Superintendent's report, dated the 12th of September, 1894, is as follows:

"J. W. Langmuir, Esq., Chairman Queen Victoria Niagara Falls Park.

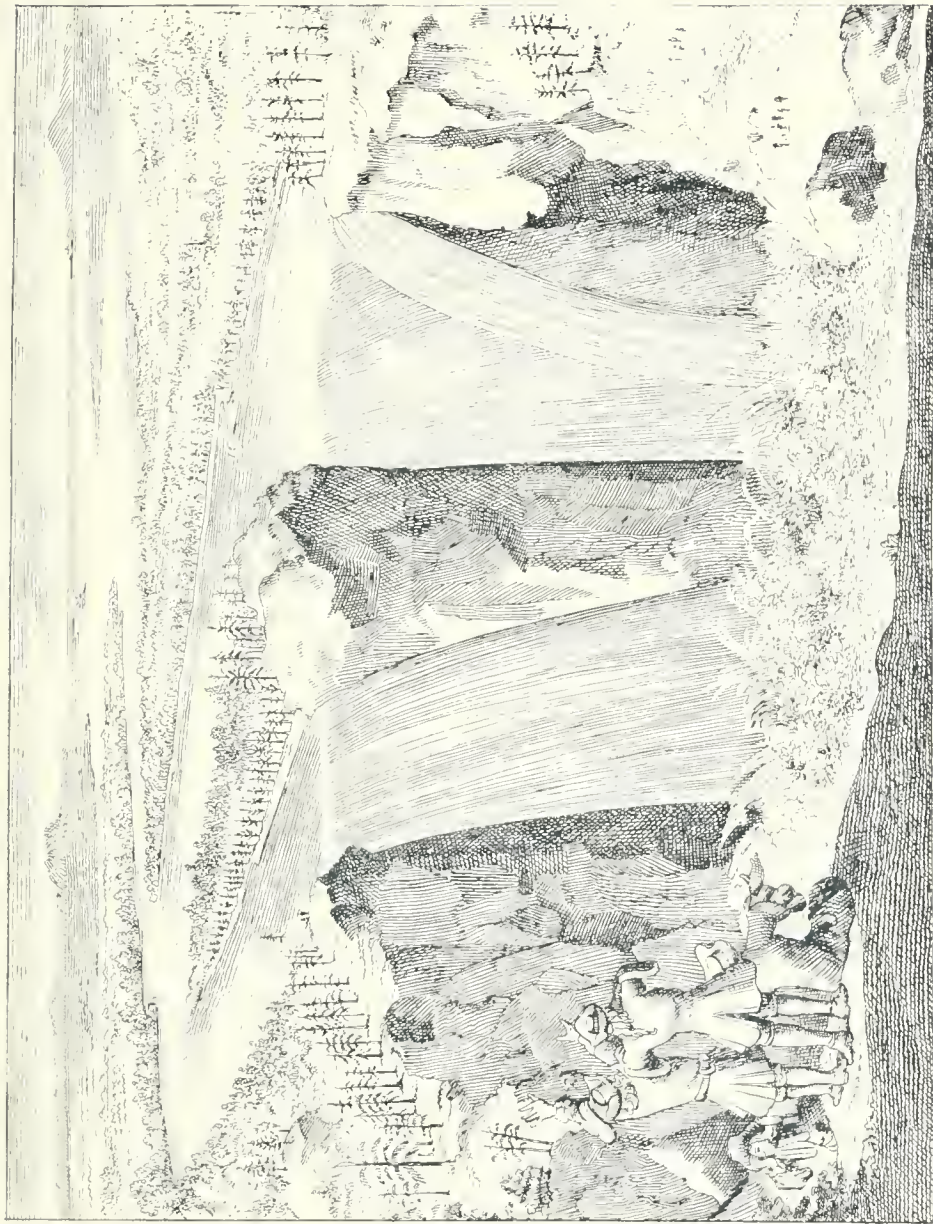
"DEAR SIR,—In accordance with your instructions, I have made an examination of the grounds at Queenston Heights, on which stands the magnificent mausoleum of Major-General Sir Isaac Brock, the hero of the battle of Queenston Heights, and of his aide-de-camp, Lieutenant-Colonel Macdonell, and beg to make the following report thereon.

"The grounds which are under the control of the Province, by virtue of an Order in Council, approved by His Excellency the Governor-General of Canada, on the 20th day of December, 1875, embrace only some twelve acres of the Military Reserve at this point, chiefly lying on the table land immediately adjoining the escarpment of the Heights, and including a portion of the eastern slope, on which the fine entrance gate and lodge are erected.

"From the present entrance to the Monument grounds, which is near the eastern angle of the Heights, and on the highway from Niagara Falls down to the Village of Queenston, a broad avenue winds up to the summit of the mountain, where, upon grounds commanding a magnificent outlook over the highly cultivated fruit lands on both sides of the Niagara River, and of the broad expanse of Lake Ontario, stands the noble monument which marks the last resting place of the illustrious Brock.

"In 1824, twelve years after the famous battle, the Provincial Government erected a column on the Heights at a point some 500 feet to the east of the present structure. This consisted of a Tuscan column resting upon a rustic base, and supporting a pedestal designed to carry, at some future time, a statue of the hero, and measuring in all from the ground to top of pedestal some 130 feet; the remains of Brock and Macdonell were deposited in the vault beneath with most imposing military ceremonies on the 13th of October of that year.

"On Good Friday, 17th April, 1840, a vagabond named Lett secretly introduced a large quantity of gunpowder into the base of the Monument, and the



NIAGARA FALLS IN 1678. FATHER HENNEPIN'S SKETCH.



THE UPPER RAPIDS FROM TEMPEST POINT, QUEEN VICTORIA PARK.

explosion which followed damaged the shaft to such an extent that it could not be repaired. This act of vandalism aroused general indignation throughout the country, and in July of the same year an immense gathering of the leading citizens from all parts of the Province assembled on the Heights to adopt measures for the erection of another monument, and a committee was appointed, of which Sir Allan McNab was chairman, to promote the object.

"Among those present were many who had fought under Brock, and some who had been instrumental in winning the great victory on this spot in 1812, and the enthusiasm was unbounded. The influence of this meeting was felt throughout the country, subscription lists were opened by the militia and Indian warriors, designs were prepared, and the erection of the existing magnificent pile was begun in 1853. The ceremony of laying the foundation stone and of re-interring the remains took place on the 13th of October (the anniversary of the battle) of that year, and the column was completed in 1856.

"The laying out of the grounds around the monument, the massive entrance gates and ornamental lodge, and the completion of the monument enclosure, were provided for by a grant from Parliament. The monument rests upon a substantial foundation of masonry, forty feet square and ten feet below the level of the ground; upon this foundation there is a two-story vaulted basement, measuring thirty-eight feet square at the ground level, and attaining a height of twenty-seven feet. Upon the four corners of the entablature of this basement are the armorial bearings of Brock carved out of stone. The massive basement is surrounded by an enriched pedestal, the die of which is sixteen feet square, and the height, including the cornice and base, thirty-eight feet.

"On the pedestal stands the exquisitely proportioned mammoth column of the Composite order measuring ninety-five feet in total height with a fluted shaft ten feet in diameter, and enriched capital and base. Above the column, and resting on a cippas or statue base, is the colossal statue of General Brock in military costume, and the right arm extended with a baton in the hand, and the left hand resting upon his sword. The total height from ground level to the top of the statue is 190 feet.

"From the ground level a circular stone staircase winds up through the centre of the shaft to the top of the column, where from small openings in the cippas a view may be had of the surrounding landscape at a height of over 500 feet above the level of the river.

"Enclosing the monument is a dwarf wall, measuring seventy-five feet on each of its four sides, and with massive military trophies in stone at the corners; the whole is surrounded by a terraced embankment with a circular driveway, 100 feet in diameter, for the convenience of visitors in carriages.

“On the north side of the pedestal is the following inscription, cut in relief:—

“UPPER CANADA”

Has dedicated this monument to the memory of the late
Major-General Sir Isaac Brock, K.B.,

Provincial Lieutenant-Governor and Commander of the
Forces in this Province, whose remains are deposited in
the vault beneath. Opposing the invading enemy he
fell in action near these heights on the 13th October, 1812,

In the 43rd year of his age,

Revered and lamented by the
people whom he governed, and de-
plored by the Sovereign to whose
service his life had been devoted.

“Entrance is had to the interior of the monument by a door on the east side,
which opens on a gallery extending around the interior of the base, just above
the ground level. On the right hand jamb of the portal is the following inscrip-
tion on a brass plate:—

A MONUMENT

Was originally erected on this spot by a grant from the
Parliament of this Province, and subsequently destroyed in
the year 1840. The present monument was erected chiefly
by the voluntary contributions of the Militia and Indian
warriors of this Province, aided by a grant from the Legisla-
ture; the authority for erecting the same being delegated
to a committee consisting of the following gentlemen:—

Sir Allan Napier McNab, Bart., Chairman.

Sir John Beverley Robinson, Bart.

Sir James Buchannan Macaulay, Knt.

The Honorable Mr. Justice McLean.

The Hon. Walter H. Dixon.

The Honorable William Hamilton Merritt, M.P.P.

Thomas Clark Street, Esq.

Colonel, The Honorable James Kirby.

Lieutenant-Colonel Daniel McDougall.

David Thorburn, Esq.

Lieutenant Garrett, late Forty-ninth Regiment.

Colonel Robert Hamilton.

Capt. H. Monroe, Secretary.

T. G. Ridout, Esq., Treasurer.

William Thomas, Architect.

John Worthington, Builder.

“ On the inner side of the gallery, and on either side of the entrance, are the vaults in which are placed the massive stone sarcophagi, containing the remains of Brock and Macdonell. Brass tablets are let into the wall, the one on the right having the following inscription :—

In a vault underneath are deposited the mortal remains of the lamented Major-General Sir Isaac Brock, K.B., who fell in action near these heights on 13th October, 1812, and was entombed on 16th October at the bastion of Fort George, Niagara; removed from thence and re-interred under a monument to the eastward of this site on the 13th October, 1824, and in consequence of that monument having received irreparable damage by a lawless act on 17th April, 1840, it was found requisite to take down the former structure and erect this monument, the foundation stone being laid, and the remains re-interred with due solemnity on 13th October, 1853.

“ The inscription on the tablet on the left is :—

In a vault beneath are deposited the mortal remains of Lieutenant-Colonel John Macdonell, P.A.D.C., and Aide-de-Camp to the lamented Major-General Sir Isaac Brock, K.B., who fell mortally wounded in the battle of Queenston on the 13th October, 1812, and died the following day. His remains were removed and re-interred with due solemnity on 13th October, 1853.

“ About sixteen feet above the level of the principal gallery there is a second one approached by a narrow passageway from the central stairway. Both of these galleries receive light and ventilation from the exterior by means of small circular openings through the massive masonry of the basement.

“ The circular stairway is ventilated by various slits in the volutes of the shaft. The stairway is of stone, circular in outline, the steps being thirty-five inches wide at the base, and twenty-five at the top. It terminates in the small cippas on top of the column, and immediately under the statue of Brock. The landing is exceedingly confined and the only means of obtaining a view of the surrounding territory is by thrusting the head into one of the small round openings, a feat which can only be performed by those whose stature has attained to at least normal proportions. The whole space is hardly sufficient for three people to stand in; and it is with difficulty that two can pass on the stairway, so that while the outlook from the top, is, perhaps, one of the finest on the continent,

yet the exertion of toiling up the 235 winding steps, and the impossibility of obtaining a view of more than a fraction of the magnificent panorama when there, usually provokes a feeling of sore disappointment on the part of the visitors. A fee of twenty-five cents is charged for the privilege of ascending the shaft.

"The grounds around the monument receive but little care, and for the most part are much in need of a thorough cleaning and overhauling. The dense growth of cedar along the escarpment completely shuts off the view from the Heights, excepting for a short space immediately in front of the monument, and even there the views are much too limited. A great deal of judicious trimming is needed throughout the grounds, and in places the wild growth of scrubby juniper should make way for ornamental and deciduous trees to vary the tone of the landscape and afford better shade for the numerous picnic parties who frequent the grounds in summer.

"The electric railway now carries great numbers of interested visitors to the monument grounds, and it is most desirable that every facility, not inconsistent with the character of the place, may be afforded them. To accomplish these results I have to make the following recommendations:

"1. That a new roadway approach be made from the west for carriages approaching from the direction of the Falls, and a pathway provided for pedestrians from Brock's monument station of the electric railway

"2. That a new fence, of neat and open construction, be placed along the highway instead of the present decayed high paling.

"3. Clean up the grounds, open up vistas of the river and surrounding country and plant out ornamental foliage and flowering trees.

"4. Provide a supply of good drinking water on the grounds and better facilities for picnic parties.

"5. Build an incline on the south side of the monument from the level of the ground to the top of the column, the frame work to be of light steel, electric power to be used for working the car, and a promenade made to rest upon the abacus of the column.

"6. Obtain title to the land on which is erected the stone cenotaph marking the spot where Brock fell, and embellish and maintain the same in good condition.

"7. Obtain title to the lands in rear of the monument ground on which earth works have been thrown up, and preserve them from further deterioration.

"A few remarks may be made upon each of these seven proposals.

"No. 1. With respect to the means of reaching the monument. The location of the entrance gates and lodge was evidently made on the supposition that visitors would always approach the ground from Queenston and the north, as Queenston was then the terminus of the lower lake navigation, and railways had not diverted the stream of travel from the water ways. For many years past, however, the great majority of visitors to the grounds drive down from Niagara

Falls, and in consequence have to descend the hill a considerable distance before reaching the entrance, and then climb up again to the site of the monument. A new road of easy gradient should be opened up from the west, and thus avoid ascending or descending the hill, and at the same time save two crossings of the electric railway. The work involved would not be very extensive, and the convenience would be great. An entrance for pedestrians, with a gravelled path leading up to the summit of the heights from a point opposite to the electric railway platform, should also be made for the convenience of visitors from either direction coming by the electric railway.

"No. 2. The existing fence is old and unsightly and should be replaced. I would suggest an iron pipe railing with turned posts, or neatly turned posts and chain, as much more appropriate to the situation. The entrance gates to the new roadway, if any are deemed necessary, should be made in an inexpensive manner.

"With respect to the roadway leading to and the circle around the monument.

"These are of excellent construction, but are at present overgrown with grass and weeds. I would suggest that a width sufficient for driving purposes be cleaned and nicely gravelled so as to distinguish the road in a proper manner, and the remainder of the macadamized approach be turned into sod.

"No. 3. The grounds are overgrown with a wild tangle of evergreens, chiefly red cedars. Much of this should be cleaned away and a selection of suitable shrubs and ornamental trees set out. This work will require judicious handling, but will vastly improve the appearance of the place. The side slopes should also in some places be covered with sod to prevent scouring, and the turf generally requires care and attention. A reasonably large sum will require to be expended in putting the grounds into good order and condition, and a small annual outlay for maintenance be provided.

"No. 4. There is a beautiful spring of water near the summit of the heights, about 375 yards west of the monument. This should be piped to some convenient place on the escarpment, and near to the centre of the grounds, and from thence forced by the aid of an electric pump to a suitable drinking fountain and trough. By placing a tank in the upper gallery of the monument an abundant supply for all purposes could be had at a very small cost for maintenance.

"No. 5. If a convenient means for reaching the top of the column without fatigue and of freely enjoying the sublimity of the emotions created by the delightful panorama could be provided, there is little question but that the revenue which would be obtained from visitors for the use of such appliances would amply provide for the outlay upon all works required to improve and maintain the property. Of course in a case of this kind it is of the utmost importance that nothing be done to detract from the dignity and strength of the monument itself

or that would offend the sensibilities of those who were instrumental in promoting its erection ; and any proposal suggested must have the qualification necessary to afford a reasonable excuse being given for its adoption.

“ After considering the question in all its bearings, I have concluded to recommend the erection of an electric lift on the south side of the monument, the frame work to be of light steel lattice work, attached to and supported in part by the column, and extending from the ground level to the top of the capital, the car to be capable of carrying up four persons at a time, to run by electric power taken from the electric railway feed wires, and to be provided with all modern safety and controlling devices.

“ On the abacus of the capital there is a space which could be utilized for a promenade, and with a protecting screen that would be practically invisible from below, visitors could obtain in perfect security a continuous view of the magnificent prospect. The framework of the tramway would be of very light construction, and would not be visible at all from the river approach, and scarcely perceptible from the south.

“ It has been suggested that it would be feasible to put a lift in the interior of the column, but this would involve the tearing out of the stone spiral stairway which is firmly built into the masonry, and the consequent weakening of the column. Besides, it would give a very contracted car space, and would also necessitate the cutting of a door through the masonry of the cippas which immediately supports the statue of Brock—altogether a proposal of exceedingly questionable merit.

“ By constructing the incline as proposed, no interference whatever would be made with the existing structure, excepting only the braces necessary to stiffen the lattice work, and the fastenings for the ropes. From the photograph herewith an idea of the nature of the incline may be had.

“ The present charge for climbing the central stairway is twenty-five cents. The charge for the incline could be made twenty-five cents for each person, and the use of the stairway made free ; thus affording a valuable concession to the general public.

“ No. 6. Near the base of the heights, and within the village limits of Queenston, there is a small stone cenotaph erected to mark the spot where Brock fell. It is just north of the line of the electric railway, and was erected in 1860, when the corner-stone was placed by the Prince of Wales. The land on which it is located was apparently never secured by those who were instrumental in having the monument erected, and the present ownership, so far as can be ascertained, is in private hands.

“ It would appear but reasonable that this interesting and sacred spot should be cared for equally with the more imposing property on the heights ; and I would suggest that say fifty or a hundred feet in width on either side of the stone, by

the whole depth of the lot, should be secured and fenced, and the ground suitably planted and cared for. Title to this piece of property can be had from the present owner.

“No. 7. Immediately west of the monument grounds, on lands belonging to Sir Casimir Gzowski, there are two earthworks or redoubts still in a fairly good state of preservation which were constructed during the war of 1812 by the Royal Engineers under Lieutenant Jenoway. These are at least worthy of preservation in connection with the monument grounds, and I take the liberty of suggesting that an effort be made to secure possession of the lands on which they are situated. Doubtless Sir Casimir would be disposed to transfer them, together with a few acres of his land, to the Commissioners on reasonable terms. Very little work is necessary in order to put these redoubts into fair condition for inspection by visitors, and it would cost practically nothing to maintain them.

“The cost of the several works referred to would be approximately as follows:—

	Proposed works.	Original outlay.	Yearly maintenance.
		\$ c.	\$ c.
1	New roadway approach from the west	1,000 00	400 00
2	Fence in front	300 00	
3	Putting grounds in order	500 00	
4	Supply of drinking water	300 00	
5	Incline complete	5,000 00	800 00
6	Cenotaph where Brock fell, including cost of lands, fencing etc.	400 00	50 00
7	Redoubts, land etc	2,500 00	50 00
		\$ 10,000 00	\$ 1,300 00
	Interest on outlay at 4 per cent		400 00
			\$ 1,700 00

“To provide for this expenditure an issue of park bonds to the extent of the outlay required, say \$10,000 at four per cent, would enable the work to be done, and from the revenues from the lift the proper care of the whole of the properties would be secured for all time.

“Photographs of the monument and cenotaph are enclosed herewith together with a plan of the grounds.”

Yours very truly,

JAMES WILSON,

Superintendent.

Queen Victoria Niagara Falls Park,

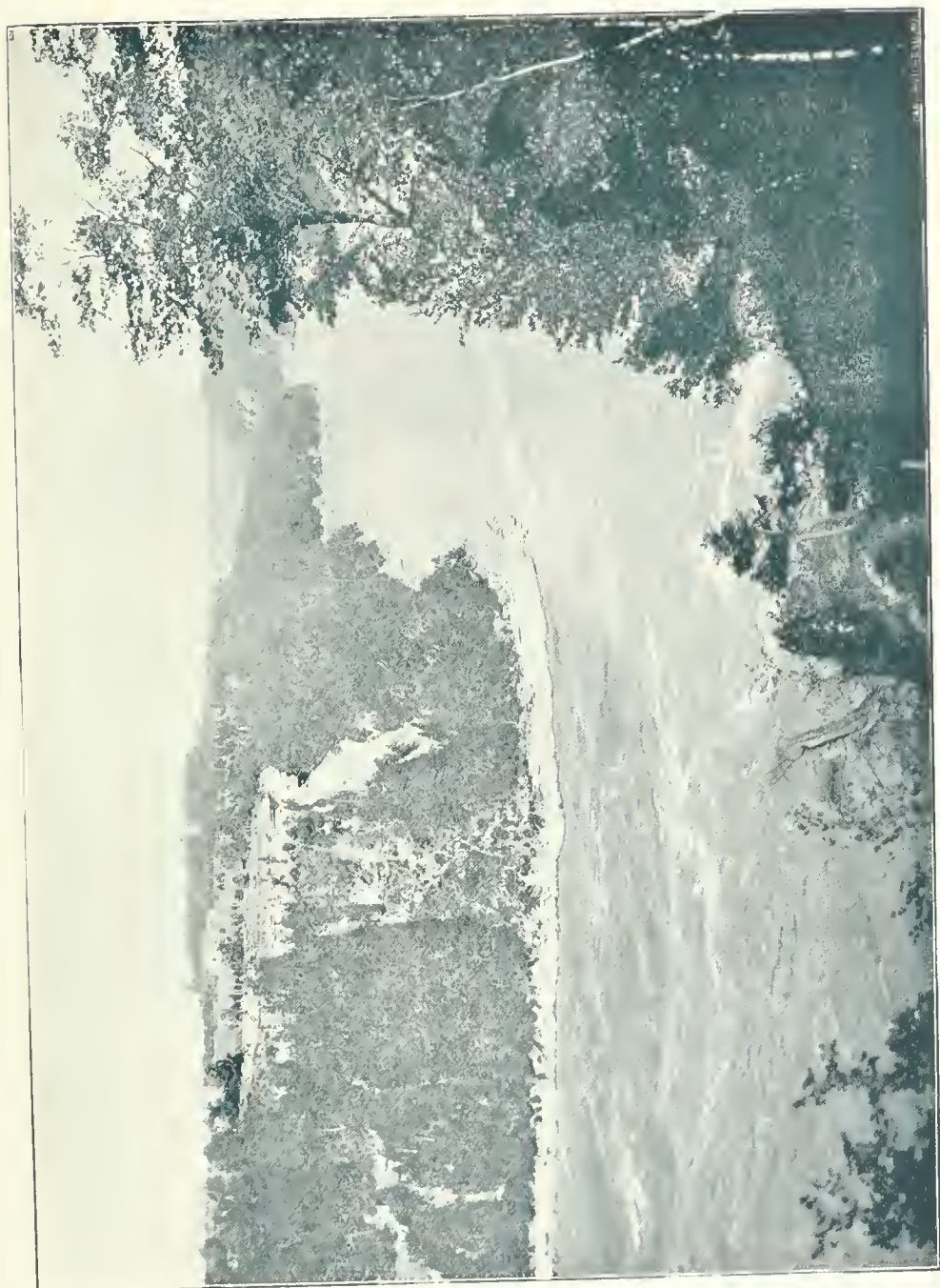
September 12th, 1894.

While the Commissioners did not fully endorse the proposal to provide for the maintenance of the premises by the erection of an electric lift, they concurred in the proposal to assume the care of the property, and an Order-in-Council was passed on the 19th March, 1895, placing the monument and the twelve acres of ground under their supervision.

Under a license of occupation, issued on the 20th June, 1891, a portion of the reserve comprising four and seven-tenths acres of the slope was granted to the Commissioners by the Dominion Government as a right of way for electric railway purposes; and on December 18th, 1895, two other parcels of land aggregating five and three-fourth acres were also vested in them by a lease under the great seal of the Dominion. It is confidently expected that before long the balance of this historic property, with which so many glorious associations are connected, will be placed under the permanent jurisdiction and control of the Commissioners, with a view to its proper preservation as part of the general park system.

Upon assuming control of the monument and its adjacent grounds, works of reclamation were immediately begun; the dense growth of juniper which marred the views in every direction was trimmed or removed; new vistas were opened up, conveniences for picnic parties, including a supply of spring water, were provided, and the old wooden picket fence on the side of the highway was removed and replaced by a neat chain railing supported on turned wooden posts of appropriate design. A new and convenient pathway was also opened for pedestrians from the electric railway platform to the main roadway leading up to the monument.

The Commissioners have kept constantly in view from the first the necessity for promptly undertaking the improvement of the various properties placed from time to time under their jurisdiction, and of bringing them as far as possible in harmony with the natural surroundings, while at the same time making every available provision for the comfort and enjoyment of the many thousand visitors who gather here from all parts of the globe. Unfortunately, however, the very limited revenue derived from the property, and the large amount required every six months to meet the debenture interest, necessitated the exercise of the most rigid economy in expenditures for new works, and the most careful husbanding of their resources; consequently after the removal of objectionable structures, and providing for the initial works of construction needed for the opening of the property was accomplished, and for which provision had been made when the first bonds were issued, the most that could be done for several successive years was to keep the grounds in fair order and condition, and to postpone to some more convenient season every undertaking that involved the expenditure of any considerable sum of money. This somewhat parsimonious treatment of the property was greatly to be regretted; but under the circumstances no other course was open to the Commissioners.



THOMPSON'S POINT AND WHIRLPOOL, QUEEN VICTORIA PARK.



NORTH TERMINUS OF NIAGARA CANON, QUEEN VICTORIA PARK.

Within the last two years some efforts have been made to take up the work in a modest and tentative way, and in the Park proper—that is in the immediate vicinity of the Falls—a good deal has already been accomplished, particularly in planting bare places with selected trees and shrubs of the best kinds, and also adding, where admissible, beds of choice herbaceous perennials. It must be borne in mind, however, that years must elapse before the results to be obtained from planting out deciduous trees or evergreens will be fully realized; consequently any delay in beginning the work necessarily postpones the time when the desired effects of foliage and shade may be expected to reach a fair degree of perfection. The absolute necessity for incurring considerable expense in renewing the crib-work forming the shore protection works in the upper reaches of the Park has also prevented a larger outlay in this most essential and much-needed work.

It may be interesting to show at this point the receipts from all sources since the inception of the Park to the present time, and also the expenditures made in connection with the whole of the property which is under the jurisdiction of the Commissioners:

RECEIPTS.

Bonds issued, proceeds of and advances by the Government for preliminary surveys, etc.	\$630,882 11
Tolls from visitors "Under the Falls" (five years only) ..	\$20,256 26
Tolls from visitors over the Islands	14,661 42
Tolls from visitors to Brock's Monument (1895 only) ..	308 75
	<hr/>
	35,226 43
Rentals for the privilege of conducting visitors under the Falls, and for the sale of photos. and refreshments	26,491 33
Rentals from the Niagara Falls Park and River Railway Co.	42,500 00
Rentals from the Canadian Niagara Power Co.	74,577 78
Deposit, Col. A. D. Shaw, <i>re</i> railway franchise	4,866 66
Sundries, sale of old buildings and materials, etc.	3,208 54
Sundries, town of Niagara Falls, towards cost of River Road	1,000 00
Interest on bank deposits	11,757 50
	<hr/>
	\$830,510 35

EXPENDITURES.

Capital Account.

Lands for park purposes, including cost of surveys, arbitrations and legal expenses in connection therewith	\$453,932 72
Works of improvement, including cost of materials, labor, etc.	56,614 98
	<hr/>
	\$510,547 70

Maintenance.

Materials, salaries, wages, etc	\$118,247 54	
Commissioners' disbursements and expenses.....	1,831 11	
Bank interest on temporary loans	8,944 91	
Refund to Col. Shaw <i>re</i> railway franchise.....	4,866 66	
Coupon interest on bonds and charges	183,735 89	
		317,626 11
Balance at Imperial Bank, December 31st, 1895		2,336 54
		<u>\$830,510 35</u>

It will thus be seen that, including all the works of construction and renewal completed before the Park was opened to the public, only a little over \$50,000 has, to the present time, been expended in opening up and otherwise improving the large extent of territory now embraced in the Park system.

A few facts in relation to the original cost and the expenditures for maintenance and improvements in connection with the New York State Reservation may not be out of place. The following figures are either taken from the published reports of the Board of Commissioners of the Reservation, or supplied through the kindness of Mr. T. V. Welsh, the Superintendent :

NEW YORK STATE RESERVATION.

Total area embraced by Reservation, 107 $\frac{2}{3}$ acres.

Original cost of land, including the cost of appraisal	\$1,452,929 50	
Expended in new works since the opening of the Reservation in 1885	110,000 00	
		\$1,562,929 50
Amount of appropriations by Legislature for main- tenance account.	\$185,000 00	
Receipts on account of buildings, etc., sold in the Reservation, and proceeds applied for mainten- ance.....	47,514 82	
		232,514 82
Or a total, not including interest on the capital account, of.....	\$1,795,444 32	
There has been received since the establishment of the Reservation from rentals and privileges, and from the Incline Railway down to the " Maid of the Mist " landing, the sum of		\$71,169 66

As the Reservation was opened to the public on the 15th July, 1885, the cost of maintenance appears to have been about \$23,000 per annum on an average, and the expenditure for new works has averaged about \$11,000.

Altogether, it is shown by a reference in the last annual report of the Commissioners of the Reservation, that the 107 acres comprised in the State Reservation at Niagara has cost the State of New York, up to the present time, in round numbers, \$2,500,000. This is certainly a vast outlay, and one which, without prospect of any financial return whatever, the people of the Empire State have willingly contributed in order to redeem their heritage in Niagara Falls from its unseemly environment, and preserve to succeeding generations this "Crowning glory of the Continent" in all its native beauty and magnificence.

Perhaps we have in the wise and eloquent words of the Commissioners of the State Survey, when reporting to the Legislature upon the project in 1880, a key to the noble sentiment which has prompted this great outlay of money on the part of our neighbors, and which without doubt stimulated our Legislature to action in respect to the Canadian side. They say :

"The question cannot be regarded simply as an economical one. It has been fully recognized by wise men in all times and in all lands to be conducive to civilization, to the instruction of the people, and to the conservation of public order, that localities which are associated with the lives, the achievements and the deaths of distinguished men should be set apart, preserved and held as a sacred heritage to be transmitted from one generation to another. In the same way gifts of nature which appeal to the higher sensibilities of mankind by their beauty and by their grandeur are entitled to reverential protection. Americans go to Europe not only to visit the burial places of great men of past generations, but also to see the valleys of the Rhine and the Danube, the mountains of Switzerland and the shores of the Mediterranean. The impulses which thus draw the nations together are a powerful influence for the obliteration of race prejudices, and thus for the preservation of the peace of the world."

"There is nowhere a natural object better adapted to serve these great ends than the Falls of Niagara, and the State which holds such a treasure, holds it under sacred obligations to mankind."

"It cannot be doubted that another generation will hold us greatly to account if we so neglect or badly administer our trust, that the Falls of Niagara lose their beauty and their human interest. If we blame the men of a former day for not setting apart, when it was the property of the State, and might easily have been done, the Falls of Niagara, as the Yosemite and the Yellowstone have in our day been set apart, then how much more culpable shall we be, who, knowing their value and perceiving their certain destruction, still refuse to take the necessary means for their preservation."

In a very important sense, however, the outlay has not been without large pecuniary gain to the citizens of the State of New York in particular, and to the public generally, in the saving effected to visitors by the removal of the charges

formerly made for admission to all chief points of interest. In the seventh annual report of the Commissioners of the reservation, this feature is thus dealt with by the Superintendent:

"A careful observation of the visitors to the Reservation during the entire year, leaves the impression that 500,000 visitors per annum is a fair estimate, and a considerable portion of the whole number are residents of the State of New York."

"Assuming 500,000 visitors per annum to be a fair estimate, and that there has been saved to each the amount of the tolls formerly charged upon the grounds now included in the Reservation, to wit: Fifty cents admission to the Islands, twenty-five cents admission to Prospect Park, and twenty-five cents for the use of the stairway at the Incline Railway in Prospect Park, aggregating one dollar for each visitor, there has been at this time (March, 1890) saved to the public the amount paid by the State for the lands included within the State Reservation at Niagara, and the cost of maintenance up to the present time."

Of course, it can readily be understood that a project of this magnitude, which, though undoubtedly practicable for the wealthy and prosperous State of New York, could only be undertaken by the Province of Ontario upon an entirely different principle, as has already been fully explained. In many respects, however, the Canadian Park system is much more complete than the one on the American side, and embraces sufficient territory to not only command the immediate surroundings of the Falls, but, in addition, nearly the whole reach of the Niagara River, from its beginning at Fort Erie down to the mouth of Niagara. It has been stated that the area of the Queen Victoria Niagara Falls Park, as at first defined, comprised about 154 acres, but to this must be added the lands acquired from private owners for extensions to the park system, and the several properties which have been vested in the Commissioners by the Crown from time to time.

The following tabulated statement shows the approximate areas of the several portions of the park domain:

Queen Victoria Niagara Falls Park (being the park proper) ..	154 acres
Chain Reservation along river from Chippawa to Fort Erie ..	106 "
Accretions at Fort Erie	10 $\frac{3}{4}$ "
Chain Reserve and land on top of the high bank of the river northerly from the park to the Military Reserve at Queenston	70 "
Talus and lands below the cliff from the park to Queenston ..	255 $\frac{3}{4}$ "
Lands at Queenston, including portions of the Military Reserve now in tenure of Commissioners	35 "

Reserve along water's edge from Queenston to Military Reserve at Niagara-on-the-Lake.....	43½ acres.
Thus giving a total area, not including the water lots, or lands under water, vested in the Commissioners at the close of 1895 of.....	675 “

Of this total area, the Ontario Government conveyed to the Commissioners by Orders-in-Council and by Letters Patent 431 acres, and there has been acquired by purchase 244 acres; the aggregate price paid for the 118 acres which it was necessary to acquire in order to form, together with the thirty-six acres granted by the Government, the Queen Victoria Park was, including cost of survey and arbitration proceedings, \$431,874.64, and the cost of the 126 acres which has been purchased outside the park, and which includes some large tracts below the high bank of the river forming the talus and flats, was \$22,230.07. When it is borne in mind that the whole of this large outlay for the lands purchased, and, in addition, the very considerable sum which has been expended for improving, supervising and maintaining the property from 1887 up to the present time, has been obtained without drawing on the Government for a single dollar, and when it is remembered, moreover, that from the franchises already referred to, the Commissioners have an assured revenue sufficient to meet all the interest charges on the debentures issued, and in addition a good round sum, over and above the interest payments, has been secured for the general maintenance of the property, the Commissioners feel justified in congratulating the Province on the success which has already been attained in the establishment and carrying on of this great work. These results afford a complete vindication of the prediction made by the Commissioners in the early days of the movement, that the project would in course of time become self-sustaining, and ultimately constitute one of the most valuable assets of the Province of Ontario. The park system has broadened out into proportions not contemplated at the time these opinions were expressed, and the initial outlay has been measurably greater than was anticipated, but notwithstanding all this the whole scheme is now on a well-established and sound basis financially, and the outlook for the future is certainly bright and encouraging.

The work of development, however, may be said to have been but begun. Of all the territory now vested in the Commission, operations on an extensive scale have only been attempted on a portion of the ground within the limits of the Queen Victoria Park, and a beginning made during the past season in the work of reclaiming the grounds around Brock's Monument on Queenston Heights. In the former case a considerable part of the grounds near the Falls must be underdrained before other improvements can be commenced. Long reaches of crib work protection to the shores of the river require to be rebuilt, and in some cases considerably extended in order to prevent further damage to

the beautifully wooded slopes forming the bank of the river near Clark Hill; and the insidious erosion of the land near Tempest Point, by the fierce action of the stormy waters of the rapids, must be guarded against by a similar provision. New pathways, opening up convenient avenues to the shady hillsides enclosing the park, and from whence the most charming vistas of all the varied aspects of land and water may be enjoyed, are urgently needed, as well as permanent forms of driveway construction wherever the influence of the spray has the effect of changing, in an hour, smooth gravel-ways into veritable lakes of mud, even on the brightest days of summer. Additional arbors and shelters of rustic design must be provided, to give the accommodation which experience has shown to be necessary, and the general work of planting out foliage and shade trees, with desirable forms of shrubbery, prosecuted with a greater degree of energy than has been practicable in the past.

For a number of years the execution of some most needed and desirable improvements, particularly in the immediate vicinity of the Falls, had to be postponed for want of the necessary funds, and in consequence the precautions against unduly crowding the visitors at certain points of commanding interest could not be provided. It may be stated that during the months of July and August, and part of September, the visitors usually arrive in very large contingents; and as the time at their disposal in which to "see Niagara" is generally limited to a few hours, a hurried round of the chief attractions is all that can be attempted; and this is frequently done in such large aggregations that crowding takes place, with all its discomforts and evident want of harmony with the emotions awakened in every thoughtful mind by the distinctive charms of Niagara scenery.

The only way in which this unseemly condition of things can be guarded against is by the opening up of a number of additional points of attraction, and the development of new and interesting features of natural scenery, with restful arbors, of easy access from the main thoroughfares, by means of which the numbers may be distributed over a wider area and the tranquil enjoyment of each one greatly enhanced.

During the past season work upon a much more extended scale than was permissible heretofore has been undertaken, and should nothing unforeseen take place to disturb the plans which the Commissioners have in view, much better effects may be expected in the course of a few years in the general character of the scenery in and around the extensive territory which now forms the Park system, and the many incongruities which have perforce been permitted to remain up to the present time will be removed, or ameliorated, as far as it is possible to do so.

There are several objectionable features in the Park which the Commissioners feel to be somewhat at variance with what may be considered as the ideal in

respect to the environment of the Falls, among which may be noted the large stone structures comprising the Restaurant, Table Rock House, and the electric railway power house. The circumstances, however, under which the whole project was placed, and the necessity of realizing a revenue from the property as a *sine qua non* for its very existence, rendered the preservation of these buildings essential to the success of the enterprise; and, consequently, they have been allowed to remain. In addition to these structures there is a large stone building very near the edge of the Horse Shoe Fall, which was built for the town water-works pumping station, and although no revenue is derived from it, it is allowed to remain as a concession to the citizens of the town in order that they may have a proper supply of water for fire protection and household purposes. In all of these cases efforts will be made to minimize the want of harmony which these structures now present with the natural conditions, and doubtless much will be accomplished in this direction in the future. The conservation of the natural scenery along the lower reach of the river, on top of the cliffs, as well as within the walls of the cañon, and the removal of objectionable or unnecessary artificial features, will also shortly be taken in hand and carried on with as much expedition and thoroughness as possible.

Since the acquisition of the outlying territories, some change would appear to be desirable in the nomenclature of the several properties which are now embraced within the jurisdiction of the Commissioners, some of these having a character distinct in themselves, with local designations, more or less appropriate, and now all forming, and quite properly so, integral parts of the Park system.

After some consideration the Commissioners would take the liberty of suggesting for the consideration of His Honor the Lieutenant-Governor in Council, the following appellations as being appropriate for the chief divisions of the property, and by which they should be known in future, viz. :

The whole of the territory extending from Fort Erie to Niagara on the Lake to be called "The Queen Victoria Park," and the Commissioners for the time being, known and designated as "The Commissioners for the Queen Victoria Park."

That portion of the property which is comprised within the original limits of the Queen Victoria Niagara Falls Park to be designated "The Niagara Falls Park."

The extension of the talus below the high bank, north of the whirlpool, which is sometimes called Foster's Flats, together with Wintergreen Point, which forms a projection of the cliff immediately above, to be designated "Niagara Glen."

The grounds in the vicinity of Brock's Monument, to be still known as "Queenston Heights." The sixty-six feet strip along the shore of the upper

river, between Chippawa and Fort Erie, to be called "Niagara Riverway," and the existing driveway along the edge of the cliff, in front of the Town of Niagara Falls, "Victoria Parkway."

Should this suggestion be approved, the necessary authority might be given to authorize the adoption of these changes.

Vast numbers of visitors have been attracted to Niagara, from all quarters of the earth, by the fame of its marvellous beauty and the exceeding vastness of its power, which has perforce captivated the senses and compelled the admiration of every cultured observer from the time when Father Hennepin first gazed upon the stupendous spectacle in 1678, down to the present time. The emotions created in the mind of Father Hennepin, who was the first European of whose visit we have any record, found vent in the following words, which are taken from his "New Discovery of a Vast Country in America," published in London, England, in 1698 :

"Betwixt the Lake Ontario and Erie, there is a vast and prodigious cadence of water which falls down after a surprising and astonishing manner, insomuch that the universe does not afford its parallel. 'Tis true, Italy and Suedland boast of some such things, but we may well say they are but sorry patterns when compared to this of which we now speak. At the foot of this horrible precipice we meet with the River Niagara, which is not above a quarter of a league broad, but is wonderfully deep in some places. It is so rapid above this descent, that it violently hurries down the wild beasts while endeavoring to pass it to feed on the other side, they not being able to withstand the force of its current, which inevitably casts them headlong above six hundred feet high.

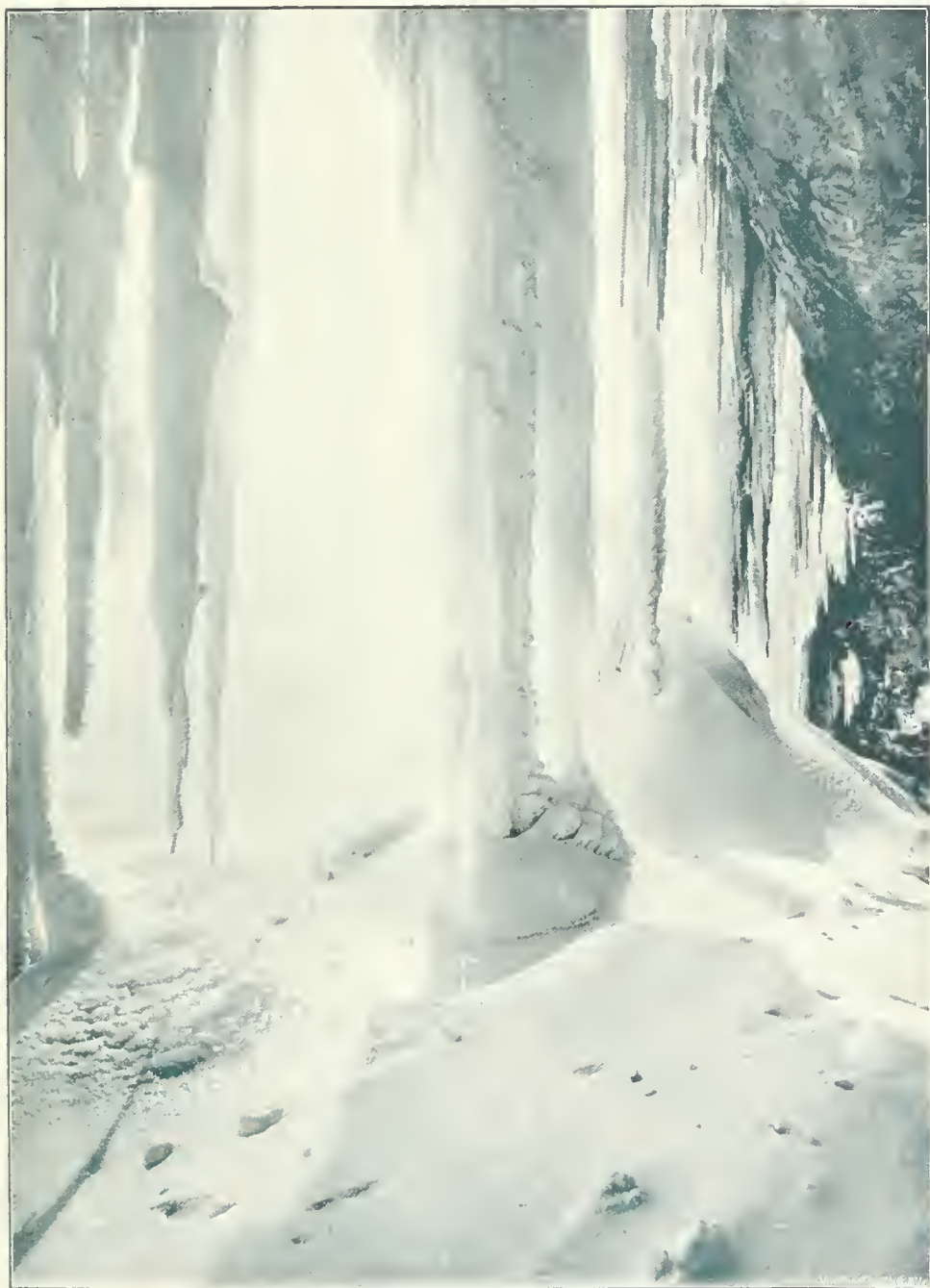
"This wonderful downfall is compounded of two great cross streams of water, and two falls with an isle sloping along the middle of it. The waters which fall from this horrible precipice do foam and boil after the most hideous manner imaginable, making an outrageous noise, more terrible than that of thunder; for when the wind blows out of the south their dismal roaring may be heard more than fifteen leagues off.

"The River Niagara, having thrown itself down this incredible precipice, continues its impetuous course for two leagues together to the great rock above mentioned with an inexpressible rapidity; but, having passed that, its impetuosity relents, gliding along more gently for other two leagues till it arrives at the Lake Ontario or Frontenac.

"Any bark or greater vessel may pass from the Fort to the foot of the huge rock above mentioned; this rock lies to the westward and is cut off from the land by the river Niagara, about two leagues farther down than the great fall; for which two leagues the people are obliged to transport their goods overland; but the way is very good and the trees are but few, chiefly firs and oaks.



UNDER TABLE ROCK IN WINTER, QUEEN VICTORIA PARK.



ICE FORMATIONS UNDER TABLE ROCK, QUEEN VICTORIA PARK.

"From the great fall unto this rock, which is to the west of the river, the two brinks of it are so prodigious high that it would make one tremble to look steadily upon the water rolling along with a rapidity not to be imagined. Were it not for this great cataract, which interrupts navigation, they might sail with barks or greater vessels more than four hundred leagues, crossing the Lake of Huron and reaching even to the farther end of the Lake Illinois; which two lakes we may easily say are little seas of fresh water."

Although Father Hennepin's estimate of the height of the cataract was doubtless somewhat affected by the sympathetic impulses of his admiration and awe at the wonderful spectacle, yet in some respects his description is most interesting and valuable, the more so as he has furnished us with a bird's eye picture of the Falls and upper river to Lake Erie as they appeared at the time of his visit. This interesting drawing is here reproduced :

"Since Father Hennepin's day, countless pilgrims have recorded the impressions made upon their minds by the sight of the same glorious scenes.

Early in this century (1804) Tom Moore, the eloquent Irish poet, made a special journey from New York to see Niagara, a more difficult feat in those days than it is now, and chronicles his emotions in these soul-stirring words :

"I have seen the falls, and am all rapture and amazement. I cannot give you a better idea of what I felt than by transcribing what I wrote off hastily in my journal on returning.

"Arrived at Chippawa, within three miles of the Falls, on Saturday, July 21st, to dinner. That evening walked towards the Falls, but got no further than the rapids which gave us a prelibation of the grandeur we had to expect. Next day, Sunday, July 22nd, went to visit the Falls. Never shall I forget the impression I felt at the first glimpse of them which we got as the carriage passed over the hill that over-looks them. We were not near enough to be agitated by the terrific effects of the scene; but saw through the trees this mighty flow of waters descending with calm magnificence and received enough of its grandeur to set imagination on the wing—imagination which, even at Niagara, can out-run reality. I felt as if approaching the residence of the Deity; the tears started into my eyes; and I remained, for moments after we had lost sight of the scene, in that delicious absorption which enthusiasm alone can produce. We arrived at the New Ladder, and descended to the bottom. Here all its awful sublimities rushed full upon me; but the former exquisite sensation was gone, I now saw all. The string that had been touched by the first impulse and which fancy would have kept for ever vibrating, now rested in reality. Yet, though there was no more to imagine, there was much to feel. My whole heart and soul ascended towards the Divinity in a swell of devout admiration which I never before experienced. Oh, bring the atheist here and he cannot return an atheist. I pity the man who can coldly sit down to write a description of these ineffable

wonders; much more do I pity him who can submit them to the admeasurement of gallons and yards. It is impossible by pen or pencil to give even a faint idea of their magnificence. Painting is lifeless, and the most burning words of poetry have all been lavished upon inferior and ordinary subjects. We must have new combinations of language to describe the Falls of Niagara.'

In the year 1842 Charles Dickens, that great master of the pen, whose gifts and graces all the English speaking world reveres, says in his 'Notes on America':

"In the morning we arrived at Buffalo, and being too near the Great Falls to wait patiently anywhere else, we set off by the train at nine o'clock to Niagara. It was a miserable day, chilly and raw, a damp mist falling, and the trees in that northern region quite bare and wintry. Whenever the train halted I listened for the roar; and was constantly straining my eyes in the direction I knew the Falls must be from seeing the river rolling on towards them; every moment expecting to behold the spray. Within a few minutes of our stopping, not before, I saw two great white clouds rising up slowly and majestically from the depths of the earth, that was all. At length we alighted, and then, for the first time, I heard the mighty rush of water, and felt the ground tremble underneath my feet. The bank is very steep and was slippery with rain and half melted ice. I hardly knew how I got down, but I was soon at the bottom and climbing, with two English officers, who were crossing and had joined me, over some broken rocks, deafened by the noise, half blinded by the spray, and wet to the skin. We were at the foot of the American Fall. I could see an immense torrent of water tearing headlong down from some great height, but had no idea of shape or situation, or anything but vague immensity. When we were seated in the little ferry boat and were crossing the swollen river, immediately before both cataracts, I began to feel what it was; but I was in a manner stunned, and unable to comprehend the vastness of the scene.

"It was not until I came to Table Rock, and looked, Great Heaven, on what a fall of bright green water, that it came upon me in its full might and majesty. Then when I felt how near to my Creator I was standing, the first effect and the enduring one—instant and lasting—of the tremendous spectacle was peace, peace of mind; tranquility; calm recollection of the dead, great thoughts of eternal rest and happiness, nothing of gloom and terror. Niagara was at once stamped upon my heart, an image of beauty, to remain there changeless and indelible, until its pulses cease to beat forever.

"Oh, how the strifes and trouble of our daily life receded from my view, and lessened in the distance, during the ten memorable days we passed on the enchanted ground. What voices spoke from out the thundering water; what

faces faded from the earth, looked out upon me from its gleaming depths ; what heavenly promise glistened in those Angels' tears, the drops of many hues, that showered around and twined themselves about the gorgeous arches which the changing rainbow made, I never stirred in all this time from the Canadian side whither I had gone first. I never crossed the river again, for I knew there were people on the other shore, and in such a place it is natural to shun strange company.

“ ‘To wander to and fro all day and see the cataract from all points of view, to stand upon the edge of the great Horse Shoe Fall, marking the hurried water gathering strength as it approached the verge, yet seeming, too, to pause before it shot into the gulf below ; to gaze from the river's level up to the torrent as it came streaming down ; to climb the neighboring heights and watch it through the trees, and see the wreathing water in the rapids hurrying on to take its fearful plunge ; to linger in the shadow of the solemn rocks three miles below ; watching the river as, stirred by no visible cause, it heaved and eddied and awoke the echoes, being troubled yet far down beneath the surface by its giant leap, to have Niagara before me, lighted by the sun and by the moon, red in the day's decline, and grey as evening slowly fell upon it ; to look upon it every day, and wake up in the night and hear its ceaseless noise ; this was enough.

“ ‘I think in every quiet season now, still do those waters roll and leap, and roar and tumble all day long ; still are the rainbows spanning them, a hundred feet below ; still, when the sun is on them, do they shine and glow like molten gold ; still, when the day is gloomy, do they fall like snow, or seem to crumble away like the front of the great chalk cliff, or roll down the rock like dense white smoke.

“ ‘But always does the mighty stream appear to die, as it comes down, and always from its unfathomable grave arises the tremendous ghost of spray and mist, which is never laid ; which has haunted this place with the same dread solemnity since darkness brooded on the deep, and the first flood before the Deluge, light came rushing on creation at the Word of God.’ ”

Grand though the panorama of the Falls may be in the springtime, when prolific nature clothes the setting in the brightest green, or in the autumn when the rich and varied tints of the deciduous foliage contrasting with the more solemn evergreens in the surrounding landscape, add a charm that is at once striking and delightful ; yet it is in winter, when Boreas holds sway, and all the brilliant shades of autumn or the refreshing verdure of spring time, which furnish such a pleasing framework to the majestic river and Falls, are wreathed in a mantle of white, that the most sublime and inspiring emotions are awakened in the human mind.

We cannot do better than quote the words of our brilliant fellow citizen, Principal Grant, of Queen's University, in describing the beauty of the winter scenery in the vicinity of Table Rock. He says :

“After a few days of hard frost in winter, the Falls become more like a vision of some enchanted land than a real scene in the world we are living in. No marvels wrought by genii and magicians in eastern tales could surpass the wonderful creations that rise along the surrounding banks and hang over the walls of the cataract. Glittering wreaths of icicles like jewelled diadems gleam on the brow of every projecting rock and jutting crag. Arches, pillars and porticos of shining splendor are grouped beneath the overhanging cliffs, giving fanciful suggestions of fairy palaces beyond. Every fallen fragment of rock under its icy covering becomes a marble column, pyramid or obelisk, and masses of frozen spray stand up here and there in graceful and statuesque forms, easily shaped by imagination into the half finished work of a sculptor.

“Every rift and opening in the cliff is transformed into an alabaster grotto, with friezes and mouldings ‘all fretted and froze’ with filagree wreaths and festoons and filmy veils and canopies of lace-like pattern and gossamer texture ; and on every curve and angle, round every fissure and crevice, some fantastic and lovely decoration is woven by winter’s master artist, king frost. Every tree and shrub, every tiny twig and blade of grass, on which this wonder-working spray falls and freezes, becomes wrapped in a gleaming white crust, and glistens in the sun as if made of crystal and mother of pearl. From the tips of the ever-green branches hang clusters, of ice balls, popularly called ice apples, which flash and glitter when the rays of sunlight fall on them, like the jewels growing on the trees of the magic garden in the Arabian Nights. Still more fairy like are the evanescent charms produced by a night’s hoar frost, fringing the pearly covering in which everything is wrapped with a delicate, fragile efflorescence, and giving a soft, shadowy, visionary aspect to the whole scene, as if it were the creation of some wonderful dream, then as the sun, before which its unearthly beauty melts away, shines out, all changes for a few brief minutes into a sparkling, dazzling glory, as if a shower of diamond dust had suddenly fallen.”

Although the “Crowning Glory” of Niagara is unquestionably the great Horse Shoe Fall, and second only to that the wondrously beautiful American Fall, and to these, therefore, will ever be given the highest poems of man’s admiration ; yet in the minds of many a scientific and appreciative visitor, the feelings of wonder and interest created by the distinctive beauty of the Great Canon, holding in its giant grasp the aggregated volume of water hurled over the two great Falls, or by the strange phenomenon of the mighty Whirlpool, whose ceaseless gyrations interrupt the onward rush of maddened waters, are hardly less intense or delightful than those which are called forth by the contemplation of the Falls themselves.

Mr. Frederick Law Olmsted, in his report before referred to on the proposed park scheme, quotes the words of William Robinson, F. L. S., as follows :

"The noblest of nature's gardens that I have yet seen is that of the surroundings and neighborhood of the Falls of Niagara ; grand as are the colossal Falls, the Rapids and the course of the river for a considerable distance above and below possess more interest and beauty.

"As the river courses far below the Falls, confined between vast walls of rock, the clear water of a peculiar greenish hue, and white here and there with circlelets of yet unsoothed foam, the effect is startlingly beautiful, quite apart from the Falls. The high cliffs are crested with woods, the ruins of the great rock walls forming wide, irregular banks between them and the water, and also beautifully clothed with wood to the river's edge, often so far below that you sometimes look from the upper brink down on the top of tall pines that seem diminished in size. The wild vines scramble among the trees ; many shrubs and flowers seam the high rocks ; in moist spots here and there a sharp eye may detect many flowered tufts of the beautiful fringed gentian, strange to European eyes ; and beyond that, and at the upper end of the wood-embowered deep river bed, a portion of the crowning glory of the scene—the Falls—a vast cliff of illuminated foam with a zone towards its upper edge as of green molten glass."

Again, a mile below the Whirlpool, the beautifully wooded talus which lies between the high cliffs and the water's edge, widens out to form the expanse locally known as Foster's Flats, a lovely spot which has been described by Principal Grant in the following words :—

"Lying under the cliffs which project picturesquely above it, richly wooded, interspersed with rocky mounds, leafy dells, and moss-grown hollows, shut in by the great lichen covered rocks, this tiny glen is a perfect epitome of wild natural beauty, only accessible by a winding precipitous path from the cliffs above, sheltered by its lofty banks and embowed trees, and kept fresh and green in the heats of summer by the moisture from the river, verdure lingers here nearly all the year around and its temperature in winter is almost as mild as if it looked up at a southern sky. Beautiful even in winter, this favored spot, in spring is a perfect paradise of wild flowers and blossoming shrubs. Its rocks, worn into caves and grottos by the water which once covered them, are hung with graceful tapestry of ferns, mosses and plants ; even tall trees grow on their tops, and send down a maze of tangled roots to reach the earth below. Rare and lovely shrubs and trees flourish here uncared for and unheeded, and ferns of every variety grow, in the most lavish profusion. At one extremity of the glen the river has formed a charming little eddy, smooth and clear as glass, where fish are caught with hook and line ; at the other a miniature bay lies within the rocky cape that

encloses it with a beach of rounded pebbles, on which the river, torn and tortured by the rocks that obstruct its way, dashes and breaks like the waves of the sea."

Realizing the great value of a better acquaintance with the teachings of science on this subject, the Commissioners have, through the great courtesy of the author, been permitted to republish, as an addenda to this report, the most recent results obtained from careful and reiterated surveys of this region made by Professor G. K. Gilbert of the U. S. Geological Survey, one of the best known authorities in America on geological subjects; and whose monograph will, without doubt, be read with very great interest and appreciation by all whom it may reach.

Many eminent scientific men have recorded their appreciation of the infinite variety and wonderful profusion of the vegetation found in the Niagara District. Doubtless this is in part owing to the beneficent influence of the spray in tempering the conditions of heat and cold, and supplying abundance of moisture in seasons of drought. The Park officials have for several years been making a collection of all the species found in the territory comprised in the Park, and these have been mounted and catalogued for the Herbarium in the office of the Superintendent of the Park at Niagara Falls. Through the kindness of Professor Macoun, the Dominion Botanist, the name of each specimen in the collection has been very carefully verified.

In a letter of recent date, Professor Macoun remarks: "I consider Queenston Heights, the valley of the Niagara River and the neighborhood of the Falls as far up as Chippawa, the best botanical ground in Canada; many species found there, and which are enumerated in the list, have a southern range which will prove to visitors the mildness of the climate and the value of the region about the Falls for fruit culture. The custard apple, the tulip tree, the sassafras and the sour gum are good examples of the mildness of the winters, and many herbaceous plants of the great heat of summer and autumn."

The catalogue, revised up to date, will also be found as an addenda to this report.

The Commissioners cannot close this general resumé of the work of the past ten years without referring to the invaluable services rendered the Park project by Sir Casimir Gzowski.

From the creation of the Park Commission in 1885, and during the first seven years of its history, a period of active negotiation and work, and of continued and grave anxiety to the Commissioners as to the success of the undertaking, Sir Casimir had been the chairman of the Board, and it was with unfeigned regret that his colleagues learned from him his decision to retire from active service on the commission.

On the retirement of Sir Casimir Gzowski in 1892, the Government appointed Mr. George H. Wilkes, of Brantford, a commissioner; and Mr. J. W. Langmuir, who had been a member of the Board since its inception in 1885, was made chairman.

The Commissioners also desire to record the great loss sustained by the Board in 1889 in the removal, by death of Mr. J. Grant Macdonald. Mr. Macdonald had been a Commissioner for a period of over four years, and his kindly bearing had at all times endeared him to his fellow Commissioners.

Having given in a somewhat extended form the history of the Park since its inception, the Commissioners do not consider it necessary to enlarge upon the work of the past year, a detailed reference to which will be found in the Report of the Superintendent of the Park, which is appended hereto. The following summary will show the receipts and expenditures for the year:—

Receipts.

Balance on hand at Imperial Bank, January 1st, 1895	\$ 6,463 44
Rental from photo. and refreshment privileges and the right to conduct visitors "Under the Falls."	8,200 00
Rental from the Niagara Falls Park & River Rail- way Company	10,000 00
Rental from the Canadian Niagara Power Com- pany	25,000 00
Receipts from tolls on carriages over islands....	\$ 1,385 20
" " Visitors to Brock's Monument....	308 75
	————— 1,693 95
" " Town of Niagara Falls for repairs of river road.....	1,000 00
Receipts from sundries, sales of old materials, etc.	134 25
" " Imperial Bank, interest on deposits.	170 77
	—————
	\$ 52,662 41

Expenditure.

CAPITAL ACCOUNT.—

Permanent improvements, including cost materials, etc.....	\$ 4,427 27
Wages of mechanics and laborers.....	2,947 29
Land purchases.....	3,338 15
Legal expenses	705 00
Miscellaneous.....	341 05
	————— \$11,758 76

MAINTENANCE ACCOUNT.—

Salaries and wages, including wages of laborers, teams, etc.....	\$11,723 57
Materials	2,045 88
Office expenses	168 67
Commissioners' expenses.....	297 70
Miscellaneous.....	103 79
	————— 14,339 61
Coupon interest and charges.....	24,227 50
Cash on hand in Imperial Bank, Dec. 31st, 1895	2,336 54
	————— \$52,662 41 —————

All which is respectfully submitted.

J. W. LANGMUIR,
Chairman.

JOHN A. ORCHARD,
GEORGE H. WILKES,
Commissioners.



BROCK'S MONUMENT, QUEENSTON HEIGHTS, QUEEN VICTORIA PARK.



LOOKING NORTH FROM QUEENSTON HEIGHTS, QUEEN VICTORIA PARK.

APPENDIX.

QUEEN VICTORIA NIAGARA FALLS PARK.

ANNUAL REPORT OF THE SUPERINTENDENT
FOR THE YEAR 1895.

To the Commissioners of The Queen Victoria Niagara Falls Park.

GENTLEMEN :—I beg to submit my report for the year ending 31st December, 1895.

The winter of 1894-5 was a very pleasant one at the Falls, a comparatively heavy snow fall, and consequent good sleighing, bringing many visitors to see Niagara in its winter beauty, and with all its characteristic charm of frost and spray transformations, as it is gathered and developed in icy foliage, or superimposed in glittering masses, on every object in the vicinity of Table Rock. The mounds at the base of the Fall assumed very large proportions as the winter wore on, and the visitors who would venture on them, were amply repaid by seeing the magnificent array of curtain-like draperies, of spotless purity, pendent from the face of the cliffs immediately in front; while to the left the great sheet of dark green waters, leaping from the heights above and breaking into myriads of fragments ere half the distance is accomplished, plunge into the foaming cauldron below, with a roar that is terrific by reason of its nearness, and delightful for its deep tone vibrations.

This year again a large part of the cliff extending from Table Rock southwards was entirely covered by ice, and the waterway of the Horse Shoe Falls reduced at its western extremity by over 400 feet. As this is doubtless owing to the receding of the water, having recurred for several years in succession, it appears to be altogether likely that the change is becoming a permanent one, and that visitors will soon require a new means of approach to the edge of the chasm at the very brink of the Falls,

The roads and pathways through the park were kept clear of deep snow, and all icy places, where there might be danger of visitors falling and injuring themselves, broken up and made safe.

The skating rinks, referred to in last year's report, which were made on the ponds near the principal entrance of the park, and also at the end of Cedar Island, were kept in good order, and were very much enjoyed by the young people of the town and vicinity for quite a long period.

On the opening of the season for outdoor work, the usual works of cleaning up were taken in hand and all the property in the park, which had been drained and put into shape, was maintained in good condition. Immediately to the south of the restaurant, a part of the broken ground at the base of the high hill bounding the property on the west, was graded and made to form an extension of the picnic grounds; and the numerous springs of water, which had made this portion of the park almost impassable were drained off.

Between the restaurant and Table Rock House the nearly level ground between the railway and the foot of the hill was carefully drained, and a large part of it trenched, in preparation for a bed of ornamental shrubbery, which it is intended to plant out in the ensuing summer.

The setting out of foliage and shade trees was prosecuted more extensively this year than at any time since the establishment of the park; and a large variety of the best stock that could be obtained, of trees suitable for the place, was set out. We have also secured a large selection of the choicer varieties of evergreen, mainly kinds which were not found on the place, some of which were set out and others put into nursery beds for transplanting in a year or two. In addition to this we have planted out in suitable localities a very large quantity of ornamental and flowering shrubs, which have been propagated in our nursery, and very pleasing effects have already been obtained therefrom.

As an experiment, some dozens of rhododendrons, and azaleas, of the more hardy kinds, have been set out in the picnic grounds, in expectation that they will thrive well where subject to the moderating influences of the spray. Should our experiment prove a success, we hope to try many other desirable forms of half hardy shrubs and plants in various portions of the park.

The grounds near the front entrance were levelled and improved and some very choice stock of a dwarf character put in. Altogether, with what has been done in the past season, that portion of the park which lies between the Clifton House and the restaurant is now fairly well provided for; and the portion between the restaurant and Table Rock will be filled up as much as it is considered desirable to do, by the end of the next year. Of course there are still many spots where beds of shrubbery should be planted out and clumps of specimen trees of a distinctive character so placed as to exhibit all the varieties of their order, but what is being attempted is to get some good general effects, with the least possible delay.

In the upper part of the Park, between the gardener's house and the Dufferin Islands, the uneven piece of ground between the railway and the water's edge was levelled, and planted with some good shrubbery. As this is a well sheltered portion of the property we expect to get some very good results from this season's work. Heretofore it has been difficult to secure a sufficient supply of water for irrigating purposes, during dry seasons, in this locality; but steps have been taken to overcome this evil for the future, and we hope soon to have this beautiful reach of the premises put in much better order than has been heretofore possible.

In addition to the work of planting out, we have improved the driveways in the Park at several points, and made a new pathway from the edge of the cliff up to the base of the hill at the "Jolly Cut." Some other pathways in this vicinity are required, which we hope to undertake during the ensuing year.

A very important work, which has been delayed from year to year for want of the necessary funds to carry it out, and which has been from the first one of the chief improvements contemplated, is a pathway along the side of the beautifully wooded hill, enclosing the Park on the west, from the Clifton House road to the Dufferin Gate. Such a pathway would open up innumerable vistas of the most charming description, and carry the discerning pedestrian along the choicest ground for botanical research. It is to be hoped that a beginning may be made upon this very interesting work during the coming year.

The usual work of maintaining the roads, pathways, bridges and buildings throughout the Park proper has been carried on during the year, and everything was kept in good shape. In last year's report reference was made to the pressing need for continuing the work of protecting the shores of the river at several points, but notably on the mainland opposite the wildest part of the upper rapids, at Tempest Point. This work was prosecuted vigorously during the summer, and 750 feet of cribwork put in around the great bend beyond Clark Hill, and over 100 feet laid down in the rapids at Tempest Point. All this work has been substantially done and will doubtless afford a very complete protection to the side hill for many years to come. About 500 feet remains to complete the cribwork to the summer house at the end of Riverside Ramble; this gap will be filled in early in the summer. On the completion of this work, and when the funds will admit of it, a gravelled walk is intended to be constructed over the whole length of this reach of cribwork, from the present terminus of Riverside Ramble to Dufferin Gate, a distance of over 600 yards, thus affording a lovely shaded ramble around this interesting bit of the river, and sensibly extending the facilities for the enjoyment of pedestrians. Three or four additional cribs are still required to carry the shore protection well below Tempest Point. The original cribwork facing to Cedar Island, which was put in some thirty-five years ago, is now nearly all gone, and before long it will be necessary to rebuild the whole reach

in front of this island from the "gap" down to the intake of the Electric Railway Company. As this work is necessarily of a somewhat expensive character, it will be deferred as long as possible, but a beginning will require to be made in 1886 or 1897. At several points along the many small streams traversing the Dufferin Islands, the present timbering is decayed and will also require to be renewed before long.

Around the buildings in the Park attractive flower beds have been provided, as it has been considered to be well within the scope of the Park scheme to use flowers at such points. In order to provide a permanent and sufficient supply for the use of the Park at little cost, a small greenhouse has been constructed, chiefly out of materials on hand, and a stock of the more thrifty varieties of flowers suitable for this purpose has been secured.

It was found impossible to close the gravel pit by forming it into a lake, as was intended, owing to the continued necessity for taking gravel for roadway purposes. Early in the ensuing spring it is proposed to take out a large quantity of suitable gravel, clean off the bottom of the pit, and let the water in for the summer. The completion of the work will have to be delayed for a year or two, until provision can be made for securing suitable road metal elsewhere. The gravel obtained from this source has been of exceeding value to the Park, and we cannot close it up without going to a considerable expense for other road material suitable for our purposes. When the lake is fully developed, however, it will form a very attractive feature, and the vicinity is capable of being made one of the choicest portions of our fair domain.

The ancient stone building, which for many years previous to the establishment of the Park was used for a general store, and which had been turned into a drive shed for the shelter of carriages from the spray while awaiting visitors to Table Rock, was torn down in the spring and a new and more convenient structure erected immediately to the rear of Table Rock House, where it is at once out of sight, and removes a rather disagreeable necessity from too close proximity to the public thoroughfares. The area occupied by the building has been cleaned up and the ground prepared for beds of shrubbery to be planted in the spring.

Our visitors this year were very numerous, but owing to the great numbers brought by the electric railway from both directions, and frequently up to a late hour at night, we have not attempted to keep a detailed tally as before. A very careful estimate, however, places the number at about 500,000.

The number of carriages entering the Park was not quite as large as in 1894; but the numbers brought in by the electric railway more than compensated for any deficiency in this respect. It may be noted, too, that a very large number visited the Park at night, to enjoy the weird moonlight effects upon the crest of the falls, on the drifting spray clouds, and on the foam of the seething waters of the cañon below; and also to enjoy a series of free band concerts, which were

provided by the electric railway people, in the picnic grounds. These promenade concerts proved very attractive, especially to the young people of the vicinity, and to the visitors at the hotels in the neighborhood of the Park. They were held in the large rustic pavilion, which with the grounds around it were brilliantly lighted up by electricity.

The year has been distinguished by the number of very large excursions coming to the Park, and it is stated that every Canadian excursion to Niagara Falls during the past year rendezvoused on the Canadian side. When it is borne in mind that only a few years ago all Canadian excursions went to the American side by preference, owing to the greater convenience there found for reaching the Reservation from the railway stations, it is manifest that the Commissioners have been more than justified in providing the excellent means of access to the Park premises now afforded by the electric railway system.

This year, more than ever, we have been troubled by crooks and pickpockets following the large excursion parties, and it required every effort of our police force, aided by the members of the Ontario Police, to protect the visitors from loss. Notwithstanding the large numbers present throughout the midsummer months, of all classes and conditions, good order has been maintained throughout.

Outside of the Park proper a considerable amount of clearing up has been done along the top of the river bank between the Park and Queenston. All of this territory has been entirely neglected in the past; and it will take considerable work to restore it to fair order and condition.

Brock's Monument, and the grounds connected therewith at Queenston Heights, having been vested in the Commissioners for park purposes early in the season, possession was taken and the work of clearing off and improving the property was commenced immediately. It was found that the premises were much in need of attention; and a very considerable amount of work has been expended upon it during the year. A new pathway for pedestrians was opened up from the station of the electric railway to the summit of the Heights, and the southern face of the hill between the highway and the summit was cleaned up, all decayed or unseemly wood removed, and the place generally put in good order. A supply of drinking water has been piped from Brock's Spring, a beautiful, clear, cool and never-failing fountain, which gushes out of the limestone a few feet below the top of the Heights about a quarter of a mile or so west of the monument down to a convenient place on the hillside opposite to the refreshment booth, where a tap with suitable drinking cups has been provided, and a platform for a rustic arbor has been erected. A good deal of attention has also been given to opening up vistas at various points along the edge of the escarpment, and the thick tangle of red cedar on the summit and upon the face of the hill has in many places been removed in order to give space for the growth and development of other and more symmetrical forms of trees.

On the west side of the monument grounds the lands belonging to Sir Casimir Gzowski, embracing some twelve and a-half acres in extent, and upon which stand the earthwork redoubts built during the war of 1812, having been acquired by the Commissioners, a new driveway for carriages entering from the highway leading down from Niagara Falls, was laid out, and being approved, was constructed in a most substantial manner.

Along the front of the property the unseemly picket fence which enclosed it from the highway was removed and a new turned post and looped chain fence put up in its place; this has been extended from the westerly limit of the new purchase down as far as the electric railway crossing, and opens up the premises to view in a marked degree.

Nothing has as yet been done toward restoring the earthwork redoubts, or towards preparing the grove in the new territory for the purposes of a picnic and recreation ground.

Along the upper reach of the river, between Chippawa and Fort Erie, nothing has been done towards preventing the erosion of the shore where it is exposed to the action of the waves during high water, or the cutting or grinding of the ice in winter and spring. Until some steps are taken on a comprehensive scale to secure the shore from further wasting, any efforts at planting out or improving the property would be superfluous.

Notwithstanding the many improvements made to the upper reaches of the Park proper, the receipts from visitors for driving over the islands has again diminished and only amounted for the year to \$1,385.20, as the following tabulated statement will show :—

Receipts in 1895.	Island tolls.	Brock's monument.	Rentals.	Interest.	Sundries.	Totals.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
January.....	14 50	.....	2,050 00	.....	.....	2,064 50
February.....	25 00	.....	.....	.....	.....	25 00
March	22 25	.....	.....	.....	.....	22 25
April	39 50	.....	4,550 00	.....	.....	4,589 50
May	77 25	17 85	12,500 00	93 92	.....	12,689 02
June.....	174 75	36 40	.....	18 38	.....	229 53
July	228 50	79 35	4,550 00	.....	.....	4,857 85
August.....	302 75	111 95	.....	.....	82 17	496 87
September	275 70	53 00	2,500 00	.....	47 58	2,876 28
October ..	143 50	10 20	2,050 00	.....	.....	2,203 70
November	54 50	.....	12,500 00	58 47	1 00	12,613 97
December	27 00	.....	2,500 00	.....	1,003 50	3,530 50
Total.....	1,385 20	308 75	43,200 00	170 77	1,134 25	46,198 97

The expenditure for the year has been as follows, viz.:

New Works on Capital Account.

The Queen Victoria Niagara Falls Park	\$7,241 16	
North of the Park and including Queenston Heights	4,517 60	
	—————	\$11,758 76

Works of Maintenance.

The Queen Victoria Niagara Falls Park	\$14,110 11	
North of the Park and including Queenston Heights	229 50	
	—————	14,339 61
		—————
		\$26,098 37
Bond interest and charges		24,227 50
		—————
Total expenditure		\$50,325 87

The whole respectfully submitted.

JAMES WILSON,
Superintendent.

Niagara Falls, February 1st, 1896.

GEOGRAPHIC MONOGRAPH

PREPARED UNDER THE AUSPICES OF THE

NATIONAL GEOGRAPHIC SOCIETY,

GARDINER G. HUBBARD, PRESIDENT.

NIAGARA FALLS AND THEIR HISTORY

BY

PROF. G. K. GILBERT,

U. S. GEOLOGICAL SURVEY.

NOTE.—Separate Copies of this Paper can be purchased from the American Book Company, New York City, at twenty cents per Copy.

NIAGARA FALLS AND THEIR HISTORY.

BY G. K. GILBERT.

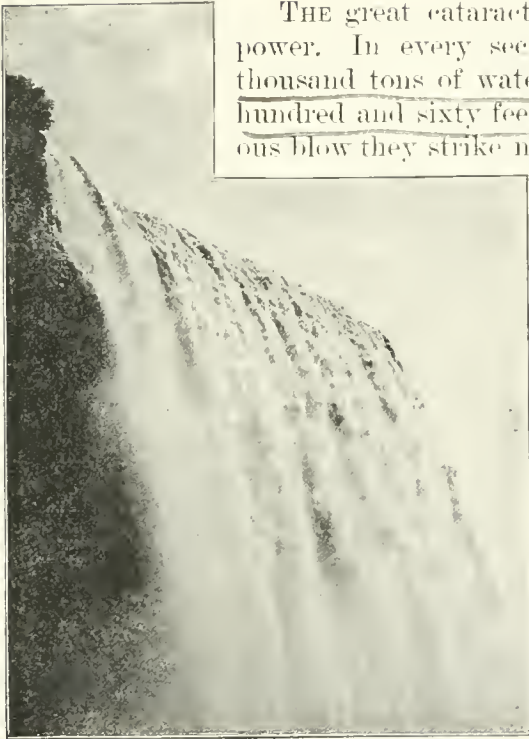


FIG. 1.—American Fall from below.

THE great cataract is the embodiment of power. In every second, unceasingly, seven thousand tons of water leap from a cliff one hundred and sixty feet high, and the continuous blow they strike makes the earth tremble.

It is a spectacle of great beauty. The clear, green, pouring stream, forced with growing speed against the air, parts into rhythmic jets which burst and spread till all the green is lost in a white cloud of spray, on which the rainbow floats. Its charms are the theme of many a gifted bard and artist, but the fascination of its ever-varied yet continuous motion, and the awe that waxes rather than

wanes with familiarity, are not to be felt at second-hand; and so the world, in long procession, goes to see. Among the multitude there are some whose appreciation of its power has a utilitarian phase, so that they think most of the myriad wheels of industry its energy may some day turn; and there are a few who recog-

nize it as a great natural engine, and in its activity and its surroundings see an impressive object lesson of geographic progress. Its aesthetic and utilitarian aspects need no expounder, but its geographic significance is too little appreciated. This paper endeavors to tell in simple language some of the lore of the professional geographer and geologist, in order that the layman may gain pleasure not only from the beauty and grandeur of the scene, but through understanding its meaning as a part in the great drama of nature.

Nature is full of change. The bud we saw yesterday is a flower to-day; the leaf that was broad and green in summer, in autumn is shriveled and brown; the bush we knew in childhood is now a broad, spreading tree. Such changes are easily seen, because they fall within the span of a man's life, and so the principle of perpetual progress in the organic world is familiar to all. Progress in the inorganic world is so slow that it is less easily seen, and there is a widespread impression that the hills are everlasting and unchanging. This impression is false. Not only hills, but mountains, plains, and valleys, are perpetually acted on by heat and cold, sunshine and rain, wind and stream, and are gradually changed. Not only do they now undergo change, but by such agents each feature was originally formed, and by such agents it will eventually be transformed into a feature of different type. Thus every element of the landscape has an origin and a history. To relate these is to explain it. This monograph may be regarded as an explanatory account of Niagara Falls and the associated natural features.

THE DRAINAGE SYSTEM.

The drainage system of the St. Lawrence is of exceptional character. In most regions the freshly fallen rain gathers into rills; these, as they run, join one with another, making brooks; brooks are united into rivers; and rivers flow to the sea. In all its journey from the hillside to the sea, the water moves forward without halt. This uninterrupted journey is rendered possible by a wonderful adjustment of slopes. The channel of the rill slopes toward the brook, the bed of the brook slopes toward the river, and the river bed slopes toward the sea. Impelled by gravity to flow downhill, the water moves continually forward from the beginning to the end of its journey. In the drainage

district of the St. Lawrence there is no such continuity of slope. The district is composed mainly of a group of great basin-like hollows, in each of which the surface slopes toward some central point, and not toward the mouth of the river. Each basin is filled with water to the level of the lowest point of its rim, and each of the lakes thus formed is a storage reservoir receiving a group of streams from the surrounding country, and pouring an even discharge over its rim to one of its neighbors. Lakes Superior and Michigan discharge to Lake Huron; Huron overflows to Erie; and Erie, having thus received all the outflow of the upper and greater lakes, sends its surplus through the Niagara to Ontario. The Niagara River is thus, from one point of view, a strait connecting two inland seas; from another point of view, it is a part of the St. Lawrence River,—the part connecting two great expansions. Viewed either way, it departs so widely from the ordinary or normal river that its name is almost misleading.

In a normal drainage system the slope is not everywhere equally steep: it is gentler in the bed of the main stream than in the beds of tributaries, and it varies from point to point so that the current, especially at low water, shows an alternation of rapid and quiet reaches. The streams of the Laurentian system not only exhibit these alternations, but have many cataracts where the water cascades down a rocky stairway or leaps from the brink of a cliff.

A normal river receives most of its water directly from rain or melting snow, and varies with the season, swelling to a flood in time of storm or at the spring snow melting, and dwindling to relative insignificance in time of drought. The water of Niagara comes only remotely from storm and thaw. The floods of the tributaries are stored by the lakes, to whose broad surfaces they add but a thin layer. The volume of Niagara depends only on the height of Lake Erie at Buffalo, and from season to season this height varies but little. On rare occasions a westerly gale will crowd the lake water toward its eastern end, and the river will grow large. On still rarer occasions a winter storm will so pile up or jam the lake ice at the entrance to the river as to make a dam, and for a day or two the river will lose most of its water.

A normal river, with its continuous current, rolls forward the pebbles loosened by its tributaries till they reach its mouth.

The rains that make its floods dislodge particles of soil, and wash them into the tributaries in such multitude that they discolor the water. The pebbles of its bed and the mud with which it is discolored are the river's load, which it transports from the face of the land to the bed of the sea. The tributaries of Niagara carry their loads only to the lakes, where the loads sink, and leave the water pure. Thus Niagara is ever clear. Sometimes, when storm waves lash the shores of Erie, a little sand is washed to the head of the river, and carried downstream; sometimes a little mud is washed into the river by the small creeks that reach its banks. Thus Niagara is not absolutely devoid of load, but its burden is so minute that it is hard to detect.

THE TWO PLAINS.

From Lake Erie to Lake Ontario the Niagara runs northward. The longer axes of the lakes trend nearly east and west,

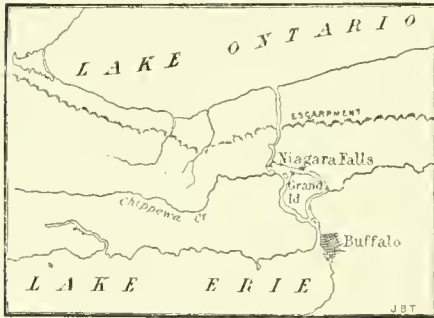


FIG. 2.—Niagara River and Vicinity.

and the lakes lap past each other for a distance of forty miles, including between their parallel shores a strip of land about twenty-five miles wide. This strip, where the river crosses it, consists of two plains, sharply separated by a cliff or escarpment. The relations of the plains to the escarpment and to the lakes are shown by the map (Fig. 2)

and the bird's-eye view (Fig. 4). The upper and broader plain has a gently undulating surface, which does not differ greatly in height from the surface of Lake Erie. Along the shore of that lake it rises in a low ridge, and there is also a gentle rise toward the escarpment. Its middle part is drained by two sluggish creeks,—the Tonawanda, flowing to the river from the east; and the Chippewa, from the west. The lower and narrower plain follows the shore of Lake Ontario, and rises gently thence to the foot of the escarpment. Its upper part is of rolling contour, like the upper plain; its lower is remarkably smooth and even, having once been the bed of a lake. The escarpment is a steep slope about two hundred feet high. Near the top it is generally a rocky

cliff, giving a sharply defined boundary to the upper plain ; at the bottom it merges insensibly with the lower plain.

These surface features are definitely related not only to the peculiarities of the river, but to the rocky framework of the country. The rocks are flat layers or strata resting one upon another, and of nearly uniform thickness for great distances. Nearly but not quite level, they slope gently toward the south ; the descent, or dip, amounting on the average to thirty-five feet per mile. Their arrangement is illustrated by Fig. 3, which gives a north-and-south profile, with such a section of the formations



FIG. 3.—Profile and Section from Lake to Lake.

Vertical scale greater than horizontal. Base line represents sea level.

as might be seen if a very deep trench were dug from lake to lake. The heavy line at the left, and the belt below divided into blocks, represent limestones, rocks notably hard and strong, while the intervening spaces are occupied chiefly by shales, which are relatively soft and weak. Originally all the formations extended farther to the north, but they have been worn away ; and, since the soft rocks were removed more easily than the hard, the edges of the hard are left somewhat prominent. This association of hard rocks with uplands and cliffs is not rare, but is rather the rule in hilly and mountainous districts. In the last preceding monograph of this series, Mr. Willis describes the plateaus and ridges of the Appalachian district, showing how frost and storm slowly but persistently ate out the soft rocks, and the rock waste was washed into streams, till valleys and lowland plains were made.

The higher of the two limestones presented in the diagram is called the Corniferous limestone. It makes a low ridge along the north shore of Lake Erie, and dips beneath the lake. The Salina shales occupy the middle part of the upper plain, and dip beneath the Corniferous. The second limestone, called the Niagara limestone, constitutes the northern part of the upper plain, and the escarpment everywhere marks its northern limit. Its full thickness is about a hundred and forty feet, but in some places it has been greatly reduced by the wasting of its upper surface. Below it is a great series of mud rocks or shales, a

thousand feet thick, interrupted near the top by a few thin beds of limestone and sandstone. These shales occupy the lower part of the escarpment and the whole of the lower plain. Their softness and the hardness of the Niagara limestone guided the erosive agents in making the escarpment and the lower plain.

Over all this rocky foundation lies a mantle of loose material. —clay, sand, gravel, and bowlders, —collectively called the *drift*. Its ordinary thickness is thirty or forty feet; but there are places, especially on top of the escarpment, where it is nearly absent, and elsewhere it fills hollows or is built into hills with a thickness of several hundred feet. It was spread over the country after the broader features of the topography had been shaped, and the agency by which it was deposited was moving ice, as will be explained a little later.

THE RIVER AND THE GORGE.

From Lake Erie the Niagara River runs over a low sag in the ridge of Corniferous limestone. Where the current crosses this

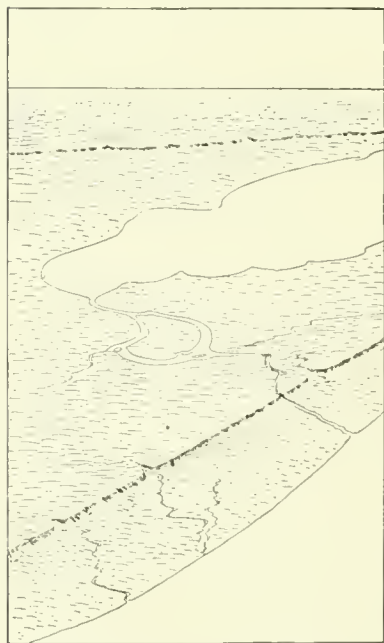


FIG. 4. — Bird's-eye View of the Niagara River from Lake Ontario. Beyond the Ontario shore are the Lower Plain, Escarpment, Upper Plain, and Lake Erie.

rocky barrier, it is rapid and disturbed. Thence for fifteen miles it flows above shales, but rarely touches them, the banks and bed consisting chiefly of drift. The channel is broad, and the water glides along with unruffled surface. Then, a little below the mouth of Chippewa Creek, the Niagara limestone appears in the bed, and the whole habit of the stream is quickly changed. For a thousand yards it is a broad, roaring rapid, tumbling over one ledge after another with tumultuous haste; and then it pours over a precipice to the bottom of a narrow, deep, steep-walled gorge. For seven miles it courses, with alternation of deep, boiling pools and narrow, violent rapids, through this gorge, whose steep walls of rock then turn abruptly

to the right and left, and merge with the face of the escarpment. Thence to Lake Ontario the width is moderate, and the current is strong and deep between steep banks of red shale capped with drift.

Thus for two thirds of its journey across the upper plain the river travels on top of the plain, and then for the remaining third it runs from two hundred to three hundred feet below the plain in a narrow trench. This contrast is the geographic fact on which scientific interest in Niagara has centered, and its importance is not readily overestimated.

The walls of the trench are vertical cliffs in their upper part, and are there seen to be composed of the same limestone that underlies the plain. The limestone cliffs are of moderate height,

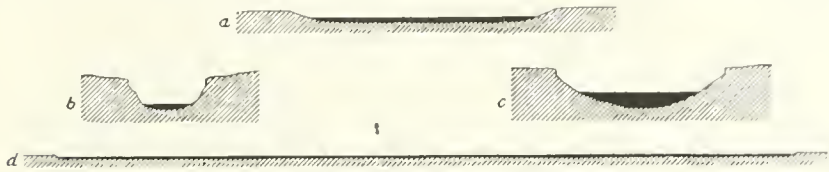


FIG. 5.—Cross Sections of Niagara River.

a, two miles below the escarpment; *b*, in the narrowest part of the gorge; *c*, in a broad part of the gorge; *d*, two miles above the falls. Scale, about 2,000 feet = 1 inch.

and from their base there usually starts a talus or apron of fragments, which descends to the river's edge. The general appearance of the gorge is fairly illustrated by the view in Fig. 7. Here and there the talus is scant or altogether absent, so that the strata can be seen; and wherever they can be seen, examination shows the two sides to have the same beds, in the same order, and at the same heights. First come gray shales about fifty feet thick; then a blue-gray limestone full of fossil shells, and ten or fifteen feet thick. This is the Clinton limestone of geologists; and it is so firm, as compared with the beds immediately above and below it, that rain and frost have affected it less, and it projects beyond its neighbors. There are several places where the edge of the bed is a cliff, though the adjacent shales are covered by fallen fragments (Fig. 6). Next below are green-gray shales, with thin limestone beds, and a soft, gray sandstone, the whole occupying a vertical space of about thirty feet; and then the color changes to a bright red, which characterizes the lower beds. These are chiefly shales, but there are soft sandstones among them; and there is one hard sandstone bed, of a pale

gray color, which stands out prominently like the Clinton limestone, and for the same reason. It is twenty feet or more in thickness, lies one hundred and twenty feet below the Clinton limestone, and is called the quartzose sandstone (see Figs. 10 and 21). The observer who sees these various rocks, hard and soft, gray and red, matched bed for bed on the opposite sides of the



FIG. 6.—Cliff and Talus of American Bank above the Whirlpool.
The Niagara limestone appears in the upper cliff; the Clinton, in the lower. The quartzose sandstone is not seen, being below the water.

gorge, and who studies them at the angles of the walls, so as to realize that each is a great level plate, which, if continued through the air, would bridge the chasm to its companion in the opposite wall, never doubts that the rock beds were originally continuous, and that the gorge is of later origin. As to the way in which the gorge was made, there has been some difference of opinion. One or two writers have thought it was a crack of the earth violently rent apart, and one or two others have thought it was washed out by ocean tides; but the prevailing opinion is that it was made by the river that flows through it, and this opinion is so well grounded that it is hardly worth while to consider its rivals in this place. The agency of the river is shown by the modern recession of the cataract, by banks, terraces, gravels, and shells, marking earlier positions of the river bed, and by a cliff

over which part of the river once poured as a cataract. It is qualified by a buried channel belonging to an earlier and different system of drainage. As these evidences are intimately connected with the history of the cataract and river, they will be set forth somewhat fully.

THE RECESSION OF THE CATARACT.

MODERN RECESSION.—The cataract is divided unequally by Goat Island. The part on the southwestern or Canadian side is the broader and deeper, and is called the Horseshoe Fall; the



FIG. 7.—The Gorge below the Whirlpool, with Part of the Whirlpool in the Foreground.

other is the American Fall. As shown by the map (Fig. 15), the Horseshoe Fall is at the end of the gorge; the American, at its side. The cliff over which the water pours is from one hundred and forty to one hundred and seventy feet high, measured from the water of the river below. It is composed of the Niagara limestone at top, from sixty to eighty feet thick; and the shales,

etc., beneath, as already described. At the edge of each fall, where one can look for a distance under the sheet of descending water, the limestone projects like a cornice beyond the wall of



FIG. 8.—The Horseshoe Fall, from the Canadian Bank.

shale; so that there is a strip of the upper rock which is not directly supported by the lower, but is sustained by its own strength. From time to time portions of this cornice have been seen to break away and fall into the pool of water below, and other fallings have made themselves known by the earth tremors



FIG. 9.—The American Fall, from the Canadian Bank.

they produced. Usually the falling masses have been large; so that their subtraction has produced conspicuous changes in the contour of the cataract, and their dimensions have been estimated in scores of feet. Nearly all have broken from the cliff under, or at the edge of, the Horseshoe Fall. As these catastrophes depend on the projection of the limestone without sup-

port, we are warranted in supposing that it is gradually deprived of support by the removal of the softer rocks beneath; and, although it is impossible to see what takes place amid the fearful rage of waters, we may properly infer that that very violence makes the cataract an engine of destruction by which the shales are battered and worn away. Under the middle of the Horseshoe, where the pouring sheet is at least twenty feet thick, its force is so great as to move most, or perhaps even the largest, of the fallen blocks of limestone, and by rolling them about make them serve as weapons of attack.

In 1827 Capt. Basil Hall, of the British Navy, made a careful drawing of the Horseshoe Fall by the aid of a *camera lucida*.

The use of that instrument gives to his drawing a quality of accuracy which constitutes it a valuable record. Sixty-eight years afterward, in 1895, a photograph was made from the same spot, and our illustrations (Figs. 11 and 12) bring the two pictures together for comparison. The bushes of his foreground have grown into tall trees which restrict the view, but the region of greatest change is not concealed. A vertical line has been drawn through the same point (Third Sister Island) in each picture to aid the eye in making the comparison. The conspicuous changes are the broadening of the gorge by the falling-away of its nearer wall, and the enlargement of the Horseshoe curve both by retreat to the right and by retreat in the direction away from the spectator. In 1842 Professor James Hall, State geologist of New York, made a careful instrumental survey of the cataract for the purpose of recording its outline, so that subsequent recession might be accurately measured by means of future surveys. His work has been repeated at various times since, the last survey being by Mr. A. S. Kibbe, assistant State engineer, in 1890. The outlines, as determined by these surveys, are reproduced in the chart on page 216 (Fig. 13), which shows that the greatest change has occurred in the middle of the Horseshoe curve, where the thickness of the descending stream is

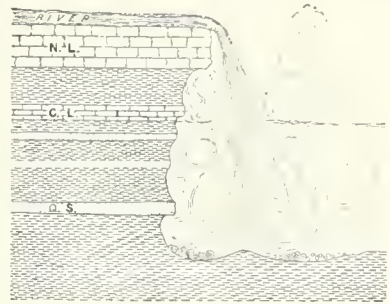


FIG. 10. — Profile and Section at Middle of Horseshoe Fall, showing Arrangement of Rocks and Probable Depth of Pool under Fall.

N.L., Niagara limestone; C.L., Clinton limestone; Q.S., quartzose sandstone. Scale, 300 feet = 1 inch.

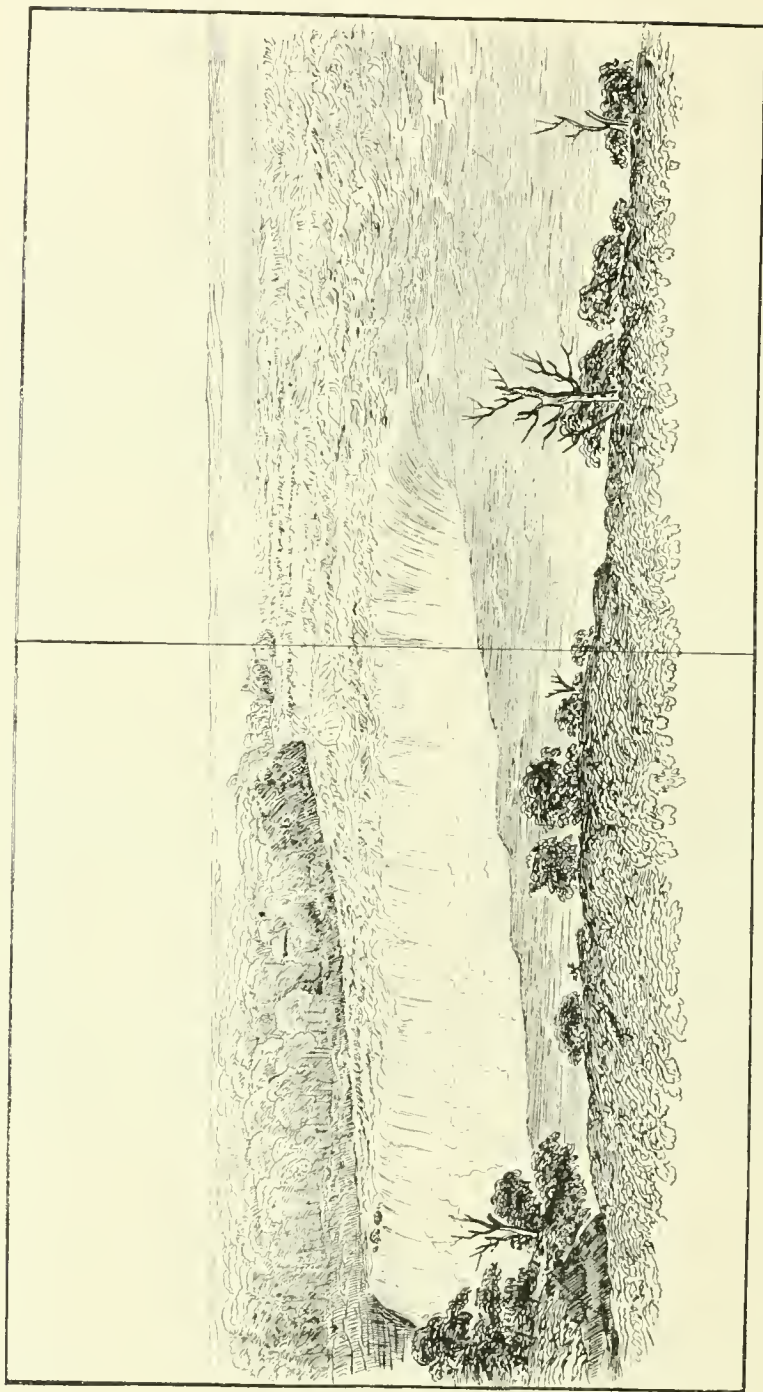


FIG. 11. — The Horseshoe Fall from Forsyth's Hotel, 1827. (Compare with FIG 12.)



FIG. 12. — The Horseshoe Fall from the Site of Forsyth's Hotel, 1895. (Compare with Fig. 11.)

greatest. In that region about two hundred and twenty feet of the limestone bed have been carried away, and the length of the gorge has been increased by that amount. From these data it has been computed that the cataract is making the gorge longer at the rate of between four and five feet a year, and the general fact determined by the observation of falling masses and the comparison of pictures thus receives a definite expression in the ordinary terms of time and distance.

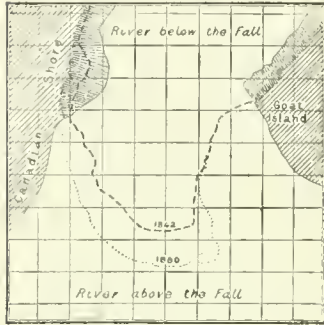


FIG. 13. — Outlines of the Crest of the Horseshoe Fall.

The vertical and horizontal lines are 300 feet apart.

The agent which has wrought such important changes during the brief period to which careful observation has been limited is manifestly able to hollow out the entire gorge if only granted enough time, and the theory which ascribes the making of the gorge to the work of the falling water is thus strongly supported.

MODE OF RECESSION.—Before passing to other facts bearing on this point, it is well to call attention to certain peculiarities of the process whereby it differs from the normal process of cataract erosion. Pure water has little power to erode solid rock. It can pick up loose particles or roll them along; but firm, coherent rock cannot be broken by so soft a tool. Rock is, indeed, worn away by rivers, and the erosion accomplished in this way is enormous; but the water does it indirectly by carrying along rock fragments which rub and pound the solid rock of the river bottom. The rock fragments are of the same material, generally speaking, as the solid rock, and they wear it away just as diamond dust wears the solid gem. As already pointed out, the Niagara is peculiar in that its current carries no rock fragments. The geographic work performed by the cataract is practically dependent on the tools furnished by the blocks of fallen limestone. It is therefore of prime importance to the work of the cataract that it shall be able to roll the limestone fragments about, and thus grind them against the river bed. A study of the different parts of the cataract, comparing one with another, shows that the water has this power only where its body is great; namely, in the middle part of the Horseshoe curve. Under each edge of that fall and under the Amer-

ican Fall great blocks of limestone lie as they have fallen, manifestly too large to be moved by the moderate streams that beat against them. Some of these are shown in the general view of the Horseshoe Fall (Fig. 8), and more clearly in the view of the American Fall (Fig. 9). The block at the extreme right of the American Fall is also pictured in Fig. 14. The resistance opposed by these blocks makes the rate of erosion of the American Fall comparatively slow. In fact, it is so slow that attempts to measure it have thus far been unsuccessful, because the changes which have taken place in its outline between the dates of surveys have been little greater than the inaccuracies of the surveys. Where the heaviest body of water pours down, the blocks are not merely moved, but are made to dig a deep hollow in the shale. The precise depth cannot be measured, because the motion of the water is there too violent for sounding; but a little farther down the river, where the cataract performed its work only a few centuries ago, the plummet shows a depth of nearly two hundred feet, and it is probable that the hollow directly under the Horseshoe is not shallower than that. The general fact appears to be that in the center of the main stream the water digs deeply, and the brink of the fall recedes rapidly. After the gorge has been lengthened by this process, it is somewhat widened by the falling in of its sides; and this falling in is in a measure aided by the thinner water streams near the banks, which clear away the smaller limestone fragments, though leaving the larger. After the cataract has altogether passed, the cliff is further modified by frost. The wall of shale, being wet by spray or rain, is exposed to the cold air of winter, and the water it contains is frozen. The expansion of freezing breaks the rock, either crumbling it or causing flakes to fall



FIG. 14.—The "Rock of Ages," a Fallen Block of Niagara Limestone at the Southern Edge of the American Fall.

away. In this way the shale is eaten back, and the limestone above is made to fall, until enough fallen fragments have been accumulated to protect the remainder of the shale from frost, after which time the process of change becomes exceedingly slow.

Thus two different modes of cataract recession are illustrated by the two falls of Niagara. They resemble each other in the most essential particular,—that the soft shale beneath is worn away, and the hard limestone above falls for lack of support,—but they differ widely in other respects. In the recession of the Horseshoe Fall, the blocks of limestone are pestles or grinding tools by which the shale is beaten or scoured away. In the recession of the American Fall, the limestone blocks have no active share, but are rather obstructive. The falling water, striking them, is splashed against the cliff, and this splashing is the only force continually applied to the shale. In the spring, ice cakes are drifted from Lake Erie into the entrance of the river, and float to the falls. Borne with the water, they, too, must be dashed against the cliff of shale, and, though softer than the shale, they probably help to dislodge it. The recession in one case is far more rapid than in the

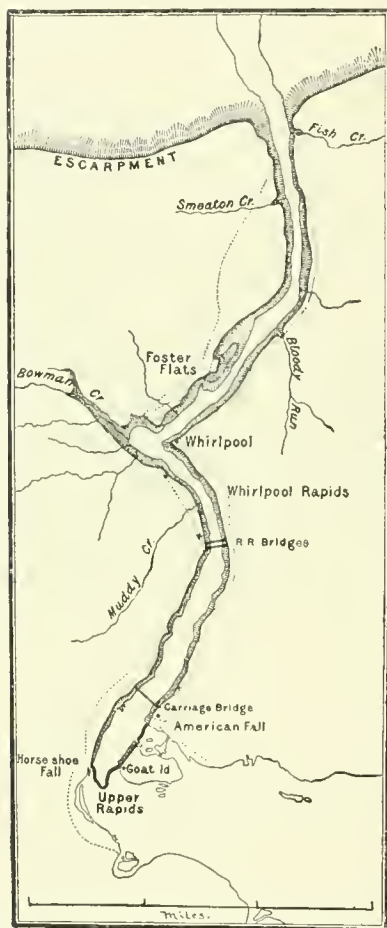


FIG. 15. —The Niagara Gorge, showing Physical Features.

Old river banks are shown by dotted lines; shell localities, by crosses.

other, the difference being explained primarily by the difference in the volume of the water.

OLD RIVER BANKS AND GRAVELS.—As just explained, the retreating cataract lengthens the gorge most rapidly in the middle of the stream, where the water is deepest. As the gorge is extended, the current turns toward its head from both margins,

and portions of the river bed on either side are thus gradually abandoned by the water. After these strips of river bed have become dry land, they retain certain features by which they can be recognized. Usually the whole of the drift is washed away as far as the water extended, so that the rock is bare, or nearly bare; and the edge of the undisturbed drift at the margin of this strip of bared rock has a steep slope, which so closely resembles the modern banks of the river above the cataract that the imagination readily restores the former outline of the water (see Fig. 16).



FIG. 16.—Old River Bank and River Bed, One Mile North of American Fall.

Sometimes the river, after running for a while at one level, has been drawn down to a lower level, and the change has caused a second bank to be produced, the space between the first and second banks standing as a bench of land, or terrace. At some points there are two or three such terraces. Along the greater part of the gorge these old banks can be found on both sides, and there are few spots where they do not survive on one side or the other. The farthest point to which they can be traced downstream is about half a mile from the end of the gorge, and

they thus serve to show that all the remainder of the gorge has been wrought during the life of the river; for it is evident that the river could not run on the upland while the gorge was in existence.

In a few cases, where the top of the limestone lies rather low, the old river beds are not excavated down to the rock, but their terraces are partly carved in drift. In yet other places the old river not only carried away material, but made additions, leaving a deposit of gravel and sand that had been rolled along by the current. In this gravelly deposit, shells have been found at a number of places, and they are all of such kinds as live in the quieter parts of the river at the present time.

On the chart on page 218 (Fig. 15) the most important of the old river banks are shown, and also a number of spots at which shells have been found in the river gravels.

FOSTER FLATS.—About two miles and a half south of the escarpment the gorge assumes a peculiar phase not elsewhere seen. It is unusually wide at the top; but the river is quite narrow, and runs close under the cliff on the eastern or American side. On the Canadian side an irregular lowland lies between the cliff and the river, but this is encroached on by a quadrangular projection of the cliff. The lowland is Foster Flats; and

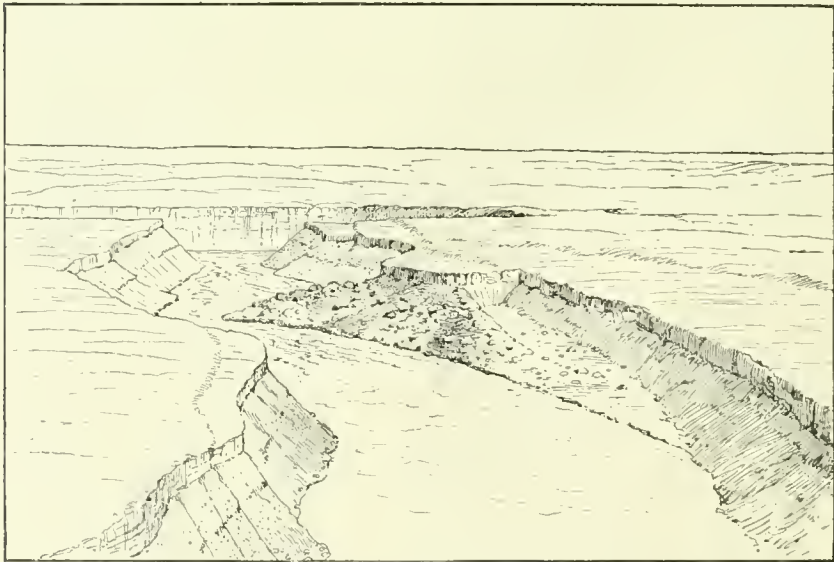


FIG. 17. — Bird's-eye View of Foster Flats, looking Southwest (Forests omitted).

the cliff projection, Wintergreen Flat. These and other features of the locality are portrayed in the bird's-eye view (Fig. 17), and also in the map (Fig. 18). The map represents the slopes of the land by means of contour lines, or lines of equal height, drawn at vertical intervals of twenty feet.

Wintergreen Flat is a platform of limestone a little below the general level of the plain, and separated from the plain by a steep bluff. This bluff is one of the old river banks, very similar to the one pictured in Fig. 16, and the platform is part of the river's bed. Following the direction of flow—parallel to the bank—to the point *A* (Fig. 18), the observer finds himself on the brink of a cliff over which the water evidently descended in a cataract; and before him, extending from the foot of the cliff to the point *B*, is a descending valley with the form of a river bed. From Wintergreen Flat only its general shape can be made out, as it is clothed with forest; but when one gets down to it, he finds it a northward-sloping plain, bounded by steep sides, and strewn here and there with great fallen blocks of limestone which the river current could not remove. The left

bank of this channel has the ordinary profile of the wall of the gorge,—a cliff of the Niagara limestone at top and a talus slope below, covered by blocks of the same rock. The right wall is lower, rising at most but fifty feet above the channel, and gradually disappearing northward. It is merely the side of a low ridge which separates the abandoned channel from the river bed at the east. Its surface is exceedingly rugged, being covered by huge blocks of limestone, so that the ridge seemingly consists of a heap of them; but there is doubtless a nucleus of undisturbed shale, with a remnant of the Clinton ledge. Eastward from Wintergreen Flat there is a continuous descent from the limestone cliff to the river; but this is less steep than the ordinary talus slope of the gorge, and it is cumbered, like the ridge, by



FIG. 18.—Map of Foster Flats.

blocks of limestone. There is an obscure terrace at about the level of the Clinton limestone, and there are other irregular terraces on the southward prolongation of the slope.

The history which appears to afford the best explanation of these features is as follows: When the cataract, in its recession from the escarpment, had reached the point *B*, it was a broad waterfall. Just above it, occupying the position *C—D*, was a narrow island, dividing the river as Goat Island now divides it. On reaching the island, the cataract was separated into two parts corresponding to the present Horseshoe and American falls, only at that epoch the greater body of water passed on the American side of the island, so that the American Fall retreated upstream the more rapidly. When the Canadian Fall reached the head of the island, the American had just passed it, and part of the sheet of water on Wintergreen Flat was drained eastward into the gorge opened by the American Fall. The Canadian Fall, through the loss of this water, became less active, and soon fell out of the race, leaving the cliff at *A* to record its defeat. For a time there was a cataract at *E* falling over the west wall of the gorge just as the modern American cataract falls over the east wall. The island was not broad enough to survive as a monument. After the cataracts had passed, its pedestal of shale was crumbled by the frost, and the unsupported limestone fell in ruins. As the main fall retreated still farther, the western portion of the water sheet was withdrawn from Wintergreen Flat, occupying a position at *F*, and at the same time the stream near the Canadian shore acquired greater volume, so as to recede rapidly toward *G* and thus broaden the channel. Probably at about the same time the whole amount of water in the river was increased in a manner to be considered later.

When the reader next visits Niagara, he will find himself fully repaid for his pains if he will go to this spot, and examine these features for himself. It is peculiarly impressive to stand on the silent brink of the old waterfall and look down the dry channel, and it is no less impressive to enter that channel and wander among the blocks of rock which record the limit of the torrent's power to transport. It is evident that here the cataract did not hollow out a deep pool, as under the Horseshoe Fall of to-day, but was rather comparable in its mode of action to the American Fall, though perhaps somewhat more vigorous. The slope eastward from Wintergreen Flat probably corresponds

closely with what one would find under the American Fall if the river were stopped and the pool drained.

Thus Foster and Wintergreen flats repeat the story told by the old river banks and the shell-bearing gravels. There was a time when there was no gorge, but when the river ran over the top of the plain nearly to its edge; and since that time the gorge has been gradually dug out by the power of the plunging water.

BEGINNING OF RECESSION.—When the geographer notes that some natural process is producing changes in the features of the land, he naturally looks backward, if he can, to see what were the earlier features which preceded the changes in progress, and looks forward to see what will be the eventual condition if changes of the same sort are continued. The tracing of the history of change in either direction is apt to be difficult, because it is not easy to tell what allowances to make for changes of circumstance or condition. In tracing the early history of Niagara such difficulties as these arise, but there is one difficulty which is not altogether unfortunate, because it leads to the discovery that the Niagara history is definitely related to one of the most interesting events of the geographic development of the continent.

Having learned from the cataract that it is engaged in the work of gorge making, and having learned from the old river beds along the margins of the gorge and from the old cataract cliff at Foster Flats that this work of gorge making has been carried on through the whole length of the gorge, we are carried back in imagination to an epoch when the river traveled on the upper plain all the way from Lake Erie to the escarpment, and there descended. The general history is clearly traced back to that point, but there it seems to stop abruptly. We may compare the river to an artisan sawing the plateau in two. The work goes on merrily and the saw cut is still short. As geologists reckon time, it is not long since the task was begun. But Nature's artisans cannot stand idle; while they live, they must work. So, before this task was begun, either the stream had some other task or else there was no Niagara River. It seems impossible to suggest any other task, and all geographers are agreed that there was none. The river's first work was the digging of the gorge, and the date of its beginning was the date of the river's beginning.

The nature of this beginning, the series of events which led

up to it, or, in other words, the cause of the river, was long sought in vain; and an interesting chapter might be written on the fruitless search. The needed light was an understanding of the origin of the drift; and it was not till a young Swiss geologist, Louis Agassiz, brought from the Alps the idea of a drift-bearing ice field that the discovery of Niagara's pedigree became possible.

DEVELOPMENT OF THE LAURENTIAN LAKES.

THE ICE SHEET.—The history of the great Canadian glacier is a large subject, to which some future monograph of this series will doubtless be devoted. Any account of it which can be given here must needs be inadequate, yet a full understanding of Niagara cannot be reached without some knowledge of the glacier. In the latest of the geologic periods the climate of North America underwent a series of remarkable changes, becoming alternately colder and warmer. While the general temperature was low, there was a large area in Canada over which the fall of snow in winter was so deep that the heat of summer did not fully melt it; so that each year a certain amount was left over, and in the course of centuries the accumulation acquired a depth of thousands of feet. By pressure, and by melting and freezing, the snow was packed, and welded into ice. When the climate again became warmer, this ice was gradually melted away; but while present it performed an important geographic work. Ice in large masses is plastic; and when the ice sheet had become thick, it did not lie inert and motionless, but spread itself outward like a mass of pitch, its edges slowly pushing away from the central tract in all directions. This motion carried the ice border into regions of warmer climate, where it was melted; and for a long period there was a slow but continuous movement from the central region of accumulation to the marginal region of waste by melting. The principal region of accumulation was north and northeast of the Great Lakes, and the flowing ice passed over the lake region, invading all our Northern States. Where the ice pressed on the ground, it enveloped bowlders, pebbles, and whatever lay loose on the surface; and as it moved forward, these were carried with it, being dragged over the solid rock, and scraping it. Thus the country was not merely swept, but scratched and plowed, with the result that its surface was worn down. The amount of wear was not

everywhere the same, but varied from place to place, and many basins were hollowed out. When the general climate became gradually warmer, the waste of ice near its margin exceeded the supply, and the extent of the sheet was diminished. When the ice was gone, the stones and earth it had picked up and ground up remained on the land, but in new positions. They were spread and heaped irregularly over the surface, constituting the mantle of *drift* to which reference has already been made. Thus by the double process of hollowing and heaping, the face of the land was remodeled; so that when the rain once more fell on it, and was gathered in streams, the old water ways were lost, and new ones had to be found.

This remodeling gave to the Laurentian system of water ways its abnormal character, supplying it with abundant lakes and waterfalls. Not only were the Great Lakes created, but a multitude of minor lakes, lakelets, ponds, and marshes. If the reader will study some good map of the United States or of North America, he will see that this lake district includes New England also, and by tracing its extent in other directions he can get a fair idea of the magnitude of the ice sheet.

The lakes have had a marked influence on the history and industries of mankind. Still water makes an easy roadway, and the chain of Great Lakes not only guided exploration and early settlement, but has determined the chief routes of commerce ever since. The most easterly of the ice-made basins, instead of holding lakes, receive arms of the sea, giving to New York and New England some of the best harbors in the world. Each cataraact is a water power, and the lakes and ponds upstream are natural storage reservoirs, holding back floods, and doling the water out in time of drought. So Chicago and New York City are the centers of trade, and New England is a land of humming spindles and lathes, because of an invasion long ago by Canadian ice.

The district of the Niagara lay far within the extreme limit of the ice, and the drift there lying on the rocks is part of the great ice-spread mantle. Wherever that drift is freshly removed, whether by the natural excavation of streams or the artificial excavation of quarrymen and builders, the rock beneath is found to be polished, and covered by parallel scratches, the result of rubbing by the ice and its gritty load. These scratches show that in this particular district the ice moved in a direction about

30° west of south. They can be seen on the western brink of the gorge four hundred yards below the railroad suspension bridge, in the beds of several creeks near the Whirlpool, and at various quarries above the escarpment. The best opportunity to study them is at a group of quarries near the brink of the escarpment, about two miles west of the river.

ICE-DAMMED LAKES.—During the period of final melting of the ice sheet, when its southern margin was gradually retreating across the region of the Great Lakes, a number of temporary lakes of peculiar character were formed. In the accompanying



FIG. 19.—The Great Lakes and their Drainage Districts.

The watersheds bounding the drainage districts are represented by dotted and broken lines.

sketch map of the Great Lake region (Fig. 19) the broken line marks the position of the southern rim of the St. Lawrence basin. It is the watershed between the district draining to the St. Lawrence and the contiguous districts draining to the Mississippi, Ohio, Susquehanna, and Hudson. When the ice sheet was greatest, its southern margin lay south of this watershed. The rain which fell on the

ice, uniting with the water made by melting ice, ran from the ice field, on to the land, and flowed away with the rivers of the land. Afterward, when the extent of the ice had been somewhat reduced, its margin lay partly beyond and partly within the basin of the lakes; but the water from it could not flow down the St. Lawrence, because that valley was still occupied by the ice. It therefore gathered between the ice front and the watershed in a series of lakes, each of which found outlet southward across some low point in the watershed. To see this clearly may require some effort of the imagination. The reader should bear in mind that the watershed is not a simple ridge, but a rolling upland of varying height, with here and there a low pass. The St. Lawrence basin is not simple and regular in form, but is made up of many smaller basins separated by minor uplands or watersheds. Some of these watersheds are shown on the map. When the ice occupied part of minor basins, it acted as a dam, holding the water back, and making

it fill the basin until it could flow in some other direction. As the position of the ice front changed, these lakes were changed, being made to unite or separate, and often to abandon one channel or outlet when another was opened at a lower level. Sometimes there were chains of lakes along the ice margin, one lake draining to another across a minor watershed, and the lowest discharging across the main watershed.

Wherever water ran from a lake, it modified the surface. The loose drift was easily moved by the current, and each stream quickly hollowed out for itself a channel,—a trough-like passage with flattish bottom and steep sides. When the lakes afterward disappeared, the channels lost their streams, but their forms remained. They are still to be seen in a hundred passes among the hills of the Northern States. The larger and longer-lived of the lakes carved by their waves a still more conspicuous record. In ways explained by Professor Shaler in the fifth monograph of this series, the waves set in motion by storms cut out strands and cliffs from the drift and built up barrier beaches, so that after the lake waters had departed there were terraces and ridges on the hillsides to show where the shores had been. Many of the old channels have been found, some of the old shore lines have been traced out and marked on maps, and by such investigation the history of geographic changes in the Great Lake region is gradually being learned.

At one stage of that history there was a long lake occupying the western part of the Ontario basin, much of the Erie, part of the Huron, and probably part of the Michigan. Its outflow crossed the main watershed at Chicago (*C*, Fig. 19), and its eastern extremity was near Batavia (*B*) in western New York. The ice mass filled the greater part of the Ontario basin, and kept the water from escaping eastward. When it melted from that region, the water shifted its outlet from Chicago to a low pass at Rome (*R*), where it discharged to the Mohawk valley. This change lowered the lake surface several hundred feet, and, by uncovering watersheds that had before been submerged, separated the Huron, Erie, and Ontario basins, and three lakes took the place of the single long lake. In the Huron basin was a lake half walled by ice; in the Erie basin, Lake Erie; and in the Ontario basin, Lake Iroquois, an ice-dammed lake with its outlet at Rome.

The draining away of so large a body of water occupied some

time, so that the lake level was gradually lowered. When it reached the pass between the Erie and Ontario basins at Buffalo, and Lakes Erie and Iroquois were thereby parted, the Erie level could fall no lower, but the Iroquois continued downward. As soon as there was a difference of level, a stream began to flow from Lake Erie, and that stream was the infant Niagara, newly born. It was a short stream, because the edge of the Iroquois water was close to Buffalo; but it grew longer day by day, as fast as the Iroquois edge receded. It had no channel until it made one, but its growing end, in following the retreating lake, selected at each instant the direction of steepest slope; and as the slopes had been formed by the glacier, it may be said that the glacier predetermined the course of the river.

During some centuries or millenniums of its early life the river was shorter than now, because the Iroquois Lake flooded more land than the Ontario, and kept the river nearer the escarpment; but in course of time the ice dam disappeared, the lake outlet was removed from Rome to the Thousand Islands, part of the lake bottom was laid bare by the retiring water, and the river stretched itself over the broadened plain. It grew, in fact, to be a few miles longer than now, and there were other changes in length; but the entire story is too long and intricate for these pages.

THE TILTING OF BASINS.—The geographers who have mapped the glacial lakes by tracing their shore lines have also measured the heights of these lines at many points. From these measurements they have found that the lines are not level. The surface of each ice-dammed lake was, of course, level, and its waves, beating on the shores, carved beaches and strands all at the same level. But these abandoned strands, preserved as terraces on the basin slopes, are not level now; and it is therefore inferred that the earth itself, the rocky foundation on which the terraces rest, has changed its form. The idea of earth movements, the slow rising of some districts and the sinking of others, is not new; but, until these old shore lines were studied, it was not known that such changes had recently affected the Lake region.

The departure of the old shore lines from horizontality is of a systematic character. They all rise toward the north and east, and fall toward the south and west. The amount of this tilting or inclination is not the same everywhere, nor is it everywhere in precisely the same direction; but the general fact plainly

appears, that the northeastern portion of the Great Lake district has been raised or the southwestern portion has been lowered, or both, several hundred feet since the epoch of these ice-dammed lakes, i.e., since the time when the Canadian ice sheet was slowly melting away. The effect of this change was to tip or cant each lake basin, and the effect of the canting was similar to the effect of canting a land basin containing water. In the land basin the water rises on the side toward which the basin is tipped, and falls away on the opposite side. In the lake basin there was a constant supply of water from rain and streams, so that it was always filled up to the level of the lowest point of its rim, and the surplus of water flowed away at that point: so, when it was canted, the changes in the extent of the lake were partly controlled by the outflow. If the outlet was on the northeastern side of the basin, the southwesterly canting would make the water rise along its southwestern shore, the submerged area being thereby enlarged. If the outlet was toward the southwest, then the canting would draw the water away from the northeastern slopes, and diminish the submerged area. If the lowest point of the rim was originally on the northeast side, the canting might lift this part of the rim so high that some point on the southwest side would become lowest, and the point of outlet might thus be changed from north or east to south or west. The evidence of the old shores and channels shows that all these possible changes have actually occurred in the lake basins, and that some of them were related in an important way to the history of the Niagara River.

The gradual canting affected the size of Lake Erie, Lake Ontario, and the temporary Lake Iroquois, making each grow toward the southwest. When Lake Erie was born, its length could not have been more than half as great as now, and its area was much smaller. The original Lake Huron may have had about the same size as the present lake, but its form and position were different. Less land was covered at the south and west, more land at the north and east, and the outlet was at North Bay (N, Fig. 19). By the tipping of the basin the lake was made gradually to expand toward the west and south till at last the water reached the pass at the head of the St. Clair River. Soon afterward the water ceased flowing through the North Bay outlet. The water then gradually withdrew from the northeastern region till finally the shores assumed their present position.

At an earlier stage, while the North Bay district was blocked by the ice sheet, it is probable that the basin had an outlet near Lake Simcoe (*S*), but the evidence of this is less complete. If the Huron water crossed the basin's rim at that point, it followed the Trent valley to Lake Iroquois or Lake Ontario; when it crossed the rim at North Bay, it followed the Ottawa valley to the St. Lawrence; and in each case it reached the ocean without passing through Lake Erie and the Niagara River. Thus there was a time when the Niagara River received no water from the Huron, Michigan, or Superior basins, but from the Erie basin alone. It was then a comparatively small stream, for the Erie basin is only one eighth of the whole district now tributary to the river; and the cataract more nearly resembled the American Fall than the Horseshoe.

THE WHIRLPOOL.

The Whirlpool is a peculiar point in the course of the river. Not only does the channel there make an abrupt turn to the right, but with equal abruptness it is enlarged and again contracted. The pool is a deep oval basin, communicating through narrow gateways with the gorge above and the gorge below. The torrent, rushing with the speed of an ocean greyhound from the steep, shallow passage known as the Whirlpool Rapids, enters the pool and courses over its surface till its headway is checked. The initial impulse prevents it from turning at once toward the channel of exit, and the current circles to the left instead of the right, following the curved margin of the pool, and finally descending under the entering stream so as to rise beyond it at the outlet. Thus the water describes a complete loop, a peculiarity of current quite as remarkable and rare as the feats of railway engineering which bear that name. In the chart of the Whirlpool (Fig. 20) the surface currents are indicated by arrows; and some idea of the appearance of the currents may be obtained from the view in Fig. 7, where the swift incoming current crosses the foreground from right to left, and the exit current occupies the middle of the picture. In the smoother tract between these two visible currents the water rises after passing under the nearer. These currents can be watched from any of the surrounding cliffs, and there is a fascination about them akin to that of the cataract itself and the Whirlpool Rapids.

The gorge above, the gorge below, and two sides of the Whirlpool are walled by rock; but the remaining side, that opposite to the incoming stream, shows no rock in its wall (Figs. 20 and 21). On the north side, the edge of the Niagara limestone can be traced to *A* (Fig. 20) with all its usual characters, but there it disappears beneath the drift. The Clinton limestone disappears in a similar way just below it, and the quartzose sandstone, which there skirts the margin of the water, is a little more quickly covered, being last seen at *B*. On the south bank the Niagara limestone can be traced farther. Its edge is visible almost continuously to *E*, and is laid bare in the bed of a small creek at *F*. The Clinton bed is similarly traceable, with slight interruption, to *D*; and the quartzose sandstone passes under the drift at *C*. Where each rock ledge is last seen it points toward the northwest, and betrays no tendency to curve around and join its fellow in the opposite wall. In the intervening space the side of the gorge seems to be composed entirely of drift. Sand and clay, pebbles and bowlders, make up the slope; and a beach of bowlders margins the water from *B* to *C*. It is inferred from this arrangement of rock and drift that there was a deep hollow in the plain before the drift was spread by the ice, the drift being deposited in it and over it until it was filled and covered. The parallel directions of the rock ledges suggest that the hollow was part of a stream channel running northwestward; and this interpretation is borne out not only by certain topographic features two or three miles away, but by a study of the bed and banks of Bowman Creek (Fig. 15). That stream, which rises two miles away, has carved a ravine where it approaches the Whirlpool. The northeast bank of the ravine (Fig. 20) seems to be composed entirely of drift; but the opposite bank, though chiefly of drift, lays bare the rock at a number of places, revealing a sloping wall descending toward the northeast. The bed of the stream in general shows nothing but drift; but there is one place where the creek swerves a little to the southward, and

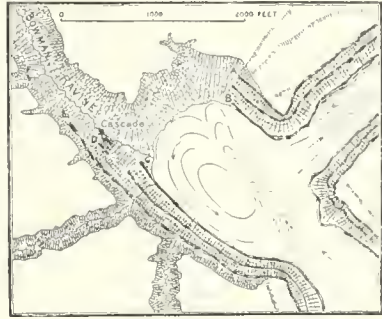


FIG. 20. — The Whirlpool.

Rock is indicated by crosshatching; drift, by dots. Arrows indicate the direction of current.

for a few rods presses against the rock slope; and it has there made a small cut into the rock, cascading at one point over a sandy ledge that is harder than the associated shale.

With the aid of this information, it is easy to understand the peculiar features of the Whirlpool. The Niagara River did not seek this old channel and thus find an easy way northward, but ran upon it accidentally at one point. Its course on the plain was determined for it by the slopes of the drift, and the arrangement of these slopes happened to guide the water across the buried channel at the Whirlpool. In making the gorge from the Whirlpool to the escarpment, and also in making the upper part of the gorge, the river found hard rock to be removed; and it worked as a quarryman, digging down below in the softer rocks with such tools as it had to use, and thus undermining the limestone cap. At the Whirlpool there was no need to quarry, because there was no limestone cap; and, to carry out the homely figure, the river merely dug in a gravel pit, shoveling the loose drift quickly away. This work of excavation did not cease when a channel of the usual width had been opened, because the angle in the course of the river set the current strongly against the bank of drift, and caused it to clear out a basin in the old channel. Had the drift been wholly, as it is partly, of sand, still more of it would have been carried out; but it included large bowlders, and these were sorted out and accumulated until they made a sloping wall or sheathing, which covers all that part of the sand below the level of the pool, and resists further encroachment by the water. So the peculiar form of the river at this place was caused by the old channel with its filling of loose sand and gravel. The looped current evidently depends on the peculiar shape of the channel. The water enters the pool with such impetus that it is carried past the outlet, and the return current follows the bottom of the pool because that route is the easiest.

TIME.

Just under the escarpment where it is divided by the river stand two villages,—the American village of Lewiston, the Canadian village of Queenston. Lewiston is built partly on an old beach of Lake Iroquois, and near its steamboat wharf is a gravel pit where one can see the pebbles that were worn round by rolling up and down the old strand. That part of the escarp-

ment which overlooks Lewiston is somewhat terraced, or divided into steps, and was called "The Three Mountains" a century ago, when loads that had been brought by boat to the landing (Lewiston) were toilsomely carried up the steep ascent on their way to other boats plying on the upper Niagara.

The escarpment above Queenston is called Queenston Heights; and from its crest rises Brock's monument, a slender shaft commemorative of a battle between British and American soldiers. Within this shaft is a spiral staircase, and from a little chamber near the top one can look through portholes far away in all directions. Eastward and westward runs the escarpment, and the eye follows it for many miles. Southward stretches the upper plain, diversified by low, rolling hills, and divided in the foreground by the gorge. In the still air a cloud of spray hovers over the cataract, and a cloud of smoke at the horizon tells of Buffalo. Northward lies blue Ontario, and straight to its shore flows the deep-channelled, majestic Niagara, dividing the smooth green lowland into parts even more closely kin than the brother nations by which they are tilled. Beyond the water, and forty miles away, gleams Scarboro Cliff, where the lake waves are undermining a hill of drift; and twenty or thirty miles farther the imagination may supply—what the earth's roundness conceals from the eye—a higher upland that bounds the Ontario basin.

The Brock monument, the Niagara gorge, and the Ontario basin are three products of human or of natural work, so related to time that their magnitudes help the mind in grasping the time factor in Niagara history. The monument, measured in diameter by feet and in height by scores of feet, stands for the epoch of the white man in America. The gorge, measured in width by hundreds of yards and in length by miles, stands for the epoch since the ice age. The basin, measured in width by scores of miles and in length by hundreds of miles, stands for a period before the ice, when the uplands and lowlands of the region were carved from a still greater upland. The monument is half a century old; the gorge was begun some tens or hundreds, or possibly thousands, of centuries ago; and the hollowing of the basin consumed a time so far beyond our comprehension that we can only say it is related to the gorge epoch in some such way as the gorge epoch is related to the monument's half century.

The glacier made changes in the Ontario basin, but they were

small in comparison with its original size, and the basin is chiefly the work of other agents. Before the glacial age it was a river valley, and we may obtain some idea of its origin by thinking of the Niagara gorge as the beginning of a river valley, and trying to imagine its mode of growing broader. It has already been explained (p. 218) that the gorge walls fall back a little after the cataract has hewn them out, but seem to come to rest as soon as all the shale is covered by talus. So nearly do they approach rest that their profile is as steep near the mouth of the gorge as it is one mile below the cataract; but, in fact, they are not unchanging. Water trickling over the limestone cliff dissolves a minute quantity of the rock. This makes it porous, and lichens take root. Lichens and other plants add something to the water that increases its solvent power. The fragments of the talus are eaten faster because they expose more surface. Each winter the frost disturbs some of the stones of the talus, so that they slowly move down the slope; and wherever the shale is laid bare, frost and rain attack it again. Thus, with almost infinite slowness,—so slowly that the entire age of the gorge is too short a unit for its measurement,—the walls of the gorge are retreating from the river. At the same time every creek that falls into the gorge is making a narrow side gorge. The strongest of them has worked back only a few hundred feet (Fig. 15); but in time they will trench the plain in many directions, and each trench will open two walls to the attack of the elements. Space forbids that we trace the process further; but enough has been said to show that valleys are made far more slowly than gorges, and that the ancient shaping of the land into valley and upland was a far greater task than the comparatively modern digging of the gorge.

The middle term of our time scale, the age of the gorge, has excited great interest, because the visible work of the river and the visible dimensions of the gorge seem to afford a means of measuring in years one of the periods of which geologic time is composed. To measure the age of the river is to determine the antiquity of the close of the ice age. The principal data for the measurement are as follows: (1) The gorge now grows longer at the rate of four or five feet a year, and its total length is six or seven miles. (2) At the Whirlpool the rate of gorge making was relatively very fast, because only loose material had to be removed. Whether the old channel ended at the Whirlpool, or

extended for some distance southward on the line of the river, is a matter of doubt. (3) Part of the time the volume of the river was so much less that the rate of recession was more like that of the American Fall than that of the Horseshoe. Some suggestions as to the comparative extent of slow work and fast work are to be obtained from the profile of the bottom of the gorge. While the volume of the river was large, we may suppose that it dug deeply, just as it now digs under the Horseshoe Fall (see p. 216); while the volume was small, we may suppose that a deep pool

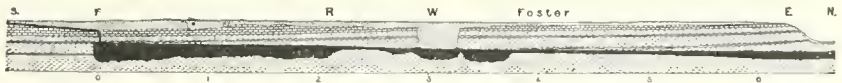


FIG. 21. — Longitudinal Section of the Niagara Gorge, with Diagram of the Western Wall.

The base line is at sea level. It is divided into miles. Water, black; drift, dotted; Niagara limestone in block pattern; shales, broken lines; F, falls; R, railway bridges; W, whirlpool; Foster, Foster Flats; E, escarpment.

was not made. Fig. 21 exhibits the approximate depth of the water channel through the length of the gorge; and by examining it the reader will see that the depth is great near the mouth of the gorge, again from the head of Foster Flats to the Whirlpool, and then from the bridges to the Horseshoe Fall. It is small, indicating slow recession, in the neighborhood of Foster Flats, and also between the Whirlpool and the railroad bridges. The problem is complicated by other factors, but they are probably less important than those stated.

Before the modern rate of recession had been determined, there were many estimates of the age of the river; but their basis of fact was so slender that they were hardly more than guesses. The first estimate with a better foundation was made by Dr. Julius Pohlman, who took account of the measured rate of recession and the influence of the old channel at the Whirlpool; he thought the river not older than 3,500 years. Dr. J. W. Spencer, adding to these factors the variations in the river's volume, computes the river's age as 32,000 years. Mr. Warren Upham, having the same facts before him, thinks 7,000 years a more reasonable estimate. And Mr. F. B. Taylor, while regarding the data as altogether insufficient for the solution of the problem, is of opinion that Mr. Upham's estimate should be multiplied by a number consisting of tens rather than units. Thus estimates founded on substantially the same facts range

from thousands of years to hundreds of thousands of years. For myself, I am disposed to agree with Mr. Taylor, that no estimate yet made has great value, and the best result obtainable may perhaps be only a rough approximation.

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CATALOGUE OF PLANTS

WHICH HAVE BEEN FOUND GROWING WITHOUT CULTIVATION IN THE

PARK AND ITS OUTLYING TERRITORIES.

COLLECTED, MOUNTED AND CATALOGUED FOR THE

PARK HERBARIUM

IN THE SUPERINTENDENT'S OFFICE AT

NIAGARA FALLS, ONTARIO.

BY

RODERICK CAMERON,

Chief Gardener.

QUEEN VICTORIA NIAGARA FALLS PARK.

JAMES WILSON, ESQ.,
Superintendent.

DEAR SIR,—Acting under your instructions I have, at odd moments during the past five years, collected a large number of specimens of the better known plants found growing without cultivation in the Park, and have mounted and catalogued them for convenience of reference.

So far 107 families, comprising 487 genera and 1,101 distinct species, have been found; and I have no doubt that others will yet be discovered. As you desired to have the catalogue embrace only such plants as have been mounted and are on evidence in the Herbarium, I have not included any of the many other species not found by me but which have been noted by visiting botanists from time to time in the immediate vicinity of the Park.

I have to thank Professor John Macoun, the eminent Chief Botanist of the Geological Survey of Canada, for verifying the names of the several species and for many acts of courtesy and words of encouragement.

The whole respectfully submitted.

RODERICK CAMERON,
Gardener.

THE PARK, NIAGARA FALLS,
February, 1896.

NAMES OF THE NATURAL ORDERS OF PLANTS.

(As defined in *Gray's Manual of Botany, Sixth Edition.*)

ORDER.	FAMILY.	No. of genera.	No. of species.
1	Ranunculaceæ(Crowfoot)....	11	24
2	Magnoliaceæ(Magnolia)....	2	3
3	Anonaceæ(Custard Apple)....	1	1
4	Menispermaceæ(Moonseed)....	1	1
5	Berberidaceæ(Barberry)....	4	4
6	Nymphæaceæ(Water-Lily)....	1	3
7	Sarraceniaceæ.....(Pitcher Plants)....	1	1
8	Papaveraceæ(Poppy)....	3	3
9	Fumariaceæ.....(Fumitory)....	1	2
10	Crucifereæ(Mustard)....	17	32
11	Capparidaceæ(Caper)....	1	1
13	Cistaceæ.....(Rock-Rose)....	1	1
14	Violaceæ(Violet)....	2	13
15	Caryophyllaceæ(Pink)....	7	17
16	Portulacaceæ(Purslane)....	2	3
18	Hypericaceæ.....(St. John's Wort)....	2	7
20	Malvaceæ(Mallow)....	3	5
21	Tiliaceæ(Linden)....	1	2
22	Linaceæ(Flax)....	1	3
23	Geraniaceæ(Geranium)....	4	7
24	Rutaceæ(Rue)....	2	3
25	Ilicineæ(Holly)....	1	1
26	Celastraceæ.....(Staff-Tree)....	2	3
27	Rhamnaceæ(Buckthorn)....	1	1
28	Vitaceæ(Vine)....	2	3
29	Sapindaceæ(Soapberry)....	4	7
30	Anacardiaceæ(Cashew)....	1	6
31	Polygalaceæ(Milkwort)....	1	2
32	Leguminosæ(Pulse). . .	15	35
33	Rosaceæ(Rose)....	14	50
35	Saxifragaceæ(Saxifrage)....	6	12
36	Crassulaceæ(Orpine)....	2	3
38	Hamamelidæ(Witch-Hazel)....	1	1
39	Haloragææ(Water-Milfoil)....	1	3
41	Lythraceæ(Loosestrife)....	2	2
42	Onagraceæ(Evening-Primrose)....	5	10
47	Ficoideæ	1	1
48	Umbelliferæ(Parsley)....	14	18
49	Araliaceæ(Ginseng)....	1	5
50	Cornaceæ.....(Dogwood)....	2	9
51	Caprifoliaceæ.....(Honeysuckle) . . .	6	19
52	Rubiaceæ.....(Madder)....	5	14
53	Valerianaceæ.....(Valerian)....	1	1
54	Dipsacæ.. . . . .(Teasel)....	1	1
55	Compositæ(Composite)....	40	100

	ORDER.	FAMILY.	No. of genera.	No. of species.
56	Lobeliaceæ	(Lobelia)	1	6
57	Campanulaceæ	(Campanula)	2	5
58	Ericaceæ	(Heath)	11	22
61	Primulaceæ	(Primrose)	4	7
65	Oleaceæ	(Olive)	3	6
66	Apocynaceæ	(Dogbane)	1	2
67	Asclepiadaceæ	(Milkweed)	3	8
69	Gentianaceæ	(Gentian)	2	5
70	Polemoniaceæ	(Polemonium)	2	2
71	Hydrophyllaceæ	(Waterleaf)	1	2
72	Borraginaceæ	(Borage)	6	12
73	Convolvulaceæ	(Convolvulus)	2	3
74	Solanaceæ	(Nightshade)	6	12
75	Scrophulariaceæ	(Figwort)	14	28
76	Orobanchaceæ	(Broom-Rape)	3	3
77	Lentibulariaceæ	(Bladderwort)	1	3
79	Pedaliaceæ . . . . .	.....	1	1
80	Acanthaceæ	(Acanthus)	1	1
81	Verbenaceæ	(Vervain)	2	3
82	Labiataæ	(Mint)	17	25
83	Plantaginaceæ	(Plantain)	1	3
86	Amarantaceæ	(Amaranth)	1	3
87	Chenopodiaceæ	(Goosefoot)	3	8
88	Phytolaccaceæ	(Pokeweed)	1	1
89	Polygonaceæ	(Buckwheat)	3	19
91	Aristolochiaceæ	(Birthwort)	1	1
92	Piperaceæ	(Pepper)	1	1
93	Lauraceæ	(Laurel)	2	2
94	Thymelæaceæ	(Mezcreum)	1	1
95	Elæagnaceæ	(Oleaster)	1	1
97	Santalaceæ	(Sandalwood)	1	1
98	Euphorbiaceæ	(Spurge)	2	6
99	Urticaceæ	(Nettle)	8	11
100	Platanaceæ	(Plane-Tree)	1	1
101	Juglandaceæ	(Walnut)	2	7
103	Cupuliferæ	(Oak)	7	17
104	Salicaceæ	(Willow)	2	11
106	Ceratophyllaceæ	(Hornwort)	1	1
107	Coniferæ	(Pine)	8	11
108	Hydrocharidaceæ	Frog's-Bit)	3	3
110	Orchidaceæ	(Orchid)	10	21
113	Iridaceæ	(Iris)	2	2
114	Amaryllidaceæ	(Amaryllis)	1	1
115	Dio-coreaceæ	(Yam)	1	1
116	Liliaceæ	(Lily)	11	25
117	Pontederiaceæ	(Picker-Weed)	2	2
121	Juncaceæ	(Rush)	2	12
122	Typhaceæ	(Cat-Tail)	2	4
123	Araceæ	(Arum)	2	2
125	Alismaceæ	(Water-Plantain)	3	6
126	Naiadaceæ	(Pondweed)	2	10
128	Cyperaceæ	(Sedge)	6	58

	ORDER.	FAMILY.	No. of genera.	No. of species.
129	Gramineæ	(Grass)....	28	52
130	Equisetaceæ.....	(Horsetail)....	1	7
131	Filices.....	(Ferns)....	14	33
132	Ophioglossaceæ. .	(Adder's Tongue)....	1	7
133	Lycopodiaceæ	(Club-Moss)....	1	3
134	Selaginellaceæ		2	2
137	Jungermanniaceæ....	(Scale-Mosses)....	11	12
138	Marchantiaceæ	(Liverwort)....	3	3
139	Musci		34	89
140	Lichens		18	41

Order 1. RANUNCULACEÆ.—Crowfoot Family.

CLEMATIS.

Clematis Virginiana Virgin's Bower.

ANEMONE.

Anemone cylindrica Long-fruited Anemone.
Anemone nemorosa Wood Anemone or Wind-flower.
Anemone dichotoma Anemone.

HEPATICA.—Liver Leaf.

Hepatica triloba Round-lobed Hepatica.
Hepatica acutiloba Sharp-lobed Hepatica.

THALICTRUM.—Meadow Rue.

Thalictrum anemonoides..... Rue Anemone.
Thalictrum polygamum Meadow Rue.
Thalictrum dioicum..... Early Meadow Rue.

RANUNCULUS.—Crowfoot, Buttercup.

Ranunculus aquatilis var *trichophyllus*.. Water Crowfoot.
Ranunculus sceleratus..... Cursed Crowfoot.
Ranunculus recurvatus Hooked Crowfoot.
Ranunculus Pennsylvanicus Bristly Crowfoot.
Ranunculus fascicularis Early Crowfoot.
Ranunculus repens Creeping Crowfoot.
Ranunculus acris..... Buttercup Crowfoot.
Ranunculus Flammula var *reptans* Creeping Crowfoot.

CALTHA.—Marsh Marigold.

Caltha palustris Marsh marigold.

COPTIS.—Gold Thread.

Coptis trifolia .. Threc-leaved Gold thread.

AQUILEGIA.—Columbine.

Aquilegia Canadensis Wild Columbine.

CIMICIFUGA.—Bugbane.

Cimicifuga racemosa Black Snakeroot.

ACTÆA.—Baneberry.

Actæa spicata var *rubra* Red Baneberry.

Actæa alba White Baneberry.

HYDRASTIS.—Orange Root.

Hydrastis Canadensis Golden Seal.

Order 2. MAGNOLIACEÆ.—Magnolia Family.

MAGNOLIA.

Magnolia acuminata Cucumber Tree.

Magnolia umbrellæ Umbrella Tree.

LIRIODENDRON.

Liriodendron tulipifera Tulip tree.

Order 3. ANONACEÆ.—Custard Apple Family.

ASIMINA.—North American Papaw.

Asimina triloba Papaw tree.

Order 4. MENISPERMACEÆ.—Moonseed Family.

MENISPERMUM.

Menispermum Canadense Moonseed.

Order 5. BERBERIDACEÆ.—Barberry Family.

BERBERIS.

Berberis vulgaris Common barberry.

CAULOPHYLLUM.

Caulophyllum thalictroides Blue cohosh or Pappoose-root

JEFFERSONIA.

Jeffersonia diphylla Twin leaf.

PODOPHYLLUM.

Podophyllum peltatum May apple.

Order 6. NYMPHÆACEÆ.—Water Lily Family.

NYMPHÆA.

Nymphæa odorata Sweet scented water lily.

NUPHAR.

Nuphar advena Yellow water lily.

Nuphar pumilum..... Small yellow water lily.

Order 7.—SARRACENIACEÆ —Pitcher Plant Family.

SARRACENIA.

Sarracenia purpurea Side saddle flower.

Order 8. PAPAVERACEÆ.—Poppy Family.

SANGUINARIA.

Sanguinaria Canadensis Bloodroot.

CHELIDONIUM.

Chelidonium majus Celandine.

PAPAVER.

Papaver somniferum Common poppy.

Order 9.—FUMARIACEÆ.—Fumitory Family.

DICENTRA.

Dicentra Cucullaria..... Dutchman's breeches.

Dicentra Canadensis Squirrel corn.

Order 10. CRUCIFERÆ.—Mustard Family.

DENTARIA.—Toothwort.

Dentaria diphylla Toothwort pepper root.

Dentaria laciniata Toothwort pepper root.

CARDAMINE.—Bitter Cress.

Cardamine rhomboidea Spring cress.

Cardamine rhomboidea var purpurea... Spring cress.

Cardamine hirsuta Small bitter cress.

ARABIS.—Rock Cress.

<i>Arabis lyrata</i>	Rock cress.
<i>Arabis confinis</i>	Rock cress.
<i>Arabis hirsuta</i>	Rock cress.
<i>Arabis lævigata</i>	Rock cress.
<i>Arabis Canadensis</i>	Sickle pod.
<i>Arabis perfoliata</i>	Tower mustard.

ALYSSUM.

<i>Alyssum calycinum</i>	Yellow alyssum.
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LUNARIA.—Satin Flower.

<i>Lunaria biennis</i>	Honesty.
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CAMELINA.

<i>Camelina sativa</i>	False flax.
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NASTURTIIUM.

<i>Nasturtium officinale</i>	True water cress.
<i>Nasturtium palustre</i>	Marsh cress.
<i>Nasturtium palustre</i> var <i>hispidum</i>	Marsh cress.
<i>Nasturtium armoracia</i>	Horse radish.

BARBAREA.—Winter Cress.

<i>Barbarea vulgaris</i>	Common winter cress.
<i>Barbarea vulgaris</i> var <i>stricta</i>	Common winter cress.

HESPERIS.—Rocket.

<i>Hesperis matronalis</i>	Dame's Violet.
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ERYSIMUM.—Treacle Mustard.

<i>Erysimum cheiranthoides</i>	Worm seed mustard.
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SISYMBRIUM.

<i>Sisymbrium officinale</i>	Hedge mustard.
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BRASSICA.

<i>Brassica sinapistrum</i> or <i>sinapis arvensis</i> ..	English charlock.
<i>Brassica</i> (or <i>sinapis</i>) <i>nigra</i>	Black mustard.
<i>Brassica rapa</i>	Turnip.

CAPSELLA.

<i>Capsella Bursa-pastoris</i>	Shepherd's purse.
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THLASPI.

Thlaspi arvense Penny cress.

LEPIDIUM.—Pepperwort.

Lepidium intermedium Wild pepper grass.

Lepidium campestre Pepperwort pepper grass.

CAKILE.

Cakile Americana American sea rocket.

RAPHANUS.

Raphanus sativus Garden radish.

Order 11. **CAPPARIDACEÆ.—Caper Family.****POLANISIA.**

Polanisia graveolens Polanisia.

Order 13. **CISTACEÆ.—Rock Rose Family.**

Helianthemum Canadense Frost weed.

Order 14. **VIOLACEÆ.—Violet Family.****VIOLA.—Heart's-ease.**

Viola rotundifolia Round-leaved violet.

Viola lanceolata Lance-leaved violet.

Viola blanda Sweet white violet.

Viola odorata Sweet or English violet.

Viola palustris Marsh violet.

Viola palmata var *cucullata* Common blue violet.

Viola canina var *sylvestris* Dog violet.

Viola rostrata Long-spurred violet.

Viola Canadensis Canada violet.

Viola pubescens Downy yellow violet.

Viola eriocephalus

Viola tricolor Pansy or heartsease.

SOLEA.

Solea concolor Green violet.

Order 15. CARYOPHYLLACEÆ.—Pink Family.

DIANTHUS.—Carnation.

Dianthus armeria Deptford pink.

SAPONARIA.—Soapwort.

Saponaria officinalis Bouncing Bet.

SILENE.

Silene antirrhina Sleepy catchfly.

Silene stellata Starry campion.

LYCHNIS.—Cockle.

Lychnis vespertina Evening lychnis.

Lychnis Githago Corn cockle.

Lychnis diurna Ragged Robin.

ARENARIA.—Sandwort.

Arenaria serpyllifolia Thyme leaved sandwort.

Arenaria lateriflora Sandwort.

STELLARIA.

Stellaria media Common chickweed.

Stellaria longifolia Long-leaved stitchwort.

Stellaria longipes Long-stalked stitchwort.

CERASTIUM.

Cerastium vulgatum Mouse-ear chickweed.

Cerastium viscosum Larger mouse-ear chickweed.

Cerastium nutans Annual chickweed.

Cerastium arvense Field chickweed.

Order 16. PORTULACACEÆ.—Purslane Family.

PORTULACA.

Portulaca oleracea Common purslane.

CLAYTONIA.—Spring Beauty.

Claytonia Virginica Narrow-leaved spring beauty.

Claytonia Caroliniana Broad-leaved spring beauty.

Order 18. HYPERICACEÆ.—St. John's Wort Family.

HYPERICUM.

<i>Hypericum Kalmianum</i>	Kalm's St. John's wort.
<i>Hypericum perforatum</i>	Common St. John's wort.
<i>Hypericum mutilum</i>	Hypericum.
<i>Hypericum maculatum</i>	Hypericum, Corymbed.
<i>Hypericum Canadense</i>	Hypericum.
<i>Hypericum Canadense</i> var <i>majus</i>	Hypericum.

ELODES.

<i>Elodes Virginica</i> or <i>campanulata</i>	Marsh St. John's wort.
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Order 20. MALVACEÆ.—Mallow Family.

MALVA.—Mallow.

<i>Malva rotundifolia</i>	Common mallow.
<i>Malva moschata</i>	Musk mallow.

ABUTILON.—Indian Mallow.

<i>Abutilon Avicennæ</i>	Velvet leaf.
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HIBISCUS.—Rose Mallow.

<i>Hibiscus Trionum</i>	Bladder ketmia.
<i>Hibiscus Moscheutos</i>	Swamp Rose mallow.

Order 21. TILIACEÆ.—Linden Family.

TILIA.—Linden or Basswood.

<i>Tilia Americana</i>	Basswood.
<i>Tilia Europæa</i>	European linden.

Order 22. LINACEÆ.—Flax Family.

LINUM.

<i>Linum striatum</i>	Flax.
<i>Linum usitatissimum</i>	Common flax.
<i>Linum Virginianum</i>	Flax.

Order 23. GERANIACEÆ.—Geranium Family.

GERANIUM.

- Geranium maculatum Wild cranesbill.
 Geranium pusillum..... Small flowered cranesbill.
 Geranium Robertianum Herb Robert.

FLÆRKEA.

- Flærkea proserpinacoides False mermaid.

OXALIS.—Wood Sorrel.

- Oxalis corniculata, var stricta Yellow wood sorrel.

IMPATIENS.—Balsam Jewel Weed.

- Impatiens pallida Pale touch-me-not.
 Impatiens fulva Spotted touch-me-not.

Order 24. RUTACEÆ.—Rue Family.

ZANTHOXYLUM.—Prickly Ash.

- Zanthoxylum Americanum..... Northern Prickly Ash.

PTELEA.—Shrubby Trefoil or Hop tree.

- Ptelea trifoliata Hop tree.
 Ailanthus glandulosus..... Tree of Heaven.

Order 25. ILICINEÆ.—Holly Family.

ILEX.—HOLLY.

- Ilex verticillata Black alder. Winterberry.

Order 26. CELASTRACEÆ.—Staff Tree Family.

CELASTRUS.—Shrubby Bitter Sweet.

- Celastrus scandens Wax work or climbing bitter sweet.

EUONYMUS.

- Euonymus atropurpureus Burning Bush.
 Euonymus Americanus, var obovatus .. Trailing euonymus.

Order 27. RHAMNACEÆ.—Buckthorn Family.

CEANOTHUS.—Red-root.

Ceanothus Americanus New Jersey tea.

Order 28. VITACEÆ.—Vine Family.

VITIS.—Grape.

Vitis æstivalis Summer grape.

Vitis riparia..... Frost grape.

AMPELOPSIS.—Virginian Creeper.

Ampelopsis quinquefolia..... Virginian creeper.

Order 29. SAPINDACEÆ.—Soapberry Family.

ÆSCULUS.

Æsculus Hippocastanum Common horse-chestnut.

ACER.—Maple.

Acer spicatum Mountain maple.

Acer saccharinum Sugar or rock maple.

Acer dasycarpum..... White or silver maple.

Acer rubrum Red or swamp maple.

NEGUNDO.—Ash Leaved Maple or box-elder.

Negundo aceroides Box elder.

STAPHYLEA.

Staphylea trifolia American bladder nut.

Order 30. ANACARDIACEÆ.—Cashew Family.

RHUS.—Sumach.

Rhus typhina Stag horn sumach.

Rhus glabra Smooth sumach.

Rhus venenata..... Poison sumach, or dogwood.

Rhus toxicodendron..... Poison ivy, or poison oak.

Rhus aromatica Fragrant sumach.

Rhus toxicodendron var *radicans* Poison ivy.

Order 31. POLYGALACEÆ.—Milkwort Family.

POLYGALA.

- Polygala verticillata* Milk wort.
Polygala senega Seneca snakeroot.

Order 32. LEGUMINOSÆ.—Pulse Family.

LUPINUS.—Lupine.

- Lupinus perennis* Wild lupine.

TRIFOLIUM.—Clover.

- Trifolium arvense* Rabbit foot clover.
Trifolium pratense Red clover.
Trifolium repens White clover.
Trifolium agrarium Yellow or hop clover.
Trifolium procumbens Low hop clover.
Trifolium hybridum Alsike.

MELILOTUS.—Sweet Clover.

- Melilotus officinalis* Yellow meliot.
Melilotus alba White meliot.

MEDICAGO.—Medick.

- Medicago savita* Lucerne.
Medicago lupulina Black medick, or nonesuch.

ROBINIA.—Locust Tree.

- Robinia Pseudacacia* Common locust or false Acacia.
Robinia viscosa Clammy locust.

ASTRAGALUS.

- Astragalus Canadensis* Tall milk vetch.
Astragalus Cooperi Downy milk vetch.

GLYCYRRHIZA.

- Glycyrrhiza lepidota* Wild liquorice.

DESMODIUM.—Tick Trefoil.

- Desmodium nudiflorum* Tick trefoil.
Desmodium acuminatum Tick trefoil.
Desmodium rotundifolium Tick trefoil.
Desmodium cuspidatum Tick trefoil.
Desmodium paniculatum Tick trefoil.
Desmodium Canadense Tick trefoil.
Desmodium rigidum Tick trefoil.

LESPEDeza.

- Lespedeza reticulata* Bush clover.
Lespedeza hirta Bush clover.

VICIA.—Vetch. Tare.

- Vicia Cracca* Vetch.
Vicia Caroliniana Vetch.
Vicia Americana Vetch.

LATHYRUS.—Everlasting Pea.

- Lathyrus ochroleucus* Vetchling.
Lathyrus palustris Marsh vetchling.
Lathyrus palustris var *myrtifolius*

APIOS.—Wild Bean.

- Apios tuberosa* Ground nut.

PHASEOLUS.

- Phaseolus diversifolius* Kidney bean.

AMPHICARPEA.—Hog Peanut.

- Amphicarpea monoica* Hog peanut.

GYMNOCLADUS.

- Gymnocladus Canadensis* Kentucky coffee tree.

GLEDITSCHIA.

- Gleditschia triacanthus* Honey locust.

Order 33.—ROSACEÆ.—Rose Family.

PRUNUS.—Plum, Cherry, etc.

- Prunus Americana* Wild yellow or red plum.
Prunus Pennsylvanica Wild red cherry.
Prunus Virginiana Choke cherry.
Prunus serotina Wild black cherry.
Prunus cerasus Black choke cherry.

SPIRÆA.—Meadow Sweet.

- Spiræa opulifolia* Nine bar.
Spiræa salicifolia Meadow sweet.

RUBUS.—Bramble.

<i>Rubus odoratus</i>	Purple flowering raspberry.
<i>Rubus triflorus</i>	Dwarf raspberry.
<i>Rubus strigosus</i>	Wild red raspberry.
<i>Rubus occidentalis</i>	Black raspberry.
<i>Rubus villosus</i>	High blackberry.
<i>Rubus Canadensis</i>	Low blackberry.
<i>Rubus hispidus</i>	Running swamp blackberry.

DALIBARDA.

<i>Dalibarda repens</i>	Dalibarda.
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GEUM.—Avens.

<i>Geum album</i>	Avens.
<i>Geum strictum</i>	Avens.
<i>Geum rivale</i>	Purple Avens.
<i>Geum Virginianum</i>	Bristly Avens.

WALDSTEINIA.

<i>Waldsteinia fragarioides</i>	Barren strawberry.
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FRAGARIA.

<i>Fragaria Virginiana</i>	Wild strawberry.
<i>Fragaria vesca</i>	Wild strawberry.

POTENTILLA.—Cinque-foil, Five Finger.

<i>Potentilla Canadensis</i>	Cinque foil.
<i>Potentilla Canadensis</i> var <i>simplex</i>	Five finger.
<i>Potentilla argentea</i>	Five finger.
<i>Potentilla recta</i>	Five finger.
<i>Potentilla Anserina</i>	Silver weed.
<i>Potentilla palustris</i>	Marsh five finger.

AGRIMONIA.

<i>Agrimonia Eupatoria</i>	Common agrimony.
<i>Agrimonia parviflora</i>	Small flowered agrimony.

ROSA.—Rose.

<i>Rosa Carolina</i>	Swamp rose.
<i>Rosa blanda</i>	Early wild rose.
<i>Rosa rubiginosa</i>	Sweet brier.
<i>Rosa micrantha</i>	Smaller sweet brier.
<i>Rosa humilis</i>	Sweet brier.

PYRUS.—Pear. Apple.

<i>Pyrus malus</i>	Apple.
<i>Pyrus communis</i>	Pear.
<i>Pyrus coronaria</i>	Wild Crab apple.
<i>Pyrus arbutifolia</i>	Chokeberry.
<i>Pyrus Americana</i>	Mountain ash.
<i>Pyrus Aucuparia</i>	European rowan tree.

CRATÆGUS.—Hawthorn.

<i>Cratægus Oxyacantha</i>	English hawthorn.
<i>Cratægus coccinea</i> var <i>macrocarpa</i>	Large spurred thorn.
<i>Cratægus coccinea</i>	Scarlet fruited thorn.
<i>Cratægus Crusgalli</i>	Cockspur thorn.
<i>Cratægus punctata</i>	Yellow fruited thorn.

AMELANCHIER.

<i>Amelanchier Canadensis</i>	Shad bush. Service berry.
<i>Amelanchier Canadensis</i> , var <i>rotundifolia</i>	Round-leaved amelanchier.
<i>Amelanchier Canadensis</i> , var <i>oblongifolia</i>	Juneberry.

Order 35. SAXIFRAGACEÆ.—Saxifrage Family.

SAXIFRAGA.

<i>Saxifraga Virginiensis</i>	Early saxifrage.
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TIARELLA

<i>Tiarella cordifolia</i>	False mitrewort.
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MITELLA.

<i>Mitella diphylla</i>	Mitrewort.
<i>Mitella nuda</i>	Mitrewort.

CHRYSOSPLENIUM.

<i>Chrysosplenium Americanum</i>	Golden saxifrage.
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PARNASSIA.

<i>Parnassia Caroliniana</i>	Grass of Parnassus.
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RIBES.—Currant, Gooseberry.

<i>Ribes Cynosbati</i>	Wild gooseberry.
<i>Ribes prostratum</i>	Fetid currant.
<i>Ribes floridum</i>	Wild black currant.
<i>Ribes rubrum</i>	Red currant.
<i>Ribes aureum</i>	Buffalo currant.
<i>Ribes oxycanthoides</i>	Swamp gooselerry.

Order 36. CRASSULACEÆ.—Orpine Family.

PENTHORUM.

Penthorum sedoides Ditch stone-crop.

SEDUM.

Sedum acre Mossy stone-crop.

Sedum Telephium Garden orpine or live-for-ever.

Order 38. HAMAMELIDEÆ.—Witch Hazel Family.

HAMAMELIS.

Hamamelis Virginiana Witch hazel.

Order 39. HALORAGÆ.—Water Milfoil Family.

MYRIOPHYLLUM.

Myriophyllum heterophyllum Water milfoil.

Myriophyllum spicatum Water milfoil.

Myriophyllum verticillatum Water milfoil.

Order 41. LYTHRACEÆ.—Loosestrife Family.

LYTHRUM.

Lythrum Salicaria Spiked loosestrife.

DECODON.

Decodon verticillata (or *nesæa verticillata*) Swamp loosestrife.

Order 42. ONAGRACEÆ.—Evening Primrose Family.

LUDWIGIA.—False Loosestrife.

Ludwigia palustris Water purslane.

EPILOBIUM.—Willow Herb.

Epilobium spicatum Great willow herb.

Epilobium hirsutum Hairy willow herb.

Epilobium lineare Swamp willow herb.

Epilobium adenocaulon Common willow herb.

ENOOTHERA.

Enothera biennis Evening primrose.

Enothera pumila Small evening primrose.

GAURA.

Gaura biennis *Gaura*.

CIRCÆA.—Enchanter's Nightshade.

Circæa Lutetiana Tall Enchanter's nightshade.

Circæa alpina Low Enchanter's nightshade.

Order 47. FICOIDEÆ.—Ice Plant Family.

MOLLUGO.—Indian Chickweed.

Mollugo verticillata Carpet weed.

Order 48. UMBELLIFERÆ.—Parsley Family.

DAUCUS.

Daucus Carota Carrot.

ANGELICA.

Angelica atropurpurea Great Angelica.

CONIOSELINUM.

Conioselinum Canadense Hemlock parsley.

HERACLEUM.

Heracleum lanatum Cow parsnip.

PASTINACA.

Pastinaca sativa Common parsnip.

THASPIUM.

Thaspium barbinode Meadow parsnip.

Thaspium aureum Golden meadow parsnip.

CRYPTOTÆNIA.

Cryptotænia Canadensis Honewort.

SIUM.

Sium cicutæfolium Water parsnip.

ZIZIA.

Zizia integerrima *Zizia*.

CICUTA.—Water-Hemlock.

- Cicuta maculata* Spotted cowbane, or beaver poison.
Cicuta bulbifera Cowbane.

CONIUM.

- Conium maculatum* Poison hemlock.

OSMORRHIZA.—Sweet Cicely.

- Osmorrhiza longistylis* Smooth sweet cicely.
Osmorrhiza brevistylis Hairy sweet cicely.

HYDROCOTYLE.

- Hydrocotyle Americana* Water Pennywort.

SANICULA.

- Sanicula Canadensis* Canadian black snakeroot.
Sanicula Marylandica Black snakeroot.

Order 49. ARALIACEÆ.—Ginseng Family.

ARALIA.—Wild Sarsaparilla.

- Aralia spinosa* Angelica tree, or Hercules club.
Aralia racemosa Spikenard.
Aralia nudicaulis Wild Sarsaparilla.
Aralia quinquefolia Ginseng.
Aralia trifolia Dwarf ginseng, ground nut.

Order 50. CORNACEÆ.—Dogwood Family.

CORNUS.—Dogwood.

- Cornus Canadensis* Dwarf cornel.
Cornus florida Flowering dogwood.
Cornus circinata Round leaved dogwood.
Cornus sericea Silky cornel.
Cornus stolonifera Red osier dogwood.
Cornus asperifolia Rough leaved dogwood.
Cornus paniculata Paniced cornel.
Cornus alternifolia Alternate leaved cornel.

NYSSA.—Sour Gum Tree.

- Nyssa sylvatica* Pepperidge, or sour gum.

Order 51. CAPRIFOLIACEÆ.—Honeysuckle Family.

SAMBUCUS.—Elder.

- Sambucus Canadensis*.....Common elder.
Sambucus pubens, or *racemosa*.....Red berried elder.

VIBURNUM.—Arrow Wood.

- Viburnum Lentago*.....Sheep berry.
Viburnum dentatum.....Arrow wood.
Viburnum cassinoides.....Withe rod.
Viburnum pubescens.....Downy arrow wood.
Viburnum acerifolium.....Maple leaved arrowwood.
Viburnum Opulus.....Cranberry tree.

TRIOSTEUM.—Horse Gentian.

- Triosteum perfoliatum*.....Horse gentian.

SYMPHORICARPUS.—Snowberry.

- Symphoricarpus vulgaris*.....Indian currant.
Symphoricarpus racemosa.....Snowberry.
Symphoricarpus racemosus, var *pauciflorus*.....Low snowberry.

LONICERA.—Honeysuckle, Woodbine.

- Lonicera sempervirens*.....Trumpet honeysuckle.
Lonicera parviflora.....Small honeysuckle.
Lonicera hirsuta.....Hairy honeysuckle.
Lonicera ciliata.....Fly honeysuckle.
Lonicera Tartarica.....Tartarian honeysuckle.
Lonicera glauca.....Glaucous leaved honeysuckle.

DIERVILLA.

- Diervilla trifida*.....Bush honeysuckle.

Order 52. RUBIACEÆ.—Madder Family.

HOUSTONIA.

- Houstonia purpurea*, var *ciliolata*.....Houstonia.

CEPHALANTHUS.

- Cephalanthus occidentalis*.....Button bush.

MITCHELLA.

- Mitchella repens*.....Partridge berry.

GALIUM.—Bedstraw.

<i>Galium Aparine</i>	Cleavers, or goose grass.
<i>Galium asprellum</i>	Rough bedstraw.
<i>Galium trifidum</i>	Small bedstraw.
<i>Galium trifedum</i> , var <i>tinctorium</i>	Bedstraw.
<i>Galium triflorum</i>	Sweet-scented bedstraw.
<i>Galium pilosum</i>	Bedstraw.
<i>Galium circæzans</i>	Wild liquorice.
<i>Galium lanceolatum</i>	Wild liquorice.
<i>Galium boreale</i>	Northern bedstraw.
<i>Galium verum</i>	Yellow bedstraw.

Order 53. VALERIANACEÆ,—Valerian Family.

VALERIANA.

<i>Valeriana officinale</i>	Valerian.
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Order 54. DIPSACEÆ.—Teasel Family.

<i>Dipsacus sylvestris</i>	Wild teasel.
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Order 55. COMPOSITÆ.—Composite Family.

EUPATORIUM.

<i>Eupatorium purpureum</i>	Trumpet weed.
<i>Eupatorium perfoliatum</i>	Boneset.
<i>Eupatorium ageratoides</i>	White snakeroot.

LIASTRIS.

<i>Liastris cylindracea</i>	Blazing star.
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SOLIDAGO.

<i>Solidago squarrosa</i>	Golden rod.
<i>Solidago bicolor</i>	Golden rod.
<i>Solidago latifolia</i>	Golden rod.
<i>Solidago cæsia</i>	Golden rod.
<i>Solidago juncea</i>	Golden rod.
<i>Solidago patula</i>	Golden rod.
<i>Solidago rugosa</i>	Golden rod.
<i>Solidago Canadensis</i>	Golden rod.
<i>Solidago lanceolata</i>	Golden rod.
<i>Solidago nemoralis</i>	Golden rod.
<i>Solidago neglecta</i>	Golden rod.
<i>Solidago arguta</i>	Golden rod.
<i>Solidago serotina</i>	Golden rod.

BELLIS.

Bellis perennis Daisy.

SERICOCARPUS.

Sericocarpus solidagineus White topped aster.

ASTER.

Aster corymbosus Starwort.
Aster macrophyllus Starwort.
Aster umbellatus Starwort.
Aster lævis Starwort.
Aster undulatus Starwort.
Aster cordifolius Starwort.
Aster sagittifolius Starwort.
Aster diffusus Starwort.
Aster paniculatus Starwort.
Aster puniceus Starwort.
Aster Novæ Angliæ Tradescanti Starwort.

ERIGERON.—Fleabane.

Erigeron bellidifolius Robin's plantain.
Erigeron Philadelphicus Common fleabane.
Erigeron Canadensis Fleabane.
Erigeron annuus Daisy fleabane.
Erigeron strigosus Daisy fleabane.

ANTENNARIA.

Antennaria plantaginifolia Plantain leaved everlasting.

ANAPHALIS.

Anaphalis margaritacea Pearly everlasting.

GNAPHALIUM.—Cudweed.

Gnaphalium polycephalum Common everlasting.
Gnaphalium uliginosum Low cudweed.
Gnaphalium decurrens Everlasting.

INULA.

Inula Helenium Elecampane.

POLYMNIA.

Polymnia Canadensis Leaf cup.

AMBROSIA.

- Ambrosia artemisiæfolia* Bitter weed.
Ambrosia trifida Great rag weed.

XANTHIUM.

- Xanthium Canadense* Cockle bur.

HELIOPSIS.

- Heliopsis scabra* Ox-eye.

RUDBECKIA.

- Rudbeckia laciniata* Cone flower.
Rudbeckia hirta Cone flower.

HELIANTHUS.

- Helianthus annuus* Sunflower.
Helianthus strumosus Sunflower.
Helianthus divaricatus Sunflower.
Helianthus decapetalus Sunflower.
Helianthus grosse serratus Sunflower.
Helianthus rigidus Sunflower.

COREOPSIS.

- Coreopsis trichosperma* Tickseeds, sunflower.

BIDENS.—Bur Marigold.

- Bidens frondosa* Beggar ticks.
Bidens connata Swamp beggar ticks.
Bidens cernua Smaller bur marigold.
Bidens chrysanthemoides Larger bur marigold.
Bidens beckii Water marigold.

HELENIUM.

- Helenium autumnale* Sneezeweed.

ANTHEMIS.—Chamomile.

- Anthemis Cotula* May weed.

ACHILLEA.

- Achillea Millefolium* Yarrow.

CHRYSANTHEMUM.

- Chrysanthemum Leucanthemum* Ox-eye or white daisy.

TANACETUM

Tanacetum vulgareTansy.

ARTEMISIA.

Artemisia CanadensisMugwort.
 Artemisia AbsinthiumWormwood.
 Artemisia biennisBiennial wormwood.
 Artemisia vulgarisCommon Mugwort.

SENECIO.—Groundsel.

Senecio aureusGolden ragwort.
 Senecio aureus, var balsamitæSquaw weed.
 Senecio vulgarisCommon groundsel.

TUSSILAGO.

Tussilago FarfaraColts foot.

ERECHTHITES.

Erechthites hieracefoliaFireweed.

ARCTIUM.—Burdock.

Arctium LappaCommon burdock.

CNICUS.—Common or Plumed Thistle.

Cnicus altrosemus var discolorThistle.
 Cnicus lanceolatusPasture thistle.
 Cnicus arvensisCanada thistle.

CENTAUREA.

Centaurea cyanusBluebottle.

LAMPSANA.

Lampsana communisNipplewort.

CICHORIUM.

Cichorium IntybusSuccory or chicory.

TRAGOPOGON.—Goat's Beard.

Tragopogon porrifoliusOyster plant, salisfy.

LEONTODON.

Leontodon autumnalisFall dandelion.

PICRIS.

Picris hieracioides.

HIERACIUM.

<i>Hieracium Canadense</i>	Canada hawkweed.
<i>Hieracium scabrum</i>	Rough hawkweed.
<i>Hieracium venosum</i>	Rattlesnake weed.
<i>Hieracium paniculatum</i>	Panicled hawkweed.
<i>Hieracium marianum</i> ..	Hawkweed.
<i>Hieracium aurantiacum</i>	Hawkweed.
<i>Hieracium</i> var <i>subcanlescens</i>	Rattlesnake weed.

PRENANTHES.

<i>Prenanthes alba</i>	White lettuce, rattlesnake root.
<i>Prenanthes altissimas</i>	Tall white lettuce.

TARAXACUM.—Dandelion.

<i>Taraxacum officinale</i>	Common dandelion.
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LACTUCA.—Lettuce.

<i>Lactuca Canadensis</i>	Wild lettuce.
<i>Lactuca Scariola</i>	Prickly lettuce.
<i>Lactuca leucophæa</i> ..	False or blue lettuce.

SONCHUS.

<i>Sonchus oleraceus</i>	Common sow thistle.
<i>Sonchus asper</i>	Spiny-leaved sow thistle.
<i>Sonchus arvensis</i>	Field sow thistle.

Order 56. LOBELIACEÆ.—Lobelia Family.

LOBELIA.

<i>Lobelia cardinalis</i>	Cardinal flower.
<i>Lobelia syphilitica</i>	Great Lobelia.
<i>Lobelia inflata</i>	Indian tobacco.
<i>Lobelia Kalmii</i>	Kalm's Lobelia.
<i>Lobelia Kalmii</i> var <i>alba</i>	White Kalm's Lobelia.
<i>Lobelia syphilitica alba</i>	Great White Lobelia.

Order 57. CAMPANULACEÆ—Campanula Family.

SPECULARIA.

<i>Specularia perfoliata</i>	Venus' looking-glass.
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CAMPANULA.—Belle Flower.

<i>Campanula rotundifolia</i>	Harebell.
<i>Campanula aparinoides</i>	Marsh bellflower.
<i>Campanula Americana</i> ..	Tall bellflower.
<i>Campanula rapunculoides</i>	Bellflower

Order 58. ERICACEÆ.—Heath Family.

GAYLUSSACIA.

Gaylussacia resinosa Black huckleberry.

VACCINIUM.

Vaccinium stamineum Deerberry or squaw huckleberry.

Vaccinium corymbosum Swamp blueberry.

Vaccinium Pennsylvanicum Dwarf blueberry.

Vaccinium Canadense Common blueberry.

Vaccinium vacillans Low blueberry.

CHIOGENES.

Chiogenes hispida Creeping snowberry.

ARCTOSTAPHYLOS.

Arctostaphylos Uva-ursi Bear berry.

GAULTHERIA.

Gaultheria procumbens Creeping wintergreen.

CASSANDRA.

Cassandra calyculata Leather leaf.

CHIMAPHILA.

Chimaphila umbellata Princess pine.

Chimaphila maculata Spotted wintergreen.

MONESES.

Moneses uniflora One-flowered pyrola.

PYROLA.—Wintergreen.

Pyrola rotundifolia Pyrola.

Pyrola rotundifolia, var incarnata Pyrola.

Pyrola rotundifolia, var asarifolia Pyrola.

Pyrola elliptica Shin leaf.

Pyrola chlorantha Pyrola.

Pyrola secunda Pyrola.

PTEROSPORA.

Pterospora andromeda Pine-drops.

MONOTROPA.

- Monotropa uniflora* Indian pipe, corpse plant.
Monotropa Hypopitys Pine cap, false beech-drops.

Order 61. PRIMULACEÆ.—Primrose Family.

TRIENTALIS.—Chickweed. Wintergreen.

- Trientalis Americana* Star flower.

STEIRONEMA.

- Steironema ciliatum* Loosestrife.
Steironema longifolium Loosestrife.

LYSIMACHIA.—Loosestrife.

- Lysimachia thyrsiflora* Tufted loosestrife.
Lysimachia stricta Loosestrife.
Lysimachia nummularia Money wort.

SAMOLUS.

- Samolus Valenderi*, var. *Americanus* Water pimpernel.

Order 65. OLEACEÆ.—Olive Family.

FRAXINUS.

- Fraxinus Americana* White ash.
Fraxinus excelsior European ash.
Fraxinus pubescens Red ash.
Fraxinus sambucifolia Black or water ash.

LIGUSTRUM.

- Ligustrum vulgare* Privet or prim.

SYRINGA.

- Syringa vulgaris* Lilac.

Order 66. APOCYNACEÆ.—Dogbane Family.

APOCYNUM.

- Apocynum cannabinum* Indian hemp.
Apocynum androsæmifolium Spreading dogbane.

Order 67. ASCLEPIADACEÆ.—Milkweed Family.

ASCLEPIAS.—Milkweed. Silkweed.

<i>Asclepias Cornuti</i>	Common milkweed.
<i>Asclepias phytolaccoides</i>	Poke milkweed.
<i>Asclepias quadrifolia</i>	Milkweed.
<i>Asclepias incarnata</i>	Swamp milkweed.
<i>Asclepias tuberosa</i>	Butterfly weed.
<i>Asclepias verticillata</i>	Milkweed.

ACERATUS.

<i>Aceratus viridiflora</i>	Green milkweed.
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VINCETOXICUM.

<i>Vincetoxicum nigrum</i>	Climbing poison.
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Order 69. GENTIANACEÆ.—Gentian Family.

FRASERA.

<i>Frasera Carolinensis</i>	American Columbo.
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GENTIANA.

<i>Gentiana crinita</i>	Fringed gentian.
<i>Gentiana serrata</i>	Small fringed gentian.
<i>Gentiana Andrewsii</i>	Closed gentian.
<i>Gentiana Alba</i>	White closed gentian.

Order 70. POLEMONIACEÆ.—Polemonium Family.

POLEMONIUM.

<i>Polemonium reptans</i>	Greek valerian.
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PHLOX.

<i>Phlox divaricata</i>	Wild phlox.
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Order 71. HYDROPHYLLACEÆ.—Waterleaf Family.

HYDROPHYLLUM.

<i>Hydrophyllum Virginicum</i>	Waterleaf.
<i>Hydrophyllum Canadense</i>	Waterleaf.

Order 72. BORRAGINACEÆ.—Borage Family.

CYNOGLOSSUM.—Hound's tongue.

- Cynoglossum officinale* Common hound's tongue.
Cynoglossum Virginicum Wild comfrey.

ECHINOSPERMUM.

- Echinospermum Lappula* Stickseed.

MYOSOTIS.

- Myosotis palustris* True forget me not.
Myosotis laxa Forget me not.
Myosotis arvensis Forget me not.
Myosotis verna Forget me not.

LITHOSPERMUM.

- Lithospermum arvense* Corn gromwell.
Lithospermum officinale Common gromwell.
Lithospermum hirtum Bristly gromwell.

LYCOPSIS.

- Lycopsis Arvensis* Small bugloss.

ECHIUM.

- Echium vulgare* Blue weed.

Order 73. CONVULVULACEÆ.—Convolvulus Family.

CONVOLVULUS.

- Convolvulus sepium* Hedge bindweed.
Convolvulus spithameus Bindweed.

CUSCUTA.

- Cuscuta Gronovii* Gold thread.

Order 74. SOLANACEÆ.—Nightshade Family.

SOLANUM.—Nightshade.

- Solanum Dulcamara* Bitter sweet.
Solanum nigrum Common nightshade.
Solanum rostratum Prickly solanum.

PHYSALIS.

<i>Physalis grandiflora</i>	Ground cherry.
<i>Physalis pubescens</i>	Ground cherry.
<i>Physalis viscosa</i>	Ground cherry.
<i>Physalis lanceolata</i>	Ground cherry.

NICANDRA.

<i>Nicandra physaloides</i>	Apple of Peru.
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HYOSCYAMUS.

<i>Hyoscyamus niger</i>	Black henbane.
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DATHURA.

<i>Datura Stramonium</i>	Thorn apple.
<i>Datura Tatula</i>	Purple thorn apple.

NICOTIANA.

<i>Nicotiana rustica</i>	Wild tobacco.
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Order 75. SCROPHULARIACEÆ.—Figwort Family.

VERBASCUM.

<i>Verbascum Thapsus</i>	Common mullein.
<i>Verbascum Blattaria</i>	Moth mullein.

LINARIA.

<i>Linaria Canadensis</i>	Wild toad flax.
<i>Linaria vulgaris</i>	Toad flax, Butter and Eggs.

ANTIRRHINUM.

<i>Antirrhinum Orontium</i>	Snapdragon.
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SCROPHULARIA.

<i>Scrophularia nodosa</i>	Figwort.
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CHELONE.

<i>Chelone glabra</i>	Turtlehead.
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PENTSTEMON.

<i>Pentstemon pubescens</i>	Beard tongue.
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MIMULUS.

Mimulus ringens Monkey flower.

GRATIOLA.

Gratiola Virginiana Hedge hyssop.

ILYSANTHES.

Ilysanthes gratioides False pimpernel.

VERONICA.

Veronica Chamædrys Speedwell.
Veronica Americana American brooklime.
Veronica scutellata Marsh speedwell.
Veronica officinalis Common speedwell.
Veronica serpyllifolia Thyme-leaved speedwell.
Veronica peregrina Purslane speedwell.
Veronica arvensis Corn speedwell.
Veronica agrestis Field speedwell.

GERARDIA.

Gerardia purpurea Purple gerardia.
Gerardia purpurea, var *pauperecula* Gerardia.
Gerardia quercifolia Smooth false foxglove.
Gerardia pedicularia Gerardia.
Gerardia tenuifolia Slender gerardia.

CASTILLEIA.

Castilleia coccinea Scarlet painted cup.

PEDICULARIS.

Pedicularis Canadensis Common lousewort. Wood Betony.
Pedicularis lanceolata Lousewort.

MELAMPYRUM.

Melampyrum Americanum Cow wheat.

Order 76. OROBANCHACEÆ.—Broom Rape Family.

EPIPHEGUS.

Epiphegus Virginiana Beech-drops. Cancer root.

CONOPHOLIS.

Conopholis Americana Squaw-root. Cancer root.

APHYLLON.

Aphyllon uniflorum One-flowered cancer root.

Order 77. LENTIBULARIACEÆ.—Bladderwort Family.

UTRICULARIA.

Utricularia vulgaris Greater bladderwort
 Utricularia gibba Small bladderwort.
 Utricularia cornuta Bladderwort.

Order 79. PEDALIACEÆ.—Bigonia Family.

MARTYNIA.

Martynia proboscidea Unicorn plant.

Order 80. ACANTHACEÆ.—Acanthus Family.

DIANTHERA.

Dianthera Americana Water willow.

Order 81. VERBENACEÆ.—Vervain Family.

VERBENA.

Verbena hastata Blue vervain.
 Verbena urticæfolia White vervain.

PHRYMA.

Phryma Leptostachya Lopseed.

Order 82. LABIATÆ.—Mint Family.

TEUCRIUM

Teucrium Canadense American Germander. Wood sage.
 Teucrium occidentale Germander.

COLLINSONIA.

Collinsonia Canadensis Horse balm.

MENTHA.

<i>Mentha Canadensis</i>	Wild mint.
<i>Mentha viridis</i>	Spearmint.
<i>Mentha piperita</i>	Peppermint.

LYCOPUS.

<i>Lycopus Virginicus</i>	Bugle weed.
<i>Lycopus sinuatus</i>	Water horehound.

CALAMINTHA.

<i>Calamintha Nuttallii</i>	Calaminth.
<i>Calamintha Clinopodium</i>	Basil.

MELISSA.

<i>Melissa officinalis</i>	Common balm.
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HEDEOMA.

<i>Hedeoma pulegioides</i>	American pennyroyal.
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MONARDA.

<i>Monarda fistulosa</i>	Wild bergamot.
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LOPHANTHUS.

<i>Lophanthus nepetoides</i>	Giant hyssop.
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NEPETA.

<i>Nepeta Cataria</i>	Catnip.
<i>Nepeta Glechoma</i>	Ground ivy.

SCUTELLARIA.

<i>Scutellaria parvula</i>	Skullcap.
<i>Scutellaria galericulata</i>	Skullcap.
<i>Scutellaria lateriflora</i>	Mad-dog skullcap.

BRUNELLA.

<i>Brunella vulgaris</i>	Common self-heal, or heal-all
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PHYSOSTEGIA.

<i>Physostegia Virginiana</i>	False dragonhead
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MARRUBIUM.

<i>Marrubium vulgare</i>	Horehound.
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LEONURUS.

Leonurus Cardiaca Motherwort.

GALEOPSIS.

Galeopsis Tetrahit Common hemp nettle.

STACHYS.

Stachys palust Hedge nettle.

Order 83. PLANTAGINACEÆ.—Plantain Family.

PLANTAGO.

Plantago major Common plantain.
 Plantago lanceolata Ribgrass, English plantain.
 Plantago Rugelii Plantain.

Order 86. AMARANTACEÆ.—Amaranth Family.

AMARANTUS.

Amarantus retroflexus Pigweed.
 Amarantus albus Tumbleweed.
 Amarantus blitoides Tumbleweed.

Order 87. CHENOPODIACEÆ.—Goosefoot Family.

CHENOPODIUM.

Chenopodium album Lamb's quarters.
 Chenopodium glaucum Oak leaved goosefoot.
 Chenopodium Botrys Jerusalem oak.
 Chenopodium hybridum Maple leaved goosefoot.
 Chenopodium capitatum Strawberry blite.

ATRIPLEX.—Orache.

Atriplex patulam Orache.
 Atriplex patulum, var hastatum Orache.

CORISPERMUM.

Corispermum hyssopifolium Bugseed.

Order 88. PHYTOLACCACEÆ.—Pokeweed Family.

PHYTOLACCA.

Phytolacca decandra Pigeon berry.

Order 89. POLYGONACEÆ.—Buckwheat Family.

RUMEX.

<i>Rumex crispus</i>	Curled dock.
<i>Rumex sanguineus</i>	Bloody veined dock.
<i>Rumex Acetosella</i>	Sheep sorrel.

POLYGONUM.

<i>Polygonum agnaticum</i>	Water persicaria.
<i>Polygonum Hartwrightii</i>	Knotweed.
<i>Polygonum orientale</i>	Prince's feather.
<i>Polygonum lapathifolium</i>	Knotweed.
<i>Polygonum Hydropiper</i>	Common smartweed, or water pepper.
<i>Polygonum acre</i>	Water smartweed.
<i>Polygonum Virginianum</i>	Smooth knotweed.
<i>Polygonum aviculare</i>	Common knotgrass.
<i>Polygonum erectum</i>	Knotgrass.
<i>Polygonum arifolium</i>	Halbert leaved tear thumb.
<i>Polygonum sagittatum</i>	Arrow leaved tear thumb.
<i>Polygonum convolvulus</i>	Black bindweed.
<i>Polygonum dumetorum</i>	Climbing false buckwheat.
<i>Polygonum persicaria</i>	Lady's thumb.
<i>Polygonum Pennsylvanicum</i> .	

FAGOPYRUM.

<i>Fagopyrum esculentum</i>	Buckwheat.
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Order 91. ARISTOLOCHIACEÆ—Birthwort Family.

ASARUM.

<i>Asarum Canadense</i> ...	Wild ginger.
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Order 92. PIPERACEÆ.—Lizard's Tail Family.

SAURURUS.

<i>Saururus cernuus</i>	Lizard's tail.
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Order 93. LAURACEÆ.—Laurel Family.

SASSAFRAS.

<i>Sassafras officinale</i>	Sassafras.
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LINDERA.

<i>Lindera Benzoin</i>	Wild allspice.
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Order 94. THYMELÆACEÆ.—Mezereum Family.

DAPHNE.

Daphne Mezereum English Daphne.

Order 95. ELÆAGNACEÆ.—Oleaster Family.

SHEPHERDIA.

Shepherdia Canadensis Canadian shepherdia.

Order 97. SANTALACEÆ.—Sandalwood Family.

COMANDRA.

Comandra umbellata Bastard toad flax.

Order 98. EUPHORBIACEÆ.—Spurge Family.

EUPHORBIA.

Euphorbia glyptosperma Spurge.
Euphorbia maculata Spurge.
Euphorbia Helioscopia Spurge.
Euphorbia platyphylla Spurge.
Euphorbia polygonifolia Spurge.

ACALYPHA.

Acalypha Virginica Three-seeded mercury.

Order 99. URTICACEÆ.—Nettle Family.

ULMUS.

Ulmus Americana White elm.
Ulmus fulva Slippery, or red elm.
Ulmus racemosa Cork elm.

CELTIS.

Celtis occidentalis Nettle tree or sugar berry.

HUMULUS.

Humulus Lupulus Common hop.

MORUS.

- Morus rubra.....Red mulberry.
 Morus albaWhite mulberry.

URTICA.

- Urtica gracilisNettle.

LAPORTEA.

- Laportea CanadensisWood nettle.

PILEA.

- Pilea pumila.....Clearweed.

BÖEHMERIA.

- Böehmeria cylindricaFalse nettle.

Order 100. PLATANACEÆ.—Plane Tree Family.

PLATANUS.

- Platanus Occidentalis.....Sycamore tree.

Order 101. JUGLANDACEÆ.—Walnut Family.

JUGLANS.

- Juglans cinereaButternut.
 Juglans nigraBlack walnut.
 Juglans regiaMadeira nut

CARYA.

- Carya albaShell bark hickory.
 Carya porcinaPig nut hickory.
 Carya amaraBitter nut hickory.
 Carpa tomentosa.....White heart or downy hickory.

Order 103. CUPULIFERÆ.—Oak Family.

BETULA.

- Betula lutea.....Yellow birch.
 Betula albaWhite weeping birch.
 Betula papyriferaCanoe or paper birch.
 Betula lenta.....Sweet or black birch.

ALNUS.

Alnus incana Speckled alder.

OSTRYA.

Ostrya Virginica American hop hornbeam.

CARPINUS.

Carpinus Caroliniana Blue or water beech.

QUERCUS.

Quercus alba White oak.
Quercus bicolor Swamp white oak.
Quercus Prinus Chestnut oak.
Quercus Muhlenbergii Yellow chestnut oak.
Quercus coccinea Scarlet oak.
Quercus rubra Red oak.
Quercus palustris Swamp pin oak.

CASTANEA.

Castanea sativa var *Americana* American chestnut.

FAGUS.

Fagus ferruginea American beech.

Order 104. SALICACEÆ.—Willow Family.

SALIX.

Salix discolor Glaucous willow.
Salix petiolaris Petioled willow.
Salix alba White willow.
Salix Babylonica Weeping willow.
Salix longifolia Long leaved willow.
Salix nigra Black willow.

POPULUS.

Populus grandidentata Large toothed aspen.
Populus monilifera Cotton wood.
Populus balsamifera Balsam poplar.
Populus alba White poplar.
Populus tremuloides American aspen.

Order 106. CERATOPHYLLACEÆ.—Hornwort Family.

CERATOPHYLLUM.

Ceratophyllum demersum Hornwort.

Order 107. CONIFERÆ.—Pinæ Family.

PINUS.

- Pinus Strobus* White pine.
Pinus resinosa Red pine.

PICEA.

- Picea alba* White spruce.

TSUGA.

- Tsuga Canadensis* Hemlock.

ABIES.

- Abies balsamea* Balm of Gilead or balsam fir.

LARIX.

- Larix Americana* Black larch tamarac.

THUYA.

- Thuja occidentalis* American arbor vitæ, white cedar.

JUNIPERUS.

- Juniperus Virginiana* Red cedar.
Juniperus sabina var *procumbens* Creeping Juniper.
Juniperus communis Juniper.

TAXUS.

- Taxus baccata* var *Canadensis* American yew, ground hemlock.

Order 108. HYDROCHARIDACEÆ.—Frog's Bit Family.

ANACHARIS.

- Anacharis Canadensis* (*Elodea C.*) Waterweed.

CHARA.

- Chara fragilis* Waterweed.

VALLISNERIA.

- Vallisneria spiralis* Eel grass. Tape grass. .

Order 110. ORCHIDACEÆ.

MICROSTYLIS.

Microstylis monophyllos Adder's mouth.

LIPARIS.

Liparis Læselii Tway blade.

APLECTRUM.

Aplectrum hiemale Adam and Eve.

CORALLORHIZA.

Corallorhiza innata Yellow coral root.

Corallorhiza multiflora Purple coral root.

LISTERA.

Listera convallarioides Tway blade.

SPIRANTHES.—Ladies' Tresses.

Spiranthes latifolia Ladies' tresses.

Spiranthes Romanzoffiana Ladies' tresses.

Spiranthes cernua Ladies' tresses.

GOODYERA.

Goodyera pubescens Rattlesnake plantain.

Goodyera repens Small rattlesnake plantain.

ORCHIS.

Orchis spectabilis Showy orchis.

HABENARIA.

Habenaria virescens Rein orchis.

Habenaria viridis Rein orchis.

Habenaria hyperborea Rein orchis.

Habenaria Hookeri Rein orchis.

Habenaria blephariglottis White fringed orchis.

Habenaria lacera Ragged fringed orchis.

Habenaria psycodes Purple fringed orchis.

CYPRIPEDIUM.

Cypripedium parviflorum Moccasin flower.

Cypripedium pubescens Moccasin flower.

Order 113. IRIDACEÆ.—Iris Family.

Iris versicolor Large blue flag.

SISYRINCHIUM.

Sisyrinchium anceps Blue-eyed grass.

Order 114. AMARYLLIDACEÆ.—Amaryllis Family.

HYPOXYS.

Hypoxys Star grass.

Order 115. DIOSCOREACEÆ.—Yam Family.

DIOSCOREA.

Dioscorea villosa Wild yam root.

Order 116. LILIACEÆ.—Lily Family.

SMILAX.

Smilax hispida Greenbriar.

Smilax herbacea Carrion flower.

ALLIUM.

Allium tricoccum Wild leek.

Allium Canadense Wild garlic.

POLYGONATUM.

Polygonatum giganteum Great Solomon's Seal.

Polygonatum biflorum Smaller Solomon's Seal.

ASPARAGUS.

Asparagus officinalis Asparagus.

SMILACINA.

Smilacina racemosa False spikenard.

Smilacina stellata False Solomon's Seal.

Smilacina trifolia False Solomon's Seal.

Smilacina bifolia False Solomon's Seal.

 UVULARIA.

<i>Uvularia grandiflora</i>	Bellwort.
<i>Uvularia perfoliata</i>	Smaller bellwort.
<i>Uvularia sessilifolia</i>	Bellwort.

ERYTHRONIUM.

<i>Erythronium Americanum</i>	Yellow adder's tongue.
<i>Erythronium albidum</i>	White dog's tooth violet.
<i>Erythronium propullans</i>	Dog's tooth violet

LILIUM.

<i>Lilium Philadelphicum</i>	Wild orange red lily.
<i>Lilium Canadense</i>	Wild yellow lily.
<i>Lilium Carolinianum</i>	Lily.

MEDEOLA.

<i>Medeola Virginica</i>	Indian cucumber.
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TRILLIUM.

<i>Trillium grandiflorum</i>	Large white trillium.
<i>Trillium erectum</i>	Purple trillium.
<i>Trillium erectum</i> , var <i>viride</i>	Trillium.

CHAMÆLIRIUM.

<i>Chamælorium Carolinianum</i>	Devil's bit.
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MELANTHIUM.

<i>Melanthium Virginicum</i>	Bunch flower.
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Order 117. PONTEDERIACEÆ.—Pickerel weed Family.

PONTEDERIA.

<i>Pontederia cordata</i> , var <i>angustifolia</i> ...	Pickerel weed.
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SCHOLLERA.

<i>Schollera graminea</i> (<i>Heteranthera</i>) ...	Water star grass.
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Order 121. JUNCACEÆ.—Rush Family.

JUNCUS.

<i>Juncus effusus</i>	Common or soft rush.
<i>Juncus filiformis</i>	Rush.
<i>Juncus Balticus</i>	Rush.
<i>Juncus Bufonius</i>	Rush.
<i>Juncus tenuis</i>	Rush.
<i>Juncus articulatus</i>	Rush.
<i>Juncus alpinus</i> var <i>insignis</i>	Rush.
<i>Juncus nodosus</i>	Rush.
<i>Juncus nodosus</i> , var <i>megacephalus</i>	Rush.
<i>Juncus Canadensis</i> , var <i>longicaudatus</i> ..	Rush.

LUZULA.

<i>Luzula pilosa</i>	Woodrush
<i>Luzula campestris</i> , var <i>pallescens</i>	Woodrush.

Order 122. TYPHACEÆ.—Cat-tail Family.

TYPHA.

<i>Typha latifolia</i>	Cat-tail flag.
<i>Typha angustifolia</i>	Small Cat-tail flag.

SPARGANIUM.

<i>Sparganium eurycarpum</i>	Bur-reed.
<i>Sparganium simplex</i>	Bur-reed.

Order 123. ARACEÆ.—Arum Family.

ARISÆMA.

<i>Arisæma triphyllum</i>	Indian turnip.
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SYMPLOCARPUS.

<i>Symplocarpus foetidus</i>	Skunk cabbage.
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Order 125. ALISMACEÆ.—Water Plantain Family.

ALISMA.

<i>Alisma Plantago</i> var <i>Americanum</i>	Water plantain.
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SAGITTARIA.

<i>Sagittaria variabilis</i>	Arrowhead.
<i>Sagittaria variabilis</i> , var <i>hastata</i>	Arrowhead.
<i>Sagittaria variabilis</i> , var <i>angustifolia</i> ..	Arrowhead.
<i>Sagittaria heterophylla</i>	Arrowhead.

Order 126. NAIADACEÆ.—Pondweed Family.

TRIGLOCHIN.

<i>Triglochin palustris</i>	Arrow grass.
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POTAMOGETON.

<i>Potamogeton natans</i>	Pondweed.
<i>Potamogeton natans</i> , var <i>prolixus</i>	Pondweed.
<i>Potamogeton mucronatus</i>	Pondweed.
<i>Potamogeton praelongus</i>	Pondweed.
<i>Potamogeton perfoliatus</i>	Pondweed.
<i>Potamogeton pauciflorus</i>	Pondweed.
<i>Potamogeton pusillus</i>	Pondweed.
<i>Potamogeton zosteræfolius</i>	Pondweed.
<i>Potamogeton pectinatus</i>	Pondweed.

NAIAS.

<i>Naias Flexilis</i>	Naiad.
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Order 128. CYPERACEÆ.—Sedge Family

CYPERUS.

<i>Cyperus diandrus</i>	Galingale.
<i>Cyperus esculentus</i>	Galingale.
<i>Cyperus strigosus</i>	Galingale.
<i>Cyperus Schweinitzii</i>	Galingale.
<i>Cyperus filiculmis</i>	Galingale.

DULICHIMUM.

<i>Dulichium spathaceum</i>	Dulichium.
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ELEOCHARIS.

<i>Eleocharis obtusa</i> (E. <i>Ovata</i>)	Spikerush.
<i>Eleocharis palustris</i>	Spikerush.
<i>Eleocharis acicularis</i>	Spikerush.

SCIRPUS.

<i>Scirpus pungens</i>	Bulrush.
<i>Scirpus lacustris</i>	Great Bulrush.
<i>Scirpus fluviatilis</i>	Clubrush.
<i>Scirpus sylvaticus</i>	Clubrush.
<i>Scirpus atrovirens</i>	Clubrush.

ERIOPHORUM.

Eriophorum cyperinum Wool grass.

CAREX.

Carex festucasea Sedge.
Carex echinata Sedge.
Carex polytrichoides Sedge.
Carex tribuloides var *cristata* Sedge.
Carex teretiuscula Sedge.
Carex vulpinoidea Sedge.
Carex sparganioides Sedge.
Carex cephalophora Sedge.
Carex rosea Sedge.
Carex tenella Sedge.
Carex scoparia Sedge.
Carex virescens Sedge.
Carex staminea Sedge.
Carex stricta Sedge.
Carex crinita Sedge.
Carex aurea Sedge.
Carex Crawei Sedge.
Carex stricta var *decora* Sedge.
Carex granularis Sedge.
Carex gracillima Sedge.
Carex plantaginea Sedge.
Carex Careyana Sedge.
Carex laxiflora var *patulifolia* Sedge.
Carex eburnea Sedge.
Carex pedunculata Sedge.
Carex Pennsylvanica Sedge.
Carex flava Sedge.
Carex Oederi Sedge.
Carex intumescens Sedge.
Carex Grayii Sedge.
Carex lupulina Sedge.
Carex Tuckermani Sedge.
Carex tribuloides Sedge.
Carex triceps Sedge.
Carex Backii Sedge.
Carex Deweyi Sedge.
Carex olgiocarpa Sedge.
Carex scabrata Sedge.
Carex digitalis Sedge.
Carex arctata Sedge.
Carex platyphylla Sedge.
Carex Muhlenbergia Sedge.
Carex Mexicana Sedge.

Order 129. GRAMINEÆ.—Grass Family

SPARTINA.

Spartina cynosuroides Cord or marsh grass.

LEERSIA.

Leersia oryzoides Rice cut grass.

ALOPECURUS.

Alopecurus aristulatus Foxtail grass.

PHLEUM.

Phleum pratense Timothy.

SPOROBOLUS.

Sporobolus vaginiflorus Rush grass.

AGROSTIS.

Agrostis perennans Thin grass.

Agrostis scabra Hair grass.

Agrostis vulgaris Red top.

Agrostis alba White rent grass.

CINNA.

Cinna pendula Wood reed grass.

MUHLENBERGIA.

Muhlenbergia sylvatic Drop seed grass.

Muhlenbergia Willdenovii Drop seed grass.

ORYZOPSIS.

Oryzopsis asperifolia Mountain rice.

CYNOSURUS.

Cynosurus cristatus Dog's-tail grass.

DACTYLIS.

Dactylis glomerata Orchard grass.

GLYCERIA.

Glyceria nervata Fowl meadow grass.

Glyceria fluitans Fowl meadow grass.

Glyceria grandis Reed meadow grass.

POA.

Poa compressa Wire grass.

Poa serotina False red top.

Poa pratensis Meadow grass.

Poa debilis Weak meadow grass.

FESTUCA.

Festuca elatior Meadow fescue.
Festuca nutans Fescue.

BROMUS.

Bromus secalinus Cheat or chess.
Bromus ciliatus Brome grass.

LOLIUM.

Lolium perenne Darnel or rye grass.
Lolium temulentum Bearded darnell.

HORDEUM.

Hordeum jubatum Squirrel-tail grass.

ELYMUS.

Elymus Virginicus Lyme grass.
Elymus Canadensis Lyme grass.
Elymus striatus Lyme grass.
Elymus sativa Lyme grass.

CHRYSOPOGON.

Chrysopogon nutans Wood grass.

ASPRELLA.

Asprella hystrix Bottle brush grass.

DANTHONIA.

Danthonia spicata Wild oat grass.

DESCHAMPSIA.

Deschampsia cæspitosa Hair grass.

HOLCUS.

Holcus lanatus Velvet grass.

ANTHOXANTHUM.

Anthoxanthum odoratum Sweet vernal grass.

PANICUM.

<i>Panicum sanguinale</i>	Crab grass.
<i>Panicum capillare</i>	Old witch grass.
<i>Panicum latifolium</i>	Panic grass.
<i>Panicum dichotomum</i>	Panic grass.
<i>Panicum Crus-galli</i>	Barnyard grass.
<i>Panicum depauperatum</i>	Panic grass.
<i>Panicum zanthophysum</i>	Panic grass.

SETARIA.

<i>Setaria viridis</i>	Green foxtail grass.
<i>Setaria Italica</i>	Millet.

ANDROPOGON.

<i>Andropogon provincialis</i>	Beard grass.
<i>Andropogon scoparius</i>	Beard grass.

AGROPYRUM.

<i>Agropyrum caninum</i>	Spear grass.
<i>Agropyrum repens</i>	Couch grass.

Order 130. Equisetaceæ.—Horsetail Family.

EQUISETUM.

<i>Equisetum arvense</i>	Common horsetail.
<i>Equisetum pratense</i>	Meadow horsetail.
<i>Equisetum palustre</i>	Water horsetail.
<i>Equisetum limosum</i>	River horsetail.
<i>Equisetum hyemale</i>	Scouring rush.
<i>Equisetum variegatum</i>	Variegated horsetail.
<i>Equisetum scirpoides</i>	Little horsetail.

Order 131. Filices.—Ferns.

POLYPODIUM.

<i>Polypodium vulgare</i>	Polypody.
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ADIANTUM.

<i>Adiantum pedatum</i>	Maidenhair.
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PTERIS.

<i>Pteris aquilina</i>	Common brake.
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 PELLÆA.

- Pellæa gracilis Cliff brake.
 Pellæa atropurpurea Cliff brake.

ASPLENIUM.

- Asplenium Trichomanes Spleenwort.
 Asplenium angustifolium Spleenwort.
 Asplenium thelypteroides Spleenwort.
 Asplenium Filix fœmina Spleenwort.

SCOLOPENDRIUM

- Scolopendrium vulgare Hart's-tongue.

CAMPTOSORUS.

- Camptosorus rhizophyllus Walking leaf.

PHEGopteris.

- Phegopteris polypodioides Beech fern.
 Phegopteris Dryopteris.

ASPIDIUM.

- Aspidium Thelypteris Shield fern.
 Aspidium Noveboracense.
 Aspidium spinulosum.
 Aspidium spinulosum var intermedium.
 Aspidium spinulosum var dilatatum.
 Aspidium cristatum var Clintonianum.
 Aspidium Goldianum.
 Aspidium Filix mas.
 Aspidium marginale.
 Aspidium acrostichoides.
 Aspidium acrostichoides var incisum.
 Aspidium aculeatum.

CYSTOPTERIS.

- Cystopteris bulbifera Bladder fern.
 Cystopteris fragilis Bladder fern.

STRUTHIOPTERIS.

- Struthiopteris Germanica Ostrich fern.

ONOCLEA.

- Onoclea sensibilis Sensitive fern.

OSMUNDA.

- Osmunda regalis* Flowering royal fern.
Osmunda Claytoniana
Osmunda cinnamomea Cinnamon fern.

LOMARIA.

- Lomaria spicant* Deer fern. .

Order 132. OPHIOGLOSSACEÆ.—Adder's Tongue Family.

BOTRYCHIUM.

- Botrychium Lunaria* (Grape fern)..... Moonwort.
Botrychium lanceolatum.
Botrychium Virginianum.
Botrychium lunaroides.
Botrychium lunaroides var *obliquum*.
Botrychium matricariæfolium.
Botrychium lunaroides, var *dissectum*.

Order 133. LYCOPODIACEÆ —Club Moss Family.

LYCOPodium.

- Lycopodium annotinum* Club moss.
Lycopodium lucidulum Club moss.
Lycopodium complanatum Club moss.

Order 134.—SELAGINELLACEÆ.

SELAGINELLA.

- Selaginella apus*.

CHARA.

- Chara fragilis* Chara.

Order 137. JUNGERMANNIACEÆ.—Scale Mosses.

FRULLANIA.

- Frullania eboracensis*.

RADULA.

- Radula complanata*.

PORELLA.

Porella platyphylla.

PTILIDIUM.

Ptilidium ciliare.

TRICHOCOLEA.

Trichocolea tomentella.

LEPIDOZIA.

Lepidozia reptans.

BLEPHAROSTOMA.

Blepharostoma trichophyllum.

CEPHALOZIA.

Cephalozia multiflora.

KANTIA.

Kantia Trichomanis.

PLAGIOCHILA.

Plagiochila porelloides.

JUNGERMANNIA.

Jungermannia oschraderi.

Jungermannia barbata.

Order 139. MARCHANTIACEÆ.—Liverworts.

MARCHANTIA.

Marchantia polymorpha.

PREISSIA.

Preissia hemisphærica.

FEGATELLA.

Fegatella (conocephalus) conica.

MUSCI.—Mosses.

HYPNUM.

Hypnum Alleghaniense.
Hypnum chrysophyllum.
Hypnum curvifolium.
Hypnum dissitifolium.
Hypnum haldan'anum.
Hypnum imponens.
Hypnum lætum.
Hypnum rivulare.
Hypnum rutabulum.
Hypnum salebrosum.
Hypnum serpens.
Hypnum splendens.
Hypnum stellatum.
Hypnum strigosum.
Hypnum subcompactum.
Hypnum trignetrum.
Hypnum uncinatum.

MNIUM.

Mnium affine.
Mnium cuspidatum.
Mnium Niagaræ.
Mnium punctatum.

POLYTRICHUM.

Polytrichum juniperinum.

EUTODON.

Eutodon cladorrhizans.
Eutodon seductrix.

SPHAGNUM.

Sphagnum cymbifolium.
Sphagnum acutifolium.

WEBERA

Webera annotina.
Webera albicans.
Webera nutans.

FUNARIA.

Funaria hygrometrica.

 PHILONOTIS.

Philonotis fontana.

ANOMODON.

Anomodon rostratus.
 Anomodon obtusifolius.
 Anomodon attenuatus.
 Anomodon apiculatus.
 Anomodon viticulosus.

CERATODON.

Ceratodon purpurens.

BRYUM.

Bryum bimum.
 Bryum argenteum.
 Bryum atropurium.
 Bryum caespitium.
 Bryum intermedium.
 Bryum Ontariense.

BARTRAMIA.

Bartramia pomiformis.
 Bartramia oederiana.

DESMATODON.

Desmatodon porteri.

BARBULA.

Barbula convoluta.
 Barbula recurvifolia.
 Barbula rigida.
 Barbula ruralis.
 Barbula tortuosa.
 Barbula unguiculata.

LEPTOBIGUM.

Leptobigum pyriforma.

GRIMMIA.

Grimmia apocarpa.
 Grimmia Pennsylvanica.

HEDWIGIA.

Hedwigia ciliata.

PELYCHOMITRIUM.

Pelychomitrium incurvum.

DRUMMONDIA.

Drummondia clavellata.

ORTHOTRICHUM.

Orthotrichum obtusifolium.

Orthotrichum speciosum.

Orthotrichum strangulatum.

NECKERA.

Neckera pennata.

LEPTODON.

Leptodon trichomitron.

PYLAISIA.

Pylaisia heteromalla.

Pylaisia intricata.

Pylaisia polyantha.

LEUCOBRYUM.

Leucobryum vulgare.

DIDYMODON.

Didymodon luridus.

Didymodon rubellus.

AULACOMNIUM.

Aulacomnium heterostichum.

Aulacomnium palustre.

THUIDIUM,

Thuidium abietinum

Thuidium delicatulum.

Thuidium recognitum.

SELIGERIA.

Seligeria recurvata.

PLAGIOTHECIUM.

Plagiothecium denticulatum.

DICRANELLA.

Dicranella heteromalla.

FISSIDENS.

Fissidens adiantoides.

Fissidens deciprens.

Fissidens grandifrons.

ATRICHUM.

Atrichum undulatum.

GYMNOSTORUM.

Gymnostorum calarens.

Gymnostorum curvirostrum.

Gymnostorum rupestre.

CLIMACIUM.

Climacium Americanum.

DICRANUM.

Dicranum flagellare.

Dicranum fuloum.

Dicranum fusciscens.

Dicranum montanum.

Dicranum scoparium.

LICHENS.

Ramalina calicaris, var *farmacea*.

Ramalina calicaris, var *fraxinea*.

Ramalina calicaris, var *fastigiata*.

Ramalina calicaris, var *parniacea*.

Alectoria jubata, var *chalybeiformis*.

Evernia prunastri.

Usnea barbata, var *hista*.

Theloschistes chrysophthalmus.

Theloschistes lychnus.

Theloschistes polycarpus.

Physcia ciliaris.

Physcia hispida.

Physcia hypoleuca.

Physcia oxina.

Physcia pulverulenta.

Physcia speciviva.

Physcia stelleris.

Cladonia cristatella.

Cladonia fimbriata.

Cladonia furcata.

Cladonia furcata, var *racemosa*.

Cladonia gracilis, var *hybrida*.

Cladonia pixidata.

Cladonia pyridata.

Cladonia rangiferina.

Pettigera aphthosa.

Sticta amplissima.

Sticta pulmonaria.

Leptogium tremelloides.

Leptogium pulchellum.

Parmelia caperata.

Parmelia olivacea, var *sorediata*.

Parmelia plysodes.

Parmelia saratitis, var *sulcata*.

Cetraria ciliaris.

Placodium corinum.

Lucanora subfusea.

Pannaria langinosa.

Brachythecium acuminatum.

Thamnum Alleghaniense.

Barbula tornosa.
